This booklet is based on the outcomes of the International Expert Workshop “Sector-Specific Approaches for Communication of Life Cycle Information to different Stakeholders”, which was held at the Escola Superior de Comerç Internacional, Barcelona, in September 2005, as well as those from the follow-up workshop “Sustainability Communication in the Building Sector in different World Regions – Connecting Life Cycle Information with Market Impacts”, which was held in Stuttgart in December 2006. Both meetings were organized by the Task Force on Communication of Life Cycle Information of the UNEP/SETAC Life Cycle Initiative.

The text provides a comprehensive overview of the state of the art in Environmental Product Information Systems (EPIS) in the construction and energy sectors. In particular, it contains valuable information on type III Eco-labelling, including an updated discussion of the main existing programmes in this field worldwide, including European, Asian and South American ones. All of the original presentations delivered at the 2005 workshop are also included in the booklet as an appendix.
About the UNEP Division of Technology, Industry and Economics

The UNEP Division of Technology, Industry and Economics (DTIE) helps governments, local authorities and decision-makers in business and industry to develop and implement policies and practices focusing on sustainable development.

The Division works to promote:
> sustainable consumption and production,
> the efficient use of renewable energy,
> adequate management of chemicals,
> the integration of environmental costs in development policies.

The Office of the Director, located in Paris, coordinates activities through:

> The International Environmental Technology Centre - IETC (Osaka, Shiga), which implements integrated waste, water and disaster management programmes, focusing in particular on Asia.
> Sustainable Consumption and Production (Paris), which promotes sustainable consumption and production patterns as a contribution to human development through global markets.
> Chemicals (Geneva), which catalyzes global actions to bring about the sound management of chemicals and the improvement of chemical safety worldwide.
> Energy (Paris), which fosters energy and transport policies for sustainable development and encourages investment in renewable energy and energy efficiency.
> OzonAction (Paris), which supports the phase-out of ozone depleting substances in developing countries and countries with economies in transition to ensure implementation of the Montreal Protocol.
> Economics and Trade (Geneva), which helps countries to integrate environmental considerations into economic and trade policies, and works with the finance sector to incorporate sustainable development policies.

UNEP DTIE activities focus on raising awareness, improving the transfer of knowledge and information, fostering technological cooperation and partnerships, and implementing international conventions and agreements.

For more information, see www.unep.fr
COMMUNICATION OF LIFE CYCLE INFORMATION IN THE BUILDING AND ENERGY SECTORS

October 2008
Report on the International Expert Workshop
“Sector-Specific Approaches for Communication of Life Cycle Information to different Stakeholders”
held in Escola Superior de Comerç Internacional, Barcelona, 8th September 2005, organized by the
Task Force on Communication of Life Cycle Information of the UNEP/SETAC Life Cycle Initiative
The edition of this report has been funded by the Ministry of Environment of the Government of Catalonia

Title
Communication of Life Cycle Information in the Building and Energy Sectors

Authors
Pere Fullana
Escola Superior de Comerç Internacional, Barcelona, Spain

Paolo Frankl
Ecobilancio Italia/Ambiente Italia, Rome, Italy\(^1\)

Johannes Kreissig
PE International, Stuttgart, Germany

Contributions
Steve Baer
Armstrong World Industries, USA

Birgit Bodlund
Vattenfall, Sweden

Udo Jesle
Forschungszentrum Karlsruhe, Germany

Mark Johnson
British Energy, United Kingdom

Denis Le Boulch
Électricité de France, France

Fritz Moedinger
Gasser, Italy

Timothy Smith
University of Minnesota, USA

Cristina Gazulla
Escola Superior de Comerç Internacional, Barcelona, Spain

Emanuela Menichetti
Ecobilancio Italia, Rome, Italy, and University of St. Gallen, Switzerland\(^2\)

Frieder Rubik
Institut für ökologische Wirtschaftsforschung (IÖW), Heidelberg, Germany

Gianluca Donato
ASBB Group Service Center, Italy

Deborah Dunning
International Design Center for the Environment, USA

Annik Magerholm
Fet Norwegian University of Sci. and Technology, Norway

Jeppe Frydendal
LCA Center Denmark, Denmark

Sébastien Humbert
University of California Berkeley, USA

Shpresia Kotaji
Huntman, Belgium

Chee Norianis
JEMAI, Japan

Krstian Steel
BRE, United Kingdom

Chris van Rossum
Lund University

Supervision, technical editing and support
Marco Raugei
Escola Superior de Comerç Internacional, Barcelona, Spain

Sonia Valdivia
UNEP DTIE

Guido Sonnemann
UNEP DTIE

Bas de Leeuw
UNEP DTIE

Acknowledgments
The authors wish to acknowledge the financial support of Vattenfall AB Generation and Escola Superior de Comerç Internacional for the workshop organisation and of the Ministry of Environment and Housing of the Catalan Government for the edition of this report.

We also want to thank all the experts who participated in the discussion during the workshop in Barcelona for their kind contributions, especially those who prepared a presentation.

We thank all the experts who sent written contributions for their very valuable review and input. Moreover, we thank the group of reviewers who contributed to the final review process set up by the Secretariat of the Life Cycle Initiative at the Sustainable Consumption and Production (SCP) Branch of UNEP:

Sonia Valdivia
UNEP DTIE

Eva Schmincke
FivWinds International, Germany

Rolf Wuestenhagen
University of St. Gallen, Switzerland

Paolo Masoni
ENEA, Italy

Ning Yu
Environment and Development Foundation, Taiwan (PROC)

Joyce Cooper
University of Washington, USA

Finally, we would like to thank the local organizing committee of the 2nd expert workshop on “Sustainability Communication in the Building Sector in different World Regions – Connecting Life Cycle Information with Market Impacts”, which was held at the University of Stuttgart, Germany, on 6th December, 2006:

Anna Braune

Cecilia Makishi

Michael Held

All from the University of Stuttgart, Lehrstuhl fuer Bauphysik, Abteilung Ganzheitliche Bilanzierung.
Table of contents

Preface 7

1 Introduction 8

1.1 Objective and structure of the Report 8

1.2 Integrated Product Policy and Communication of Life Cycle Information 9

1.3 The UNEP-SETAC Life Cycle Initiative 10

1.4 Environmental Product Information Schemes 11

1.4.1 Definitions, existing standards and references 11

1.4.2 Existing “classical” programmes worldwide (ISO type I labels) 12

1.4.3 A more recent communication tool: Environmental Product Declarations (ISO type III) 13

2 Environmental product information schemes in the building and energy sectors 15

2.1 Introductory remarks 15

2.2 Sector-specific approaches 16

2.3 The Building and Construction Sector 17

2.3.1 ISO-type I ecolabels 17

2.3.2 ISO-type II environmental claims 19

2.3.3 ISO-type III Environmental Product Declarations 20

2.3.4 Other quantitative declarations 28

2.3.5 Environmental Assessment of Buildings 29

2.4 The Energy Sector 35

2.4.1 ISO-type I ecolabels 35

2.4.2 ISO-type II environmental claims (green electricity marketing) 36

2.4.3 ISO-type I-like guarantee labels (green electricity marketing) 37

2.4.4 ISO-type III environmental declarations 38

3 The International Expert UNEP/SETAC Workshop in Barcelona 40

3.1 Objectives 40

3.2 Summary of presentations 41

3.2.1 LCA information in marketing communications: addressing communication effectiveness in the building materials industries (Timothy Smith) 41

3.2.2 ISO-type III standardization activities in the building sector (Johannes Kreissig) 42

3.2.3 The experience in the US building sector (Steve Baer) 44

3.2.4 EPO as a credible communication tool for sustainable clay brick products (Fritz Moedinger) 45

3.2.5 The user needs – The German experience (Udo Jeske) 46

3.2.6 The experience at Vattenfall (Birgit Boldlund) 48

3.2.7 The experience at British Energy (Mark Johnson) 49

3.2.8 The experience at Electricité de France (Denis Le Boulch) 50

3.3 Discussion 52

3.3.1 Effectiveness for change? 52

3.3.2 Credibility 52

3.3.3 Role and limits of EPD 53

3.3.4 User needs and life cycle information for change 56

3.3.5 Next steps 56

3.4 Conclusions and Future Research Areas 57

3.4.1 Main Conclusions 57

3.4.2 Needs for future research 62

3.4.3 Preliminary results from the 2nd Expert Workshop “Sustainability Communication in the Building Sector in different World Regions – Connecting Life Cycle Information with Market Impacts” 64

4 Recommendations 65

5 References 68

Annex 1 - List of workshop participants 71

Annex 2 - Workshop full presentations 73
In developed societies like our own, there still linger some individual and collective habits stemming from an erroneous environmental conception of progress and well-being.

This conception translates into accelerated consumption of raw materials and non-renewable and scarce resources, like fossil energy resources and water; generation of large amounts of wastes which are harder and harder to manage; and mobility habits that impair air quality and, year by year, increase the greenhouse effect which is responsible for climate change.

In this century, an extraordinarily complex transformation is bound to occur, which will bring about gradual but inexorable change in the development model that we have been following till now. We will move from growth based on production and consumption patterns characterized by little to no respect for the environment, to a new growth model that will harmonize quality of life with economic activity, and preserve future generations’ rights on natural patrimony.

Experts from all over the world agree that only this new growth model, known as sustainable development, will be able to ensure the long term well-being of the world’s citizens and nations.

For that reason, the governments of the most developed countries have taken this change of model as a challenge, and consider promoting public consent in order to implement sustainability strategies in this first third of our century to be an unavoidable goal. The European Union has recently expressed this will most clearly in the Communication “on the Sustainable Consumption and Production and Sustainable Industrial Policy Action Plan (2008)”.

The widespread availability of high quality information is crucial to the accomplishment of this goal. Workshops like the one organized in Barcelona in September 2005 are to be considered a fundamental tool in this sense. In this book, comprehensive information on the results of that workshop can be found, as well as additional complementary data.

Many initiatives have been developed in the Department of Environment and Housing of Catalonia since 2005, but one in particular may be singled out as especially relevant to the objectives of this book: the setting up of an environmental product declaration programme (type III eco-labelling according to ISO nomenclature) for the building sector, which will complement the activities in terms of type I eco-labelling that are already being carried out in Catalonia since the 1990’s through the “Distintiu de Garantia de Qualitat Ambiental” (the Catalan Environmental Quality Label) and the EU-flower. The programme follows the ISO and CEN guidelines to be compatible with other similar ones from around the world, and is born with the aim of sparking the development of type III eco-labelling all over Spain. It also receives support from both the industrial sector and professional organizations, and thus we are sure that it will be a useful tool for the building sector (a cornerstone of our country’s economy and environment) to be able to place itself within the framework of sustainability.

Last but not least, I would like to acknowledge the effort and commitment of all those who made this publication possible. In particular, I am grateful for having had the opportunity to take part in the UNEP-SETAC Life Cycle Initiative, within the Life Cycle Management Programme, which aims at fostering the application of life cycle approaches and life cycle thinking in business practices and political decision making. This initiative by UNEP and SETAC responds to the exhortation made by various countries in the Malmö Declaration (2000) to create a life cycle economy. Let us hope that this book and those activities which, in this sense, we are developing in our country make a substantial contribution to the practical application of such a wise concept.

Francesc Baltasar i Albesa
Minister of the Environment and Housing
Government of Catalonia
1 Introduction

1.1 Objective and structure of the Report

The objective of this report is manifold. Initially it started as proceedings of the International Expert Workshop “Sector-Specific Approaches for Communication of Life Cycle Information to different Stakeholders” held in Escola Superior de Comerç Internacional, Barcelona, September 8th 2005, and organized by the Task Force on Communication of Life Cycle Information of the UNEP/SETAC® Life Cycle Initiative. To fulfill this goal, summaries of all presentations have been written and presented in Chapter 3. Moreover, sections on the discussion generated after the presentations and on the reached conclusions and recommendations for future work are also included in this chapter. Full presentations can be found in Annex 2.

The Barcelona workshop was intended to collect experiences and generate discussion from experts from all over the world and to focus on two industrial sectors: construction and energy. The results were found geographically representative and of very good quality. Therefore, it was thought to expand the document.

The report now provides a comprehensive overview and the state-of-the art of Environmental Product Information Systems (EPIS) in the two studied sectors. Background information about the three ISO types for EPIS is given in Chapter 1. This is followed by Chapter 2, a quite comprehensive descriptive inventory of EPIS in the building and energy sectors worldwide. More specific effort has been given to finding information on the less studied type III ecoclabelling, i.e. environmental product declarations (EPD). This review reports the main existing experiences, which are mostly found in developed economies, especially in Europe and in Japan, South-Korea and Taiwan. However, it also looks at emerging economies, i.e. focusing particularly on the significant experience accumulated in China.

Chapter 3 summarizes the presentations given in Barcelona and draws the main conclusions, based both on the review of EPIS and the discussion at the expert workshop. The report finishes with a set of recommendations to different stakeholders on how to improve the use of life cycle information in those industrial sectors.

However, the work is not finished here. Several discussion points were left open, especially in relation to market aspects. Some of these pending issues were the focus of discussion of the follow up workshop held in Stuttgart in December 2006, with the title: “Sustainability Communication in the Building Sector in different World Regions – Connecting Life Cycle Information with Market Impacts”. This second expert meeting also had an increasing focus on emerging economies, in particular China. Preliminary results of this second workshop are included in the present report as well.

1.2 Integrated Product Policy and Communication of Life Cycle Information

In the last 15 years, a topic appeared on the environmental policy and research agenda – non-sustainable production and consumption patterns in modern societies. Political authorities, researchers, and business and civil society stakeholders became aware of a long-time underestimated environmental challenge – the challenge to cope systematically with environmental problems caused by products and services. Of course, challenging the “consumption society” in industrialized worlds had been a key issue among more radical environmentalists during the 1970s. Currently, it seems that production and consumption issues enter political and policy of societies. Sustainable consumption and production patterns (SCP) have become an issue since the Johannesburg summit of 2002. The so-called Marakach process set out to look for answers with regard to this huge challenge.

One aspect of SCP refers to products. As a new paradigm of which the elaboration started during the 1990s, the concept of Integrated Product Policy (IPP) has been introduced (see for instance Oosterhuis et al. 1996; and Ermst & Young/SPRU 1998). With the focus on improving the environmental performance of products and services along the whole life-cycle, IPP combines integration, communication and co-operation as leading principles. IPP can be seen as a long-term framework strategy implying continuous learning processes among policy-makers and civil society actors, among businesses and consumers and among stakeholders and stakeholders. On its way to eco-efficient products and services, IPP emphasizes market-based and multi-stakeholder approaches. The focus on products, their life cycles and the crucial role of communication is rapidly increasing among policy-makers. Information exchange and co-operation between stakeholders are major issues for IPP.

Voluntary market driven tools like ecocertification and EPDs fit very well in this framework, as ecocertification criteria and EPDs product category rules are developed through the involvement of a combination of interested parties. Communication of life cycle information not only helps consumers to know the environmental impacts associated to the manufacturing, use and end-of-life of the products they buy, but it also provides designers with the proper information to develop better products. Furthermore, the process of searching for life cycle information builds new relations among the actors of the supply chain, who can work together much more efficiently (sharing responsibility and networking). The combination of these aspects is expected to produce and diffuse less environmentally harmful products on the market.

Consumer information tools and life cycle analysis are also mentioned in the plan of implementation of the Johannesburg World Summit on Sustainable Development from 2002. They are also relevant elements of the 2003 issued Communication of the European Commission on Integrated Product Policy (CEC COM 2003) that was reflected at the International UN DESA/UNEP Expert Meeting on a 10-Year Framework of Programmes for Sustainable Consumption and Production, convened from 16–19 June 2003, in Marrakech, Morocco.

The present report reviews the availability and use of life cycle communication tools in different countries worldwide, with a specific focus on the sectors of building & construction and energy. It discusses their main characteristics (e.g. in terms of format, criteria, etc.) and their appropriateness and effectiveness in reaching the target audiences. The main providers of Life Cycle Information and/or Environmental Product Information (EPI) are industry and businesses, i.e. the supply side. The latter are motivated by a series of driving forces, which depend on the target audience and which include the communication of EPI to (list not exhaustive):

1. Final private consumers, in order to get competitive advantage in emerging or new green markets.
2. Business clients, either because requested to (this is especially the case of SMEs in the supply chain), or to compete in the business-to-business market arena.
3. Societal stakeholders, to respond to the external pressure from environmental NGOs and consumer associations.
4. Financial stakeholders, who are increasingly attune to the sustainable dimensions of organizations and products.
5. Public administrations, in order to apply to Green Public Procurement (GPP) programmes and/or to obtain tax incentives, whenever applicable.
6. Policy makers, providing credible life cycle information and reference data to support them in better-informed policy decisions and to prevent a misuse of life cycle approach and simplistic green claims, which might be highly misleading.

1.3 The UNEP-SETAC Life Cycle Initiative

The UNEP-SETAC Life Cycle Initiative is a response to the call from governments for a life cycle economy in the Malmö Declaration (2003). It contributes to the 10-year framework of programmes to promote sustainable consumption and production patterns, as requested at the World Summit on Sustainable Development (WSSD) in Johannesburg (2002). The Initiative was officially launched by UNEP’s Executive Director Klaus Toepfer at the start of UNEP’s 7th International High-Level Seminar on Cleaner Production (CP-7), the biennial global forum that looks at progress made in promoting sustainable production and consumption, held in Prague in April 2002.

The Life Cycle Initiative is a joint collaboration between UNEP and SETAC, aiming at helping governments, businesses and consumers to adopt more environmentally friendly policies, practices and life-styles.

The programme’s aim is to put life cycle thinking into practice and improve the supporting tools through better data and indicators, by hosting and facilitating expert groups, and disseminating their work through web-based information systems.

In the Phase 1 of the Initiative (2002-2007), the overall set of activities was split in three main programmes, i.e. on (i) Life Cycle Inventories (LCI), (ii) Life cycle Impact Assessment (LCIA) and (iii) Life Cycle Management. The present report constitutes a main deliverable of the Task Force 3 of the LCM programme, focusing on Communication of Life Cycle Information.

1.4 Environmental Product Information Schemes

1.4.1 Definitions, existing standards and references

The actual landscape of existing voluntary EPI schemes is wide, ranging from voluntary seal-of-approval programmes, single-attribute programmes, hazardous warning programmes, information disclosure programmes, environmental self-declaration by individual firms or test reporting. They can be classified in First-party and third party labelling programmes. First-party verification is performed by producers on their own behalf, to promote the positive attributes of their products on the market. On the contrary, third-party verification is carried out by an independent source that awards labels to products based on certain environmental criteria or assessment procedures.

The International Organisation of Standardisation (ISO), through the technical committee (ISO/TC 207), has done much to structure environmental labelling schemes. Three types of voluntary labels are distinguished:

ISO Type I label schemes are “Voluntary, multiple criteria-based third party programmes that awards a licence authorising the use of environmental labels on products. These indicate the overall environmental preferable of a product within a particular product category based on life cycle considerations. These labels provide qualitative environmental information” (ISO 14024: 1). They are covered by ISO 14024 published in April 1999. Life cycle thinking (but not necessarily LCIA) is explicitly used to set the criteria, which involve multiple environmental indicators. Involvement of interested parties is required and detailed in the standard. Verification is guaranteed by an independent third-party body. These positive feature of Type I environmental labels is that they provide consumers with concise information, which enables them to make quick purchasing decisions.

ISO Type II claims are “self-declared environmental claims made by manufacturers, importers, distributors, retailers, or anyone else likely to benefit from such a claim without independent third-party certification” (ISO 14021: 3). They are covered by ISO 14021 published in 1999. The claims may take the form of statements, symbols or graphics on products or package labels, or in product literature, technical bulletins, advertising, publicity, telemarketing, as well as digital or electronic media, such as the Internet. The relationship with the product life cycle is implicit, and generally weak. Usually, just one life cycle stage is taken into account. Moreover, often just a single environmental criterion is considered. The positive aspect of ISO-type II for industry is quite obviously the high flexibility of the tool. However, the problem of credibility often remains. Many existing labels do not fully satisfy the ISO 14021 requirements and the possibility of misleading claims is a matter of fact. Environmental claims are subject to national legislation and to EC Directives aimed at the protection of consumers.

As defined in ISO 14025, an ISO Type III declaration is an “environmental declaration (claim which indicates the environmental aspects of a product or service) providing quantified environmental data using predetermined parameters and, where relevant, additional environmental information”. The predetermined parameters are based on the ISO 14040 series of standards and the additional environmental information may be quantitative or qualitative. They are covered by the standard ISO 14025, which was published in July 2006, after a long standardization process. ISO-type III declarations are described in more detail in paragraph 1.4.3.

Other relevant EPI schemes are not covered by the ISO standards. They include product certifications, like the Forest Stewardship Council (FSC), the Marine Stewardship Council (MSC), the Oeko-Tex Standard 100, etc. They usually refer to one product group only. Because they are based on some major elements of the ISO type I standard (i.e. third-party verification, multi-criteria based, and partly open stakeholder participation), some authors classify them as “ISO-type I like” labels in literature, as opposed to “classical” ISO-type I labels like the EU-Flower, the Blue Angel in Germany and the White Swan in the Nordic countries (DEEP 2003).

Finally, social labels are relevant to promote sustainable production and consumption patterns. They include for instance the Social Accountability 8000 International Standard (SA 8000), the TransFair and the Fair Trade labels.

---

4. The WSSD plan of implementation states: “We must develop production and consumption policies to improve the products and services provided, while reducing environmental and health impacts, using, where appropriate, science-based approaches, such as life cycle analysis.”

5. The Task Force on Communication of Life Cycle Information (TF00-AT) was chaired by Dr. Paolo Frati and co-chaired by Dr. Pere Fullana.
1.4.2 Existing “classical” programmes worldwide (ISO type I labels)

The German "Blue Angel" was the first official national eco-labelling scheme worldwide, launched in 1978, followed a decade later (1989) by the "Swan" in the Nordic Countries and the "Eco-Mark" in Japan. The majority of national third-party labelling schemes emerged during the late eighties and nineties. At supra-national level, the EU-Flower was introduced in 1992 and had a major regulation revision in 2000. At regional level some schemes have also been introduced, like the Catalan "Distintiu", officially created by the Catalan Government in 1994.

As of 2003, slightly more than the half of the European Union (EU-25) had developed their own national ISO-type I labelling system. This reflects a quite relevant focus of environmental product policy in EU-member countries.

Several other ISO-type I schemes have been developed in other countries at worldwide level (Table 1).

Japan is historically one of the main leading countries worldwide in eco-labelling, together with Germany, the US, Nordic Countries and Canada. Japan is also a founding member of GEN (Global Eco-labelling Network) and it is worth mentioning that the general affairs office of the latter is settled precisely in Japan, at the Japan Environmental Association (JEA), a non-governmental organisation under the guidance and advice of the Environment Agency. The latter has the responsibility for the Administration of the Eco-mark programme. Concerning the programme methodology, the latter was profoundly revised in March 1996 to conform to the draft (at that time) ISO 14024 standards. More specifically, two very important changes were introduced, i.e. a life cycle approach to develop label criteria and consultation with stakeholders and related parties (EPA 1998).

The Green Seal is the only US-wide eco-labelling programme fulfilling the ISO-type I standard. It is awarded by the Green Seal Inc. Current requirements for more than 30 product groups have been formed and accepted by a Stakeholder Committee representing manufacturers, trade associations, governmental agencies, product users, environmental and public interest groups.

In India, the Ministry of Environment (MoEF), Government of India (GoI) initiated a scheme in 1991, which is basically a scheme of labelling the eco-friendly products. An earthen pot has been chosen as the logo for the Ecomark scheme and is awarded to consumer goods, which meet the specified environmental criteria and the quality requirements of Indian Standards. Sixteen categories of products such as soaps and detergents, paper, food items etc. have been covered under the scheme so far (Sharma & Kurani 2003).

In Catalonia, the Ministry of Environment created the “Distintiu de Garantia de Qualitat Ambiental” through the Decree 316/1994. Initially it was used to guarantee the environmental quality of products but, in 1998, it was extended to include services. As environmental matters are part of the exclusive regional jurisdiction in Spain and as national eco-labelling schemes were being promoted in Spain and neighbouring countries, the Catalan Government felt that having its own scheme guided by its own environmental policy would be more adequate for Catalan consumers and producers. Although it has a life cycle perspective, criteria usually focus on reducing resource consumption and minimizing waste.

1.4.3 A more recent communication tool: Environmental Product Declarations (ISO type III)

An ISO-type III environmental declaration is based on a Life Cycle Assessment (LCA) study carried out in accordance with the ISO 14040 series. To be compared with each other, the results of LCA studies must have the same scope, system boundaries, and calculation rules and must be presented in the same format. In an EPD, not just LCA information is presented; other relevant information is also given as agreed in the PCR. This is ensured in an Environmental Declaration Programme, which provides both general and product category-specific prescriptions for data collection, handling and calculation rules. The latter are contained in the product category rules (PCR) i.e., a set of specific rules, requirements, and guidelines for developing Type III environmental declarations for one or more product categories. PCR are approved in a multi-stakeholder open consultation process. Information contained in the declaration gives no criteria for assessment, preference or minimum levels to be met, but the customer can compare products by comparing the quantified results presented in the corresponding type III declarations.

In 2002, the results of a study commissioned by the EC/ DG Environment and carried out by ERM reviewing existing EPD schemes were published (ERM 2002). The study reviewed over-sector initiatives in ten countries, three collaboration initiatives (GEDNet, NIMBUS and Asia), and sector-specific initiatives in the areas of automotive, chemicals, construction, energy & transport, electrical and electronic equipment, food, packaging, pulp & paper, textiles and tourism. In 2003, the study was further updated and expanded within the Task 1 of the EU-LIFE Project INTEND, whose main objective is to develop an EPD scheme at international level (INTEND 2003). Table 2 gives an overview of existing national over-sector EPD programmes and sector-specific initiatives, as of 2006.
## 2 Environmental product information schemes in the building and energy sectors

### 2.1 Introductory remarks

Which tools are used by industry to communicate life cycle information to consumers and other stakeholders in practice? How effective is this information in fostering the production and consumption of more environmentally sound products and services? Is the use of specific communication tools just dependent on target group or also on product groups? This section tries to give a first answer to these questions.

ISO-type I labels are still the EPI tools most widely used by industry and business for their communication to consumers in several countries. As far as these specific communication tools are concerned, an indirect measure of their effectiveness can be provided, in terms of:

1. The number of product groups for which award criteria have been developed.
2. The number of awarded products and firms participating in the scheme, reflecting the adoption by industry and the behaviour (change) of producers.
3. The market shares of eco-labelled goods and services, which are meant to reflect the actual change in behaviour of consumers.

However, ISO-type I labels have a set of important limitations. Therefore industry has also been developing and using other tools to increase the awareness of life cycle environmental impacts of products among consumers and to encourage the latter to be more closely involved in reducing impact via better use of the product. Communication materials include information on packaging, in product catalogues and/or advertising campaigns via internet, media and information brochures.

Another trend to be observed (e.g. in Japan) is the simplification of complex life cycle information into ISO-type II claims, through which the consumers can more easily understand how products are improved in a life cycle perspective. This kind of information is spread out via the web, product catalogues and environmental and sustainability reports.

### Table 2 - Overview of existing national over-sectoral EPD programmes and selected sector-specific initiatives

<table>
<thead>
<tr>
<th>COUNTRIES</th>
<th>NATIONAL SCHEME (Scheme Owner)</th>
<th>SECTORAL SCHEME (Sector)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Europe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Catalonia (Spain)</td>
<td>—</td>
<td>Operated by the technical architects association of Barcelona (CAATB), promoted by the Catalan Government and developed by ESC (construction)</td>
</tr>
<tr>
<td>Denmark</td>
<td>Pilot Project EPD (DEPA – Danish Environmental Protection Agency)</td>
<td>BY og BYG (construction)</td>
</tr>
<tr>
<td>France</td>
<td>Experimental standard on type III environmental declarations (AFNOR - Association Francaise de Normalisation)</td>
<td>FDES (construction)</td>
</tr>
<tr>
<td>Finland</td>
<td>—</td>
<td>RTS (construction), Paper profile</td>
</tr>
<tr>
<td>Germany</td>
<td>—</td>
<td>ALB (construction)</td>
</tr>
<tr>
<td>Italy</td>
<td>Pilot EPD Programme (ANPA 2000-2001) EU-LIFE INTEND Project – Pilot international EPD system (2003-05)</td>
<td>Consortium lead by Comune di Territo (flower cultivation, scheme under development)</td>
</tr>
<tr>
<td>Netherlands</td>
<td>—</td>
<td>MRPI (construction)</td>
</tr>
<tr>
<td>Norway</td>
<td>NHO Type II Project (NHO - Confederation of Norwegian Business and Industry)</td>
<td>Volvo Cars EPDs (automotive) Volvo Trucks EPDs (automotive) IT Eco Declaration (Information technology and telecom) Byggvardeklaration (Construction) Teko Environmental Declarations (Textile)</td>
</tr>
<tr>
<td>Sweden</td>
<td>EPD programme SEMC (Swedish Environmental Management Council, a company jointly owned by the Swedish state, industry and communities) and SWEDAC (the body giving accreditation to certifiers)</td>
<td>Volvo Cars EPDs (automotive) Volvo Trucks EPDs (automotive) IT Eco Declaration (Information technology and telecom) Byggvardeklaration (Construction) Teko Environmental Declarations (Textile)</td>
</tr>
<tr>
<td>Switzerland</td>
<td>—</td>
<td>SIA (construction)</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>—</td>
<td>BRE Environmental Profiles (construction)</td>
</tr>
<tr>
<td>Extra-Europe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>EPDS – Environmental Profile Data Sheet (FPAC – Forest Product Association of Canada, in cooperation with Terrachoice)</td>
<td>—</td>
</tr>
<tr>
<td>Japan</td>
<td>ECOS-LEAF (JEMAI - Japan Environmental Management Association for Industry)</td>
<td>—</td>
</tr>
<tr>
<td>South Korea</td>
<td>EDP program (MoE – Ministry for the Environment)</td>
<td>—</td>
</tr>
<tr>
<td>USA</td>
<td>CEP – Certified Eco-Profile Programme (SCS – Scientific Certification Systems)</td>
<td>AISI Code of Conduct (household laundry detergents)</td>
</tr>
<tr>
<td>No State Based</td>
<td>—</td>
<td>NNI “better-best” (textile)</td>
</tr>
</tbody>
</table>

Table 2 - Overview of existing national over-sectoral EPD programmes and selected sector-specific initiatives Source: Adapted and updated from INTEND (2005), ERM (2002).
2.2 Sector-specific approaches

Which Environmental Product Information Schemes (EPIS) and other tools are currently mostly used for communication with consumers and other stakeholders? What is the format and channel of information used for different stakeholders? How effective is this information in fostering the production and consumption of more environmentally sound products and services? These and other questions are addressed by the work of the Task Force on Communication of Life Cycle Information within the UNEP/SETAC Life Cycle Initiative. A recent review carried out by the Task Force shows that industry and businesses are developing their own toolboxes to provide environmental information on products to their stakeholders. A variety of communication tools are used in everyday business practice. They include ISO-type I ecolabels, ISO-type II self-declared environmental claims, ISO-type III environmental declarations, but also other communication tools, such as advertising and product catalogues, information campaigns, environmental and sustainability reports and information brochures.

This is for example the case of Sweden's Byggvarudeklarationen, a Building Product Declaration which doesn't really fall under the ISO Type I, II, or III. There are somewhere between 4,000-7,000 of these declarations on the market, which represents a very high penetration. However, research has shown that although there is a general uptake of this declaration on the supply side, when requested by purchasers it is very uncertain how the information is influencing the purchasing decision. There may also be issues with how often this information is updated by companies as well as its accuracy or even relevance. Many contractors simply ask for declaration of the products that they are purchasing and assemble them in a binder that would be given to the client when the project is complete. The type of information presented in the label does address most life cycle stages, but does not present impacts.

One branch of the building sector in Sweden (water, heating and ventilation) developed two tools (although never released to the public) to assist information users (consumers). The first is an interpretative tool for users to better understand the information presented in the declaration and the environmental significance. The second is a decision making tool to assist users when choosing between potential suppliers of components. Overall it can be said that different communication tools are used in function of the target stakeholders, i.e. final consumers, business clients, financial stakeholders, public administrations, policy makers, NGO's and others. Moreover, the review reveals that industry and businesses have been increasingly using a combination of tools for communication with stakeholders. For instance, some companies carry out ISO-type III declarations on their products but at the same time use simplified communication to consumers and/or public administrators.

There is evidence that the specific EPS and/or communication tools used do not just depend on the target-group receiving the information but also on the industry sector and product group. This is quite logical, because each sector and product group has its own specific requirements in terms of environmental issues and communication needs.

Taking this into account, the Task Force on Communication of Life Cycle Information has taken a working approach, which aims at:

1. Focusing on specific sectors and product categories.
2. Involving industry and other stakeholders.
3. Identifying success stories.
4. Assessing the transferability of results.

The first step of this work process was the organisation of an expert workshop in Barcelona in September 2005, which focused on the building/construction and energy sectors, followed by a workshop in Stuttgart narrowed to the construction sector. These are two crucial sectors of our society, because at the same time they are very relevant in socio-economic terms, have significant environmental impacts and present a large potential for improvement. Moreover, several companies in both sectors are very active in the development and use of different EPIS for communication to stakeholders.

Table 3 summarises the indicators: number of product groups, participating firms and awarded products for the main existing ISO-type I labelling schemes in different countries.

As shown in Table 3, the ecolabel scheme with the largest number of awarded products (21,000) is by far the China Environmental Labelling programme, operated by China Environmental United Certification Center Co., Ltd (CEC). The second country in terms of ecolabelled products (the first in terms of awarded firms) is Japan, with more than 5,000 products. It is followed by South Korea, Taiwan and Germany, which record quite high figures of ecolabelled products under their schemes. As far as the EU-Flower is concerned, absolute figures of awards are much lower, but rapidly increasing.
increasing. The number of companies using the label was 37 in March 2000 (ERM 2002), 59 in January 2001 (Rubik & Scholl 2002), 128 at the end of 2002, 185 as of June 2004 and 309 by October 2006, corresponding to an increase by a factor ten in six years. Acceleration is particularly strong in specific countries (e.g. Italy, France and Denmark, but also Catalonia). The case of Catalo-

nism is of special interest, given the very high number of labelled products with the regional scheme DGQA plus the strong acceleration in the EU-Flower scheme. This is a remarkable result for a small country.

The schemes in operation are in most cases “de-

pendent” on only a small number of product catego-

ries. Most important product areas are paper products, paints, durable office equipment and some products ad-

ressing national/regional characteristics (e.g. products for water-saving, tourism, flower arrangements, bags, or-

ganisers, food, cat litter, and recycled plastic products).

Very clearly, the diffusion and effectiveness of ISO-type I labels are not only dependent on countries but also on product groups and/or product group “families”.

As far as the product category group “Building and construction” is specifically addressed, China, Germany and South Korea take the lead in terms of product cat-

ey groups, participating firms and eco-labelled prod-

ucts. Germany and South Korea are also the only two coun-

tries – together with Catalonia – for which a complete statistics of awarded products and participating firms are available. In fact, in general publicly available information is very limited, with particular respect to the number of eco-labelled products for a specific industry sector.

Going deeper into the analysis of data per single country, it is possible to see how in Germany the Build-

ing and construction category group comprises 13 dif-

ferent product categories. Among them, varnishes and paints show the highest number of eco-labelled products. Within the Dutch eco-label system (Milieukeur), 7 product categories have been established, and 22 com-

panies have applied for the eco-label. Unfortunately, no information is available on the number of products.

Finally, the EU-Flower has two product groups es-

tablished in the Building and construction area: Hard floor coverings, and paints and varnishes. Totally, 61 firms have applied, corresponding to approximately 20% of total firms participating in the scheme. How-

ever, the same lack of data applies with respect to the number of awarded products.

Outside the EU, the most successful schemes with respect to the Building and construction category group are in China, South Korea and Taiwan.

In the China Environmental Labelling programme, 12 product categories within the Building and construction group have been established. Due to the high concerns on in-door air quality, some of them are very popular on the market. For example, about 300 firms producing wa-

ter-based paints are awarded, which is the biggest prod-

uct category in this programme. Unfortunately, complete information on the Building and construction sector is not available. Although the information of awarded products and involved firms is available month-by-month from the website, Product-by-product statistics are not easy to access. More information can be found from http://www.sepacec.com/cecen/labelling/.

As far as South Korea is concerned, 11 product cat-

ey groups have been established, for a total number of 250 participating firms and 860 awarded products. Looking at the total number of eco-labelled products it can be inferred that the share retained by the building sector is 21%.

7. Water Based Coatings, Adhesives Free Building Materials, Adhesives, Poro-

ysis Foamed Building Materials, Wood Based Flour and Finishing Prod-


In the Taiwanese Green Mark Program, there are 13 product groups which contain a total of 105 product categories. The “construction materials” group is one of the 13 groups and has 9 product categories. More details and updated information can be found at http://

Unfortunately, complete information was not avail-

able for other non-European ecolabel schemes at the

time of writing. Nevertheless, it is worth noticing that at least a product category group Building and construc-

tion exists in the two remaining listed non-European countries (Brazil and India).

More updated information of Type I ecolabeling pro-

grammes can be found on-line on the Global Ecolabel-


2.3.2 ISO-type II environmental claims

Environmental claims

A relevant example of the use of ISO-type II environ-

mental claims is provided by BASF. The latter has de vel-

oped a new label for products that have been evaluated through an Eco-Efficiency Analysis. The awarding of the label is dependent on specific requirements. For exam-

ple, a third party evaluation (critical review) of the eco-

efficiency analysis is requested. In addition, the results of the analysis have to be published on the Internet. The label is allowed to be used for three years. After that period, a revision of the analysis is required in order to cover market developments and product diversity.

More specifically, the procedure for the awarding of the label is based on the following steps:

1. Accomplished Eco-Efficiency Analysis accord-

ing to the methodology certified by TÜV Rhein-

land / Berlin-Brandenburg, Germany.

2. Verification of the investigated product to be more eco-efficient for the defined customer benefit than other alternatives as result of the analysis.

3. Presentation of a third party evaluation (so-called Critical Review according ISO 14040 ft.).

4. Publication of the results via internet on website www.oeea.de, which is referred to on the label.

5. Payment of the licence fee for the duration of three years.

The following products have been granted the label so far:

1. Styrodur in Pitched Roof Insulation above Parter (Northern Italy).

Figure 1 – Example of environmental claim at BASF

2. Incosol 400 Fotopur® - Electronic Chemicals - Systems®

3. Acid quench with the ionic liquid BASIL®

4. Astasaxanthin for Salmon Production

5. Propylene Carbonate as Solvent in Wire Coat-

ings

6. Ibufroxen Production

7. Automotive Refinish Primers for Small Surface Damage Repair

8. Injection Moulding with Ultradur® High Speed
As it is possible to see from the list, one product pertains to the Building and construction sector.

The eco-label system developed by BASF can actually be considered an “ISO-type II and a half” tool, since it requires a third party verification according to pre-determined standards, and a quite detailed and complete declaration. As an example, the one issued for roof insulation can easily be considered an “ISO-type II and a half” tool, since it is a general system open to all countries.

As mentioned, there are cross-sector EPD programmes with declarations of building and construction products and sector-specific programmes.

2.3.3 ISO-type III Environmental Product Declarations* 

Environmental product declarations are a very recent EPD communication tool and quite obviously their diffusion/adoption by companies is fairly limited in absolute numbers.

As mentioned, there are sector EPD programmes with declarations of building and construction products and sector-specific programmes.

2.3.3.1 Sweden - The EPD® programme

As mentioned, a first scheme was developed in Sweden. The Swedish government, together with industry, introduced a national system for Type III declarations programme based on certified environmental product declarations in 1999. This system is today an international system open to all countries.

The general procedure of the system includes the following steps:
1. Consider available PCRs and prepare PCR document.
2. Collecting LCA data to be included in the EPD and also other relevant information.
3. Compiling environmental information into the EPD reporting format.
4. Verification and registration.
5. Considering the rules for using the EPD® logotype.

The certification is organised by the accreditation bodies SINCERT (Italy) and SWEDAC (Sweden). Accredited certification bodies for the EPD® system are B VQi Sverige AB, Certquality, DNV Certification AB, ICMQ S.p.A., JIA, Japan Gas Appliances Inspection Association, RINA S.p.A., SEMKO-DEKRA Certification AB and SP Swedish National Testing and Research Institute. The certification bodies are accredited for specific product categories.

As of October 2006, in total 107 EPDs are reported in the official website of the Swedish EPD® system, 94 of which are certified. An additional 23 declarations are registered in the programs “On the way to EPD” and “Stepwise EPD” (http://extra.ivf.se/StepwiseEPD/default.asp). Not only Swedish companies participate in the system. Italian, Japanese, Korean, Belgian, Polish, Czech, Russian, Portuguese, Lithuanian and Latvian EPDs have also been registered in the Swedish system, which is developing to embrace EPDs from other countries.

Table 4 shows the number of EPDs registered under the Swedish system per country of provenance. As shown, a quite significant number of Italian companies are participating in the system. This is the consequence of the Italian-Swedish LIFE project INTEND. Some Japanese companies have also issued EPDs certified under the Swedish system, further showing the increasing international dimension of the latter.

Table 4 - Number of EPDs registered in the Swedish system per company’s country (own elaboration on data from www.environdec.com as retrieved in October 2006)

<table>
<thead>
<tr>
<th>Country</th>
<th>Certified EPDs</th>
<th>Reported EPDs</th>
<th>“On the way to EPD” and “Stepwise EPD”</th>
<th>Building &amp; Construction sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweden</td>
<td>26</td>
<td>27</td>
<td>16</td>
<td>10</td>
</tr>
<tr>
<td>Italy</td>
<td>30</td>
<td>36</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Belgium</td>
<td>18</td>
<td>18</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Japan</td>
<td>18</td>
<td>22</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Poland</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Korea</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Portugal</td>
<td></td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Russia</td>
<td></td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Czech Republic</td>
<td></td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Lithuania</td>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Latvia</td>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>TOTAL</td>
<td>94</td>
<td>107</td>
<td>23</td>
<td>20</td>
</tr>
</tbody>
</table>

*EPD®: Product Environmental Information Data Sheet

Overall results of the LCA are presented on the PEIDS to clarify the basis of the PEAD and to summarise the results of inventory analysis, impact assessment, and energy consumption.

Product Data Sheet

The product data sheet records the underlying data used in the preparation of the PEIDS. The company introducing EcoLeaf label prepares the product data sheet by describing the inputs and outputs of energy, raw materials, and environmental contaminants per product unit based on actual measurements within its direct range of influence (e.g., within its factory).
The auditors must be qualified by JEMAI and registered as qualified auditors by the EcoLeaf environmental labelling program.

A key feature of the Japanese ISO-type III declaration system is that, unlike other countries’ Type III programmes, several companies have issued declarations within the same product category. This allows for a real comparison of products of different companies by clients and customers. Though the absolute number of products is still limited, companies perceive that ISO-type III environmental claims without proof are just self-declaration with limited credibility and recognize on the contrary that certified ISO-type III declarations are a valuable tool to compete on the market with respect to environmental performance of products.

Looking at the different industry sectors involved so far in the Japanese system, the prominence of electronic products (e.g. photocopiers, printers, cameras, notebooks, etc.) is clear.

However, there is a growing interest in the building sector. As shown in Table 5, this sector has produced 10 PCRs (over a total of 49 for the whole EcoLeaf system) and 25 declarations so far.

Given the strong growing European and Chinese interest in EPDs for building products, more declarations are expected to be introduced in the Japanese market soon.

Table 5 – EcoLeaf PCRs and declarations for construction and building products in Japan (Source: adapted from JEMAI, 2006)

<table>
<thead>
<tr>
<th>Classification for application</th>
<th>Existing PCRs (n. of declarations)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Products delivered to the construction site</td>
<td>Structural aggregate (1)</td>
</tr>
<tr>
<td>Final products delivered to the final construction</td>
<td>- Toilet seat with bidet that sprays water from underneath and dries with air (2)</td>
</tr>
<tr>
<td>- Lavatory bowl (PCR has been published, 1)</td>
<td></td>
</tr>
<tr>
<td>- Water faucet (PCR has been published, 0)</td>
<td></td>
</tr>
<tr>
<td>- Interphone (17)</td>
<td></td>
</tr>
<tr>
<td>- Water meter box (5)</td>
<td></td>
</tr>
<tr>
<td>- Water meter unit (accessory parts) (2)</td>
<td></td>
</tr>
<tr>
<td>- Tile carpet (6)</td>
<td></td>
</tr>
<tr>
<td>Products installed when it is used</td>
<td>Desk (6)</td>
</tr>
<tr>
<td>Free access floor (raised access floor) (3)</td>
<td></td>
</tr>
<tr>
<td>Residential bathroom vanity (0)</td>
<td></td>
</tr>
<tr>
<td>Residential prefabricated bath (0)</td>
<td></td>
</tr>
</tbody>
</table>

2.3.3.3 South-Korea

The Korean EDP - Environmental Declaration of Products Program (http://www.koeco.or.kr) was established by the Korea Eco-products Institute (KOEPCO), the Environmental Management Corporation (EMC) and the Korea Environmental Preservation Association (KEPA). The system is supported by the Korean Ministry of Environment (MOE).

The focus of the system is in EEE (electric and electronic equipment). Up to now (October 2006) 96 EDPs are registered within 24 product groups, but there are no PCRs and EPDs for construction products yet.

2.3.3.4 Norway – The NHO program

The Norwegian EDP program (http://www.epd-norge.no) was founded in 2000 by NHO - Confederation of Norwegian Enterprise and is supported by Byggforsk, NTNU and Gjødforsk. The focus of the program is on furniture, building, energy and paper products. 8 PCRs have been developed. PCRs are registered, most of them for furniture, 28 EDPs are registered for construction products. As part of the system, other groups are also participating: the verification committee, the technical committee and the marketing committee. Currently there is a new initiative for the development of PCR and EPDs for building materials and indoor electrical equipment.

Verification and registration is organised by “Næringslivets Stiftelse for Miljødeklarationer”.

Figure 2 – Example of an EPD of construction products in the Norwegian EPD

2.3.3.5 China

Even though there is no type III environmental declaration programme established in China right now, China Environmental United Certification Center (CEC) has joined GEDnet and has been preparing for such a programme. China Building Material Test and Certification Centre is also interested in type III declarations of building materials.

Most recently, funded by the Chinese Ministry of Science and Technology (MOST), a project (2007-2010) has started research on type III environmental declarations of key building materials and chemicals, and certification programmes are expected to be established. Besides the two above-mentioned certification bodies, Sichuan University, Tsinghua University and China National Institute of Standardization are also involved.

2.3.3.6 Germany – AUB Environmental Declarations

In Germany the only type III EDP program is for building products. It was developed in 2004 by AUB (Association of Building Product Producers and Distributors). AUB was publishing ISO-type II declarations (Environmental Certificates) from 1982, the content of these “certificates” was basically a documentation of the life cycle of the product and results from measurements addressing all environmental relevant aspects of the product. Today, these aspects can be found in EPDs under “additional information”, next to the typical LC indicators.

EPDs in the AUB scheme are developed in a procedure with three stages, where different stakeholders are involved: In the first step the producers and experts of the sector establish a product forum organised by AUB. They develop a draft PCR document for the sector following the AUB guideline for the development of PCR documents. The draft is reviewed by an independent advisory board regarding completeness from an environmental point of view and consistency with the AUB programme. After that the PCR document is published for public consultation. In the second step the EPD is verified by the producer. In the third step the EPD is verified by a verifier authorized by the independent advisory board.

Up to now, 14 PCRs for different construction products have been developed. PCRs are verified by the independent advisory board, and a verification by an accredited body is not requested.

The AUB program is supported by several governmental organisations, like the Federal Ministry for Transport and Construction (BMVBS), the German EPA (UBA), the German Institute for Building Technology (DBI) and the Federal Institute for Materials Research and Testing (BAM).

Figure 3 – The operating scheme of the German AUB declaration system
2.3.3.7 United Kingdom – BRE Environmental Profiles

Environmental Profiles is a Life Cycle Assessment approach for presenting information about the environmental impacts of construction materials measured over the whole lifecycle of the product (from cradle to grave).

The approach called the Environmental Profiles Methodology and built around a single PCR document that has been agreed by industry stakeholders, is used by BRE to produce independently certified product profiles.

There are two distinct types of BREEAM environmental profiles:

- **Specific Product Profiles**
- **Generic Profiles**

Specific Product Profiles are usually carried out for individual manufacturers who wish to verify the environmental performance of their particular branded product. Profiles can be carried out to take account of the impacts at different stages of the product’s life namely:
  - Cradle to gate
  - Cradle to installed
  - Cradle to grave

Specific Product Profiles are individually certified by BRE certification. In addition product profile information will be promoted to the construction industry via the following routes:
  - BREEAM and Ecocounters examiner handbook
  - The Green Guide
  - BRE’s Red Book
  - Envest Software
  - The Environmental Profiles website

Generic Environmental Profiles are carried out by considering data collected from a group of manufacturers involved in producing broadly similar products. A trade association often takes responsibility for gathering the necessary data from its members.

A generic Profile can therefore:

- Give industry confidence in the manufacturing process for construction materials.
- Help benchmark industry standards across manufacturers of similar products.
- Help individual organisations improve their environmental impact and manufacturing processes.
- Highlight energy use and CO2 emissions.
- Lead to reductions in environmental impacts.

For further information on LCA Environmental Profiles please visit [http://www.bre.co.uk/service.jsp?id=53](http://www.bre.co.uk/service.jsp?id=53)

The BRE Green Guides

The Green Guides present information on the environmental impacts of building elements and specifications by ranking these on a simple rating scale of A, B, or C (where A represents the best performance). Behind these simple ratings lies full Life Cycle Assessment (LCA) studies using the UK agreed Environmental Profiling Methodology.

There are currently two Guides – one covering housing specifications and one covering commercial building specifications.

The Guides consider 13 different building components. For each of the 13 components, the standard construction specifications have been examined and ‘average’ environmental scores have been calculated.

The A, B, C ratings rank the performance of each specification against the ‘norm’ for every component. Thus the best performers in each component category can be easily identified by the reader, and designers and specifiers are comparing the performance of ‘like’ elements.

BRE will be releasing a new expanded and updated edition of the Green Guides in late 2007. The Green Guide will still be available as publication but will primarily be web based.

For further information on BRE’s Green Guides please visit [http://www.bre.co.uk/greenguide/section.jsp?sid=435](http://www.bre.co.uk/greenguide/section.jsp?sid=435)

Envest is a software package that informs the design process to deliver buildings with low environmental impact and whole life cost. Envest makes explicit the environmental and financial trade-offs available in the design process, allowing the client to optimise the final design according to their priorities.

Due to its versatility Envest is an essential product for:

- Architects
- Designers
- Engineers
- Surveyors
- Clients
- Specifiers

Envest is web based allowing design teams to store and share information in a controlled and accessible way, enabling benchmarking and design comparison.

For further information on Envest please visit [http://envest2.bre.co.uk/](http://envest2.bre.co.uk/)

2.3.3.8 France – FDES

The French programme FDES (Fiches de déclaration environnementales et sanitaires) is based on the French standard NF P01-010 “Déclaration environnementale et sanitaire pour les produits de construction” published in 2004. A first experimental standard (NP P01-010) was already published in 1999. The motivation to write a national standard was the collective request from industry (AIMCC), building actors and consumers. There is also strong support from public authorities (Housing, Environment and Architecture Ministries) and the Environmental Agency (ADEME).

A programme for verified EPDs (FDES) is on the way. AFNOR Normalisation is organising the verification process. The declarations are registered by AFNOR Normalisation with the report and the attestation published on the AFNOR + construction + website. The option can be included in the INES database (www.ines.fr), which is independent of the FDES Programme and operated by a technical committee (AIMCC) and representative of interested parties from construction sector.
The declarations can be collective or individual; they contain selected environmental impacts, health information and comfort aspects.

The EPOs are used in the building assessment HQE in France. HQE addresses 14 issues related to the environment; one of them is the “Integrated choice of construction products and systems”. For this reason, the knowledge of environmental impacts of products (based on the EPD) is necessary.

2.3.3.9 The Netherlands – MRPI

Declarations can be company or sector specific. About 200 producers published an EPD within 30 product groups.

2.3.3.10 Finland – RT

New environmental declarations (http://www.rts.fi/RTED/index.htm) have been compiled according to the publication “Methodology for Compiling Environmental Declarations for Building Products and Assessing Environmental Impacts of Buildings” since 2004.

The RT Environmental Declaration is based on the national methodology following the basic principles stated in the ISO standard series 14040 and 14020. It is developed in cooperation with the Confederation of Finnish Construction Industries RT, the Building Information RT, VTT Technical Research Centre of Finland and companies in the construction business.

The RT Environmental Declaration is a voluntary and public document providing comparable and impartial information on the environmental impacts of building materials. It is a source of information for users, designers and constructors.

26 EPDs within 13 product groups have been published (October 2006).

The eco-profile includes the life cycle stages from the acquisition of raw materials to the factory gate:
- Use of natural resources
- Materials
- Use of energy
- Emissions into air and water

Other environmental aspects included are:
- Indoor air emissions
- Service life
- Service and maintaining
- Final disposal and recycling

2.3.3.11 Catalonia (Spain)

The Catalan Government, through the Ministry of Environment and Housing has issued new legislation in relation to life cycle information for the building and construction sector, effective from August 2006: “Decree 21/2006, Regulation for the adoption of environmental and ecoefficiency criteria in buildings”. The Decree introduces a very strong Top-Down approach, as it states in chapter 6.2 that: “at least one whole family of products must be labelled through type I or type II (EPD) ecolabelling in each new building” (Fulana et al. 2006).

On the other hand, the Spanish Government has approved the “Technical Code for Edification”, as the first step for the adoption of the European Directive 2002/91/EC, which aims to promote improvements in the energy efficiency of buildings. Specifically, in chapter 2 (6.2.4) the Code refers to the use of Life Cycle Assessment, certifications and other environmental assessment tools for building and construction products. In some aspects (other than labelling), the Code goes beyond the Decree.

For the Catalan Government, EPDs could collect all these types of information. Thus, on the one hand EPOs could serve as a tool for objective and verifiable communication about the fulfillment of those requirements asked by the Code, the Catalan Decree and further coming legislation.

In fact, the main objectives of the inclusion of environmental labelling in the Decree are to promote the Catalan type I ecolabelling programme “Distintiu” and to motivate the building sector. The type III option is seen as a way to study new product categories and to foster the adoption of environmental activities by new building families. In the long run, the intention is twofold: on the one hand EPDs will be, in most cases, a step to the type I Distintiu adoption by companies and an information pool to develop new criteria for the Distintiu; and, on the other hand, EPDs will be the basis for building environmental assessment.

While the Distintiu product categories have been usually developed to help Catalan companies to market their existing eco-products, the inclusion of a clause on EPDs in the Decree could help foreign companies instead, for there is not an EPD system in place in Catalonia or Spain yet.

Joint research projects were started by the Environmental Management Research Group (GiGa) at ESCi, Escola Superior de Comerç Internacional (Universitat Pompeu Fabra), the Ministry of Environment and Housing of the Catalan Government and the Technical Architects Association of Barcelona (CAATB), which led to start an EPD programme in Catalonia for the building sector in February 2008. CAATB is the programme operator and EPD will be integrated with other technical information about the product. For CAATB this is seen as an opportunity to help their associates, who hold the responsibility of verifying that a building is complying with legislation, to facilitate their work. Two product categories are under development as pilot studies, insulation materials and ceramic products, and the programme is expected to be fully operational at the end of 2009.

As the use of EPD is mandatory for construction companies, this new programme is expected to grow very quickly.
2.3.4 Other quantitative declarations

2.3.4.1 Byggvarudeklaration – BVD – VVS Type B, version 1.4 (van Rossem 2004)

In early 1994, the Swedish Eco-cycle Council began to discuss the possibility of legislating producer responsibility in the building sector. Shortly thereafter the building industry formed the “Building Sector’s Eco-Cycle Council” and in December 1995 proposed an alternative voluntary industry commitment known as the Action plan for environmental responsible building products, a wider producer responsibility. A critical part of this was the commitment by the sector to “develop and use building materials, building systems and building methods that reduce negative environmental impacts and further long-term sustainability of our natural resources”. An important sub-goal in the action plan included the “development and supply of building product declarations by 1997”. The first version of the BVD format was available in 1997 with an updated version released in 2000. The VVS industry developed a modified version more applicable to the VVS branch requirements. In this project, the VVS – Type B version 1.4 is reviewed for its content, however, there are previous versions still in use and available on company websites and in databases.

According to a study by Koggi & Thistle (2003) in which actors involved in the development of BVDs were interviewed, a number of intended uses for the declarations were mentioned. These included:

1. Documentation; for example, assembling information on the products which are incorporated in buildings. The information can be used both when alterations are made or when the building is eventually demolished.
2. Risk reduction, to avoid the use of certain unwanted chemical substances or the release of emissions of allergic substances. The purpose is then to identify products that should not be incorporated in the building project.
3. Proactive material choices based on contents or information on the products environmental effects based on a life cycle perspective. The overall purpose is to point out the most advantageous products.
4. Building knowledge and capacity. The Building Sector’s Eco-Cycle Council pointed at the need to strengthen knowledge and the connection between the building process and the environment. Standardized formats for environmental declarations shall enhance the information and make it publicly available. That should lead to the extension of increased knowledge and environmentally sound ways of building.

VVS-Type B, version 1.4 contains the following information:

- Product name and common use
- Company Information: manufacturer, environmental policy and management system
- Supplier Information: environmental policy and management system
- Product Information: contents – substances and materials according to CAS number

Separate sections addressing the following life cycle stages: Manufacturers answer a series of yes/no questions. In some cases quantitative data is asked for.

- Use of Resources: raw materials (quantitative data), origin of material
- Production: Production data is available, environmental accounts, suppliers have EMAS, KEMI listed substances used
- Distribution of finished product: Mode of transport (options), through warehouses or delivered directly, packaging type, reusable, recoverable, take-back
- Construction Phase: Assembly instructions are available, safety, waste minimization, worker health and safety
- Use Phase: energy required, consumables needed, harmful emissions during use, possible to estimate service life, instructions are provided on – maximize service life, resource use, minimize use of consumables, how to dismantle the product
- Demolition: Product can be dismantled in an environmentally appropriate way, state how this can be done
- Residuals: product is recyclable, packaging is recyclable, recovery of materials is possible, energy recycling is possible and recommended
- Waste Products: Part of product not recyclable, parts of product classified as hazardous waste, risk of harmful emission if disposed

2.3.5 Environmental Assessment of Buildings

One of the most important applications of EPDs in the building and construction sector is their use for the environmental assessment of buildings. Several assessment schemes already exist which directly use indicator results from EPDs for the calculation of results on the building level or are planning to integrate EPDs in the future. Some building assessment schemes are using qualitative environmental information, for them a link to EPDs could be beneficial in the future.

The next chapters briefly describe some assessment schemes. It is obvious that the schemes are complex and the overview doesn’t show all details.

2.3.5.1 Japan – CASBEE

CASBEE (Comprehensive Assessment System for Building Environmental Efficiency) is a system for the Japanese market, which was developed in 2001. CASBEE is composed of four assessment tools, the so-called “CASBEE Family”, corresponding to the building lifecycle, i.e. CASBEE for:

- Pre-design,
- New Constructions,
- Existing Buildings,
- and for Renovation.

Building Environmental Efficiency (BEE) = \( \frac{Q}{L} \)

Although the tool is in an advanced development state, the present situation of its use and application is much more complex. The branch organisation that developed these tools declared recently that they do not intend to release them at any point in the short-term future. This tells us something about the difficulty of getting everyone on board in terms of developing criteria for which environmental issues have to compete on.

CASBEE evaluation is presented as a measure of “BEE (Building Environmental Efficiency) approach” or eco-efficiency indicator. The unique approach of CASBEE is that the assessment distinguishes environmental impact and quality of building performance.

By relating these two kinds of performances, results are plotted on a graph with environmental impact (loads) L on X axis and quality Q on Y axis (Figure 10). The best performing buildings score the section representing the lowest environmental impact and highest quality of performance. The criteria are prefixed from level 1 to level 5. The higher the Q value and the lower the L value, the steeper the slope and the more sustainable the building is. Using this approach, it is graphically possible to present the results of building environmental assessments. Figure 10 shows how the assessment results for buildings can be labelled on a diagram as class C (poor), class B-, class B+, class A, and class S (excellent).

In order to manage the system, the assessor should fill out two assessment formats: the Assessment Result Sheet and the Score Sheet.

More detailed information can be found at http://www.ibec.or.jp/CASBEE/english/overviewE.htm
The Japanese government (Japanese Ministry of Land, Infrastructure and Transport) is spreading this method successfully and the system is now increasingly becoming a sort of regulatory reference framework.

This method has even become a model of the Green Olympic Building Assessment System (GOBAS) for the 2008 Olympics in China.

http://www.sustainablebusiness.com/features/feature_template.cfm?ID=1289

2.3.5.2 United States - Green Building Initiatives (LEED) and other LCA-based assessment tools

In response to the oil shocks in the 1970s, attention in the U.S. focused on saving energy in buildings through energy conservation (turning off the lights, lowering/raising the thermostats), energy efficiency (installing insulation, energy-saving equipment) and renewable energy (solar cells, passive solar architecture). Growing awareness of buildings’ environmental impact (energy, air quality, land-use, materials consumption & water use) led to pioneering efforts in the late 1980s/early 1990s to create voluntary groups such as the American Institute of Architects’ Committee on the Environment and in 1993, the U.S. Green Building Council (USGBC), a national, 501(c)3 organization.

Green Building Initiatives (LEED)

In the U.S., the annual sustainable construction market has grown from roughly $200 million in 1999 to an estimated $15 billion in 2006. Its growth has been driven largely by the development and use of the LEED™ Green Building Rating System.

LEED™ is a rating system developed by the USGBC (http://www.usgbc.org) to assess the environmental sustainability of building designs. It is a voluntary, consensus-based national standard for developing high-performance, sustainable buildings and provides a framework for assessing building performance and meeting sustainability goals. LEED focuses on green or sustainable building, which is the practice of creating healthier and more resource-efficient models of construction, renovation, operation, maintenance, and demolition.

The LEED™ system can be used in three ways to improve the ‘greenness’ of a building design (Version 2.1, U.S.).

1. LEED can serve as a design guide for the design team. The LEED credit system is a systematic way of ensuring that the most important environmental issues are considered during the design of the building.
2. LEED assessment reports are a valuable means of showing the client and other interested parties that the design has effectively addressed environmental issues.
3. A building design can be certified by the U.S. or Canadian Green Building Council. Certification provides increased market exposure and places the building in elite company among the most ‘green’ buildings in North America.

To earn a LEED certification, the applicant project must satisfy all of the prerequisites and a minimum number of points that will allow a LEED rating level. The LEED rating system comprises 9 prerequisites and 60 elective points grouped into 6 categories: sustainable sites (14 points), water efficiency (5 points), energy and atmosphere (17 points), materials and resources (13 points), indoor air quality (15 points) and innovation and design (5 points). The different ratings a LEED building can obtain are: LEED certification (26-32 points), silver rating (33-38 points), gold rating (39-51 points) and platinum rating (52-69 points). The market penetration of LEED has been steadily increasing over the years.

Currently LEED guidelines have been adopted in all 50 states in the US (largely dominated by California) and over a dozen countries. Since its inception in 2000, more than 1,400 projects have registered to achieve various levels of LEED certification. To date, the market has been dominated by the government and non-profit sectors, together accounting for nearly 75 percent of all LEED-registered projects (LEED Workshop Data, July 21, 2004). The largest project type is office buildings, followed by secondary and higher education buildings.

Despite this significant success, the LEED System has not yet included a level of acceptance and use of product standards, product LCAs and environmental product declarations as achieved in the European Union. According to Rob Watson, 10 year Chair of the LEED Steering Committee, “Full recognition of the use of product LCAs to evaluate, specify and purchase products is a huge missing piece in the LEED System.” The principal achievement of LEED was to define and integrate green building performance requirements in energy, water, materials, site/land-use and indoor environment.

While the LEED™ Green Building Rating System is driving consumer demand for green construction products, it has not yet moved to incorporate a separate category of credits for use of ISO-compliant LCAs for product specification or purchase. Though it does have a number of “LCA into LEED” workgroups, they are moving forward at a glacial pace.

Other LCA-based assessment tools

Fortuitously, other organizations in the U.S. have stepped in and developed LCA tools to fill this gap. They have to some measure addressed the following factors which reportedly have precluded more extensive use of LCA by manufacturers and purchasers:

1. Related but distinct problems for designers, architects, and building owners is how best to satisfy demand for building materials and products creating the fewest environmental impacts while meeting performance, aesthetic, and cost control objectives. Lifecycle assessment promises to deliver much of the information needed to make this type of informed decision, but LCA is not yet viewed as a viable alternative by most manufacturers in the U.S.

Several LCA-based exist and/or are being developed:

Athena Environmental Impact Estimator

A not for profit organization, the Athena Institute has developed the Environmental Impact Estimator (EIE) software. Released in 2002, the software covers 90 to 95 percent of the structural and envelope systems typically used in both residential and non-residential buildings. In contrast to BEES and eLCie, it focuses on materials rather than products. The Estimator is able to simulate over 1000 different building assembly configurations. Using preset building assembly dialogues, a building professional can quickly enter a conceptual building design and instantly see its cradle-to-grave implications in terms of embodied primary energy use, global warming potential, natural resource use, and emissions to land, water and air. Given these capabilities, the Environmental Impact Estimator is the preferred LCA tool in North America for assessing the environmental impacts of building systems. Its developer, the Athena Sustainable Materials Institute, is a lead partner in the US LCI Database Project.

BEESS

Building for Environmental and Economic Sustainability (BEESS) is a free software tool developed by the National Institute for Standards and Technology (NIST), a U.S. federal government agency. It measures the environmental performance and costs of building products by using the life-cycle assessment approach specified in ISO 14040 standards, using the SimaPro software and the database created by PRe Consultants in the Netherlands. All stages in the life of a product are analyzed: raw material acquisition, manufacture, transportation, installation, use, and recycling and waste management. Its generic LCAs are very useful for comparison of generic product types and will become more so as a great number of agricultural-based products are encompassed in BEESS 4.0. Yet, as the same data collection tool has been used for all industries, the resulting data is considered by most manufacturers to be insufficiently specific to warrant evaluation and comparison of brand
products. Additionally, the BEE5 method of presenting product LCA results is regarded by building designers as too abstract and complex to be useful.

elCie System™

The elCie System concept, software and beta version tools were developed over the last 4 years by the International Design Centre for the Environment (IDCE), a 501c (3) organization. It is a comprehensive package of tools designed to streamline the use of life-cycle information through the entire chain of the built environment while meeting the ISO 14025 Standard for LCA and related aspects.

1) The elCie Industry Wizard™ which enables manufacturers to efficiently collect gate-to-gate data on processes to be integrated with peer-reviewed cradle-to-gate and gate-to-cradle data. It is used by manufacturers internally to assess how specific materials or manufacturing processes affect the environmental impacts of a product. Additionally it is used to develop a product LCA for certification by an LCA practitioner and posting potentially on elCie Online.

2) elCie™ provides building designers, builders, contractors and facility managers with science-based yet user-friendly product LCA results in a web-based format developed to meet the needs of non-scientists. It offers several options for accessing product information: i) an LCA-based label; ii) a spider diagram showing a product’s environmental impacts relative to an industry average product; iii) a summary product LCI. Core information is free of charge.

Scientific Certification Systems

Scientific Certification Systems (SCS) is a for-profit third party certifier for testing pesticide residues in fresh produce. The company certifies multiple facets of the food industry and of the environmentally sound management of forests, marine habitats, and a wide variety of manufacturing-related businesses. SCS has developed a standard for evaluating carpet for competitiveness by assessors working within a rigorous quality assurance framework, BRE trains, examines and licenses organizations and individuals to carry out the assessment process and work with the design team.

BREEAM Certification is undertaken by licensed assessors ensuring that assessment services are competitively priced by assessors working within a rigorous quality assurance framework. BRE trains, examines and licenses organisations and individuals to carry out the assessment process and work with the design team.

BREEAM assesses the performance of buildings in the following areas: management, energy use, health and well-being, pollution, transport, land use, ecology materials, and water.

Developers and designers are encouraged to consider these issues at the earliest opportunity to maximise their chances of achieving a high BREEAM rating. Credits are awarded in each area according to performance. A set of environmental weightings then enables the credits to be added together to produce a single overall score. The building is then rated on a scale of: PASS, GOOD, VERY GOOD or EXCELLENT and a certificate awarded that can be used for promotional purposes.

BREEAM covers a range of building types:

Assessments are carried out by independent assessors that are licensed and trained by BRE. For each assessment, the assessor will produce a report outlining the development’s performance against each of the criteria and its overall score and BREEAM rating. Upon satisfactory completion of the assessment, the client is presented with a certificate that confirms the development’s BREEAM rating.

Where a design-stage assessment is commissioned, BRE recommends that a Post-Construction Review is carried out to ensure that the end result achieves the design’s aspirations.

To achieve a high BREEAM rating, BRE advises that the registered assessor is involved in the design process from the early stages. Their advice will ensure that the desired BREEAM rating is achieved in the most cost-effective way. The fee for such advice should be negotiated directly with the assessor.

For further information regarding BREEAM please visit http://www.breeam.org.

2.3.5.4 Germany

The environmental assessment of buildings in Germany is based on the “Guideline for sustainable buildings”, which was drafted by the Federal Ministry for Transport, Building and Urban Affairs (BMVBS 2001).

The guideline makes its contribution by providing practical guidance for the design and management of federally owned landholdings, including a checklist. Its introduction implemented a strategy for federal building works gearing the design, construction and use of buildings and landholdings to sustainability, with the main emphasis put on the ecological and economic aspects. One of the practical implications of this is that even at the design stage of a building, the economic impact of specific measures, for instance ecological measures, has to be taken into account and an optimum strategy for investment sought. The most important aspect of the guideline is that all persons involved cooperate at an early stage in the design and construction of a building.

A Round Table for Sustainable Construction consults the ministry in improving the guideline and bringing it into practical use. The guideline is a working aid for the design, construction, maintenance, operation and use of federal buildings.

The guideline addresses new and existing buildings. Information about construction products comes from EPDs. The government is supporting the voluntary approach of the AUB scheme. Industry is supporting the approach to communicate environmental information with EPDs as well.

Up to now there is no certification scheme for sustainable building implemented in Germany. But the demand of the general public and of private investors is growing rapidly; therefore one can expect a certification system within the near future.

2.3.5.5 France - HQE

As an example of the growing green requirements in public call for tenders, the French HQE regular fars, presenting surveys of HQE experiences, have shown that a growing number of public tenders in France include the application of the “HQE Practice” to the building construction.

The HQE method has been tested since 1994 in building projects (residential and non-residential) and formalized in 1997 by HQE® Association. The scheme has two dimensions:

1. The environmental management system of the building project.
2. The building environmental performances, assessed through 14 issues addressing “Site and Construction”, “Management” (operation phase), “Comfort” (of users) and “Health” (of users).

The assessment criteria for construction products are technical quality, durability, adaptability, ability to reduce impact during refurbishment or deconstruction, easy to clean and maintain. Knowledge of environmental impacts of products is based upon EPD and the choice should take into account the environmental criteria (calculation at the building scale, for a small number of products). The same is required for health impacts (e.g. emissions to the indoor air).

French EPD, called “Fiches de Déclaration Environnementale et Sanitaire (FD&E)”, are done according to NF P 01 010. AMCG, the Association of construction
## 2.4 The Energy Sector

Life cycle communication is also increasingly being used in the energy sectors. All three ISO-type labels are applied. ISO-type I, I-like, II labels and claims are usually used in connection with the sale of “green electricity”, i.e. electricity generated from renewable energy sources. On its side, the first certified published EPD ever was on a power plant of Vattenfall in Sweden.

### 2.4.1 ISO-type I ecolabels

Table 6 presents the same statistics already provided in Table 3 (first columns on the left). On its right hand side, however, it provides existing data on the number of product category groups developed within the main eco-label schemes at EU and extra-EU level, as well as their degree of diffusion in terms of participating companies and eco-labelled products.

As is possible to see from the available information, it seems that only Germany, Sweden and The Netherlands have already developed a national ISO-type I ecolabel scheme for the energy sector.

<table>
<thead>
<tr>
<th>Country</th>
<th>Year of establishment</th>
<th>Product groups</th>
<th>Firms</th>
<th>Products</th>
<th>Product group</th>
<th>Heat or CHP</th>
<th>Firms</th>
<th>Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>1978</td>
<td>89</td>
<td>529</td>
<td>3,650</td>
<td>2</td>
<td>n.a</td>
<td>n.a</td>
<td></td>
</tr>
<tr>
<td>Nordic Countries</td>
<td>1989</td>
<td>66</td>
<td>680</td>
<td>&gt;1500</td>
<td>7</td>
<td>21</td>
<td>&gt;21</td>
<td></td>
</tr>
<tr>
<td>Sweden (Falcon)</td>
<td>1992</td>
<td>11</td>
<td>n.a.</td>
<td>n.a.</td>
<td>1</td>
<td>n.a</td>
<td>n.a</td>
<td>n.a.</td>
</tr>
<tr>
<td>Catalonia (DGQA)</td>
<td>1994</td>
<td>26</td>
<td>171</td>
<td>895</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Austria</td>
<td>1991</td>
<td>49</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a</td>
<td>n.a</td>
<td>n.a</td>
<td>n.a.</td>
</tr>
<tr>
<td>EU (October 2005)</td>
<td>1992</td>
<td>24</td>
<td>309</td>
<td>n.a.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.</td>
</tr>
<tr>
<td>France</td>
<td>1994</td>
<td>19</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a</td>
<td>n.a</td>
<td>n.a</td>
<td></td>
</tr>
<tr>
<td>The Netherlands</td>
<td>1992</td>
<td>69</td>
<td>257</td>
<td>360</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Spain (AENOR)</td>
<td>1994</td>
<td>11</td>
<td>52</td>
<td>275</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0.</td>
</tr>
<tr>
<td>Brazil (ABNT – Qualidade Ambiental)</td>
<td>1993</td>
<td>10 (under development)</td>
<td>n.a.</td>
<td>n.a.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.</td>
</tr>
<tr>
<td>China (2003)</td>
<td>1993</td>
<td>56</td>
<td>n.a.</td>
<td>n.a.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.</td>
</tr>
<tr>
<td>India (October 2006)</td>
<td>1991</td>
<td>16</td>
<td>n.a.</td>
<td>n.a.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.</td>
</tr>
<tr>
<td>Japan (October 2006)</td>
<td>1989</td>
<td>47</td>
<td>2107</td>
<td>5152</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.</td>
</tr>
<tr>
<td>South Korea (June 2006)</td>
<td>1992</td>
<td>7 (groups)</td>
<td>103 (categ)</td>
<td>1001</td>
<td>4100</td>
<td>1 Solar Water Heating Systems</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 6 - Number of product groups, firms and products in the energy sector for the main ISO-type I labelling schemes, as of October 2006

*The reason why only comparatively few Type I labels cover Green Electricity may be the fact that in many countries the market for green electricity is not open and competitive enough, resulting in little to no pressure on monopoly companies to provide Life Cycle information on their energy mix.*
2.4.2 ISO-type II environmental claims (green electricity marketing)

Green power programs are widely diffused at international level. Since the first experiences in California, The Netherlands and Sweden during the 90’s, green electricity marketing has been gradually expanding its boundaries and today is adopted by many companies all around the world.

At European level, the most active countries are The Netherlands, Sweden, the United Kingdom, Germany, Switzerland and Finland. More recently, several initiatives of green electricity marketing have also been proposed in Austria, Belgium, Denmark, France, Ireland, Italy and Spain.

Green electricity marketing has traditionally been related to the liberalisation of the electricity market. With the progressive opening of the market, utilities have in fact also started paying attention to the quality of the product offered, thus marketing greenness as an added value of the service provided to customers.

As a consequence, competition is very fierce. Despite still being a niche market, several companies in the countries indicated are offering green tariffs. The most striking case in this regard is Germany. The latest data available (source: Brandi et al. 2004) indicate that over 150 utilities offer more than 300 different products and green electricity tariffs to their customers. Of these, more than half are associated to a guarantee label.

Germany is the most exemplary case of an overflow of tariffs, brands and guarantee labels. However, a similar situation can be observed in many other European countries. For example, in Italy several green electricity tariffs associated to different brands have arisen in a very short timeframe during the year 2006, in preparation for the complete opening of the electricity market, which will occur in 2007.

This has led to a significant amount of offers, products, brands and tariffs, which has been experienced in several other countries at European level (Figure 12).

Green power marketing has been rapidly increasing. Currently, many electricity companies are advertising green tariffs through various media, like dedicated brochures, TV, and Internet websites.

Guarantee labels have arisen in many countries around the world to entrust the quality of electricity sold under a green tariff and also to respond to the confusion and lack of transparency of some ISO-type II claims. Guarantee labels have the function of raising awareness on green electricity, and to enable customers (particularly individuals) to make their choices on the basis of established criteria verified by a trustworthy third party.

Within Europe, guarantee labels exist in almost all countries where a green electricity marketing program is in place.

Among the various labels existing at European level, two examples appear of particular interest for different reasons: “100% energia verde” and “Naturemade”.

The 100% energia verde is a guarantee label established in Italy in 2003 by REEF – Renewable Energy Foundation onlus. The label guarantees that electricity is produced from renewable energy sources with low environmental impact. With this respect, the label has particular stringent criteria for hydropower plants and biomass. Stricter requirements are also envisaged for wind (on visual impacts). Another interesting aspect is that the label can be granted to different kinds of clients along the electricity value chain: Producers, distributors and customers. As far as the latter are concerned, the guarantee label allows them to use the mark for business purposes (e.g. in the case of mineral water as shown in the picture).

Naturemade is a Swiss electricity quality label established in 2000 and managed by AERIE. The label is structured in two levels: basic and star. Naturemade star has particularly strict requirements of environmental quality. More specifically, it requires producers to carry out an LCA using Ecoindicator99 evaluation method to obtain the label. Naturemade is actually one of the few cases of labels explicitly requiring LCA information, thus being a bridge between ISO-type I (or I-like) labels and ISO-type III declarations.

While guarantee labels have succeeded in improving transparency of information for consumers, there are still large differences among different ISO-type I like labels in different countries, in terms of main criteria and procedures.

A further noteworthy initiative is the Eugene green electricity standard (http://www.eugenesandard.org). It was initiated by WWF and two green power labels, OK-Power and Naturemade (discussed above), and created a standard of quality for green power, to provide a benchmark for Type I labels. It thus gave a European dimension to what were mainly national labels, thereby helping international electricity-consuming consumers who want to be sure they are being supplied high quality green power. The Eugene Standard now also serves as a reference for green power practices outside Europe (for example in Chile). So far, only OK-Power and Naturemade themselves have are ‘Eugene proof’ labels, but other countries have shown much interest, including Sweden, France, Netherlands and Italy.

The development of the Eugene standard was assisted by the 2-year lasting CLEAN-E project, supported by the European Commission under the Intelligent Energy Europe Programme.

Figure 11 - Example of brands associated to green electricity tariffs proposed in European countries
## 2.4.4 ISO-type III environmental declarations

Table 7 shows the existing EPDs related to the energy sector, released within the different programmes. As one can see, currently the largest portions of EPDs in the energy sector are being prepared within the Swedish system. Two companies, Vattenfall and Enel, cover the whole range of EPDs issued. The majority of them (6 out of 8) are related to the generation of electricity from renewable energy sources and nuclear. The remaining two refer to the production of district heat.

Other EPDs of electricity prepared under the Swedish scheme have expired. As is the case, for example, of the EPD issued in 2002 by the Norwegian company Statkraft, related to the electricity produced at its 130 MW Trollheim power station. Despite having expired in June 2005, the document is still available on the company’s website.

With respect to the PCR, it is worth remembering that the Product Category Rules for Electricity, gas and water supply will soon be revised since it is due to expire in April 2007.

Besides the Swedish programme, a PCR for Electricity and Heat also exists in the Danish EPD system.

In addition, Energinet - the transmission system operator, annually issues an impact statement for the electricity supplied in Denmark, through the collection of data among electricity and CHP producers operating in the country.

Another example of an EPD-like document which is worth mentioning is the one commissioned by British Energy to AEA Technology, and issued in May 2005. The EPD refers to a kWh of electricity generated at the Torness nuclear power plant, and thereafter distributed to customers. The EPD has been developed in accordance with PSR 2004:2 and during the work AEA was in contact with Vattenfall in Sweden to ensure that the PCR was understood and used in a proper way. However, although being verified, the EPD has not been formally certified. It has therefore to be considered as an ISO-type II claim, rather than ISO-type III declaration.

Outside the EU, two relevant EPDs have been found in Japan and South Korea, respectively. The first is referred to a kWh of grid electricity generated from a mix of different sources by Kansai Electric Power. It was issued in 2003. The latter is an EPD of a cubic meter of natural gas produced by Korea Gas Corporation.

### Table 7 - ISO-type III environmental declarations in the energy sector as of October 2006

<table>
<thead>
<tr>
<th>COUNTRIES</th>
<th>EPD SCHEME</th>
<th>PUBLISHED EPDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Europe</td>
<td>EPO programme</td>
<td>Electricity and District Heat from CHP at Vattenfall AB, Electricity from Enel’s geothermal plant of Bagnore 3</td>
</tr>
<tr>
<td></td>
<td>(SEMCC - Swedish Environmental Management Council)</td>
<td>Electricity from Ringhals AB, Electricity from the Nuclear Power Plant at Forsmark, Electricity from Vattenfall AB’s Swedish Windpower Plants, Electricity from Vattenfall’s Nordic Hydropower, Generation of district heat and steam from waste handling, Wind generated electricity from Sclafani Bagni wind farm</td>
</tr>
<tr>
<td>Extra-Europe</td>
<td>ECO-LEAF</td>
<td>Electricity generated from Kansai Electric Power distributed to the grid, Wholesale electricity from J-Power</td>
</tr>
<tr>
<td>Japan</td>
<td>ECO-LEAF</td>
<td>Liquid natural gas from Korea Gas Corporation</td>
</tr>
<tr>
<td>South Korea</td>
<td>EDP program (JEMAI - Japan Environmental Management Association for Industry)</td>
<td>Liquid natural gas from Korea Gas Corporation</td>
</tr>
</tbody>
</table>

Table 7 - ISO-type III environmental declarations in the energy sector as of October 2006
3 The international expert UNEP/SETAC workshop in Barcelona

3.1 Objectives

The objective of the workshop was twofold, i.e. to:

1. Share with a selected number of experts the experience of industry, the success-stories, the remaining challenges in the two chosen sectors;
2. Engage in fruitful debate with them and collect their suggestions and recommendations to identify best practices for the future.

For each sector, the workshop was expected to give an answer to the following questions:

1. Who are “the users” of LC information?
2. What are their needs?
3. Which tools are used today to communicate with whom?
4. Outlook: What are the expectations from industry and users, what are the challenges and opportunities?
5. What is the potential role of public administrations to foster the change towards more sustainable consumption and production?
6. What are the main recommendations for best practice in the future?

The overall goal was to make an important step-forward in identifying effective strategies and communication tools to induce a real change towards more sustainable behaviour of consumers and other stakeholders. This raises a number of research questions, which are listed below and summarized in Figure 12 - Research questions discussed at the expert workshop.

Prof. Timothy Smith (University of Minnesota, US) presented a theoretical framework aimed at addressing and evaluating the effectiveness of communication of environmental product information. He focused on the building and construction sector, reporting the results of a survey of advertisements (ads.) appearing in the sector-specific journal Builder Magazine in 2004. The latter is the official publication of the National Association of Home Builders and is the primary national advertising outlet targeting residential home builders. While the publication addresses mainly home builders (95% of the total circulation of 139,000 copies), it reaches a non-negligible number of architects (6,500). The study classifies environmental and health related claims appearing in advertisements according to three main characteristics, i.e. (i) Aggregation (qualitative vs. quantitative claims); (ii) Credibility (self-claims vs. third party verified schemes); (iii) Modality (visual vs. lexical). The survey shows that many building product firms are attempting to communicate environmental messages in national campaigns in the US. Approximately 10% of ads contain an environmental message; probably a bigger number in media targeting architects more directly. However, very little quantitative and/or disaggregated information communicated. Figure 15 shows that information is mainly presented in the form of qualitative self-claims.

Information usually refers to a single aspect (e.g. energy saving) and no life cycle information in a strict sense is presented in the advertisements. Third-party certifications are being integrated into ads, but still in minor ways. On the contrary, there is a fair degree of sophistication with regard to mode of execution (visual, lexical, etc.).

As far as the effectiveness of communication is concerned, i.e. to what extent communication influences attitudes and eventual purchase decisions, Prof. Smith illustrated a theoretical framework of consumer processing of communications. The clear conclusion is that effective environmental communication is not simply providing more information (something LCA does well). Effective information must be:

For each sector, the workshop was expected to give an answer to the following questions:

1. Who are “the users” of LC information?
2. What are their needs?
3. Which tools are used today to communicate with whom?
4. Outlook: What are the expectations from industry and users, what are the challenges and opportunities?
5. What is the potential role of public administrations to foster the change towards more sustainable consumption and production?
6. What are the main recommendations for best practice in the future?

3.2 Summary of presentations

3.2.1 LCA information in marketing communications: addressing communication effectiveness in the building materials industries (Timothy Smith)

For each sector, the workshop was expected to give an answer to the following questions:

1. Who are “the users” of LC information?
2. What are their needs?
3. Which tools are used today to communicate with whom?
4. Outlook: What are the expectations from industry and users, what are the challenges and opportunities?
5. What is the potential role of public administrations to foster the change towards more sustainable consumption and production?
6. What are the main recommendations for best practice in the future?
3.2.2 ISO-type III standardization activities in the building sector (Johannes Kreissig)

Johannes Kreissig (PE Europe, Germany) illustrated the standardization activities in the building sector at world (ISO) and European (CEN) level. Three crucial aspects were emphasized:

1. The building sector is a quite unique case, in which the assessment methods and standards are related to three different levels, i.e. i) product/process, ii) building, and iii) framework level.
2. Unlike other sectors, several standards cover all sustainability dimensions, i.e. they address environmental but also economic and social aspects.
3. The need for a consistent approach and framework.

The different ISO standards relevant for the building sector are summarized in Table 8. They are related to environmental labelling and declarations, LCA, sustainability in buildings, and building and construction assets.

At European level, the scope of CEN TC 350 activities includes:

- Credibility (honesty, sincerity and objectivity of the information itself and the process generating it, not just the source from which the communication originates in most marketing communications, the firm).
- A balance between more/disaggregated complex information and the cognitive capacity of the recipient.

A particularly crucial aspect is the expansion of the credibility dimension to include both source credibility (i.e. the firm, brand, spokesperson, etc.) and process credibility (systems, methods, standards used in determining the information communicated). As far as this is concerned, Type-I labels typically help provide source credibility through the associations established between the ecolabel and the brand, while Type-II declarations hold the potential to provide process credibility and temporal relevance (i.e. through standardization efforts within the LCA community). Communicating the right amount and format of this information becomes the crucial question.

Given the predominance of qualitative self-claims, it is clear that so far US companies in the building sector mainly focus on source credibility and on a high level of information aggregation. The research underway examines the way in which additional LCA information is processed and whether process credibility impacts communication effectiveness, even in situations where the content of the message is not fully processed by the recipient (i.e. associations with the process and increased information leads to improved attitudes toward the ad, the brand, or the company).

Table 8 - ISO standards relevant for the building sector

<table>
<thead>
<tr>
<th>Standard</th>
<th>Title</th>
<th>Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO 14025 (2006)</td>
<td>Environmental labels and declarations — Type III environmental declarations</td>
<td>Provides the framework for EPDs</td>
</tr>
<tr>
<td>ISO 14040 and</td>
<td>Environmental management — Life Cycle Assessment</td>
<td>Provides LCA-based information and additional information on the environmental aspects of products</td>
</tr>
<tr>
<td>14044 (2006)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISO 21930 (2007)</td>
<td>Sustainability in building construction — Environmental declaration of building products</td>
<td>Describes the principles and framework for the environmental declaration of building products, including consideration of the building products expected service life, seen over a building’s entire life cycle. Forms the basis for programmes leading to the environmental declaration of building products consistent with ISO 14025</td>
</tr>
<tr>
<td>(2006)</td>
<td></td>
<td>Identifies and describes issues to be taken into account - for new or existing building properties - in the design, construction, operation, refurbishment and deconstruction stages</td>
</tr>
</tbody>
</table>

It is clear that such an integrated approach needs a high level of consistency, in terms of system boundaries, methodology and background data. Such a consistent framework exists in specific EPD programmes (e.g. the German AUB Environmental Declaration System), but not at international level.

In fact several studies (INTEND 2005, ERM 2002) show the differences between different EPD systems both in terms of scope and methodology. Moreover, there is not a generally accepted database for background data. Therefore, at present, EPDs stemming from different systems can neither be compared with each other nor be combined and used in a consistent approach like the one envisaged by ISO standards and CEN activities.
3.2.3 The experience in the US building sector (Steve Baer)

Steve Baer (Armstrong World Industries, US) reported the situation of LCA information and communication in the US building and construction sector. Moreover, he showed an example of environmental product information and communication at Armstrong.

In the US, the Building and Construction Sector is recognizing that the impacts of building construction and operations are significant. The US Green Building Council (USGBC) estimates that buildings contribute to: 36% of total energy use; 65% of electricity consumption; 30% of greenhouse gases emissions; 30% of raw materials use; 30% of waste output/136 million tons annually; and 12% of potable water consumption. Industry recognizes that a systems and life cycle approach is capable of supporting progress in reducing the footprint associated with buildings. The interest of companies is significantly growing within this respect. At the USGBC conference in 2005, more than 7000 people were present.

In the US building and interiors sector, several environmental product assessment and communication tools are employed, i.e.:

1. BEES v3.0 – Has increased visibility because of LEED, but is still not robust in terms of data. Uses new TRACI US specific LC impact indicators
2. Athena – Has a more robust database, is a comprehensive tool, and a modelling tool, which models the entire buildings contribution to LCA
3. US Green Building Council LEED standards – Growing in use and number, they drive suppliers and provide an opportunity for end-users to differentiate. LEED encourages the Recycle of Construction & Demolition waste and encourages the selection of products with high PC Recycle Content. At present the explicit link with the whole product life cycle is weak. However, work is currently taking place to introduce LCA and life cycle approaches into LEED 3.0.

3.2.4 EPD as a credible communication tool for sustainable clay brick products (Fritz Moedinger)

Fritz Moedinger (Gasser, Italy, and Tile Brick Europe Association) reported the experience of carrying out an EPD and using it for communication to clients at Gasser, a brick product manufacturing company in northern Italy.

The motivations to initiate an EPD at Gasser were basically twofold, i.e. to:

1. Produce a credible and science-based communication tool for sustainable clay bricks, as opposed to the many environmental claims currently present on the market, which only contain generic and sometimes misleading information
2. Intercept demand from the portion of consumers who look for credible information and may include environmental aspects in their purchasing behaviour.

In fact, according to the recent Eurobarometer (2005) survey:

- For 41% of the population, the main issue which they do not feel informed about is the impact on health of everyday products;
- 39% of the population believe that individual environmental efforts do not have an impact as long as the big polluters (corporations and industry) do not do the same;
- 39% of the population would like to reduce home energy consumption (electricity, heating, household appliances, etc.);
- 24% of the population considers environmental aspects when making large expenditures (buying a car, heating systems, build a house, etc.).
3.2.5 The user needs – The German experience (Udo Jeske)

Udo Jeske (Forschungszentrum Karlsruhe, Germany) presented the results of an on-line survey among architects and of interviews with consumer and environmental organizations, aimed at identifying the needs of users of life cycle communication in the German building sector. The survey was carried out in two phases in the period September 2004 – July 2005 within a twin project concerning the German Network on Life cycle Inventory Data and the setup of a sector-specific system for ISO-type III environmental product declarations of building products.

The survey results were based on approximately 620 received feedbacks and 309 questionnaires duly completed. The distribution of respondents is representative of the German conditions with respect to the ageing enterprise structure of the chamber of architects 95% of respondents were architects.

Approximately 24% of respondents (37% in the case of members of Friends of the Earth association) declared always making decisions based on environmental protection aspects during planning, 70% partly depending on the project. The large majority (75%) do it for personal conviction, while the percentage of clients ordering services to consider environmental protection (against payment) is very limited, i.e. respectively 18% in the case of private builders, 10% of public authorities, 2% of enterprises and practically 0% of property developer investors.

The need to include the use phase into the planning of buildings is already understood by architects and energy is a focal point concerning environmental aspects in present planning. The survey indicates an overwhelming request for environmental declarations or certification of building products for all building levels, ranging from building materials (wall construction, insulation, roofings), indirect materials (solvents, adhesives), finishing products (paints, floor coverings). This information is wanted by more than 90% of respondents. The request is just slightly lower for technical installations (heating, ventilation, air conditioning, refrigeration – 80%), cleaning processes and agents (73%) and building panels (windows, doors – 70%). In principle, this demonstrates the high potential of ISO-type III environmental product declarations in the building sector. As far as this is concerned, the role of architects appears crucial, because the decision of applying environmental aspects in planning is strongly under their control, independently of the clients’ desires. Architects express a high willingness to use LCA-data in decision making (82%), especially if integrated in usual workflow to reduce workload to acceptable levels (as strong condition for 48% of respondents). It is worth noticing that they show a significant interest in life cycle costs, which is higher than the one in environmental life cycle information.

In contrast however, at present there is only limited knowledge of existing LCA studies (25%) and little use of tools and guidelines already in existence. Moreover, there is no clear preference with respect to the format of desired information, e.g. with respect to the choice of indicators and/or a single score indicator (Figure 19).

There is an evident gap between the wishes and the current use of life cycle communication by German architects. What is clear is their request of life cycle cost and additional information (e.g. comfort, indoor air quality) beyond “conventional” LCA information.

Figure 16 – Example of environmental product information at Gasser

The experience and impacts of communicating the EPD were mixed. Image-wise the EPD did not have a measurable effect. People are overloaded with labels and for most of them an EPD is just another label, which they are unable to distinguish from the others. It sometimes takes effort to convince people that an EPD is a measurable effect. People are overloaded with labels and for most of them an EPD is just another label, which they are unable to distinguish from the others. It sometimes takes effort to convince people that an EPD is a measurable effect. People are overloaded with labels and for most of them an EPD is just another label, which they are unable to distinguish from the others. It sometimes takes effort to convince people that an EPD is a measurable effect. People are overloaded with labels and for most of them an EPD is just another label, which they are unable to distinguish from the others. It sometimes takes effort to convince people that an EPD is a measurable effect. People are overloaded with labels and for most of them an EPD is just another label, which they are unable to distinguish from the others. It sometimes takes effort to convince people that an EPD is a measurable effect. People are overloaded with labels and for most of them an EPD is just another label, which they are unable to distinguish from the others. It sometimes takes effort to convince people that an EPD is a measurable effect. People are overloaded with labels and for most of them an EPD is just another label, which they are unable to distinguish from the others. It sometimes takes effort to convince people that an EPD is a measurable effect. People are overloaded with labels and for most of them an EPD is just another label, which they are unable to distinguish from the others. It sometimes takes effort to convince people that an EPD is a measurable effect. People are overloaded with labels and for most of them an EPD is just another label, which they are unable to distinguish from the others. It sometimes takes effort to convince people that an EPD is a measurable effect. People are overloaded with labels and for most of them an EPD is just another label, which they are unable to distinguish from the others. It sometimes takes effort to convince people that an EPD is a measurable effect. People are loaded...
3.2.6 The experience at Vattenfall (Birgit Bodlund)

Birgit Bodlund (Vattenfall Generation) started her presentation by providing some introductory notes on the Vattenfall group, which is Europe’s fifth largest generator of electricity (88 TWh in 2004) and the largest generator of heat. In particular, she pointed out the main strategic goals, ambitions and core values of the company, which are effectiveness, openness and accountability.

Vattenfall retains a long tradition of disclosure and reporting. Several publications are publicly available and directly accessible from the company’s website, including various editions of Environmental reports, Life Cycle Assessment reports, and EPDs.

As far as LCA is specifically addressed, Vattenfall has long-standing experience covering all types of generation technologies, ranging from fuel-fired power plants to nuclear, hydropower and wind, as well as cogeneration plants for district heating. In addition, she provided quantitative data deriving from the assessment of the environmental performance of electricity generation and delivery at Vattenfall.

The main motivations for “translating” this experience in LCA into credible and transparent life cycle communication tools for customers and stakeholders were threefold, i.e. to:
1. Respond to Vattenfall’s strategic goals, with specific respect to aiming at being the number one for the customer and for the environment.
2. Respond to Vattenfall’s core values of openness and accountability.
3. Comply with the new EU directive on fuel mix disclosure.

Today, Vattenfall has approximately 1 TWh of electricity licensed under the Swedish Bra Miljöval quality ISO-type I eco-label system. In addition, the company has issued certified EPDs for Ca 85 TWh (85%) of its electricity production in the Nordic Countries (Figure 20).

The main advantages of EPD identified by Vattenfall are:
1. The possibility to provide information to customers.
2. EPDs are useful tools to orientate purchasing decisions.
3. Environmental management.
4. To provide support for Sustainability Reporting.
5. Evidence for continuous improvement.

The EPD process also helped Vattenfall identify and carry out a series of environmental actions, which resulted in further benefits in terms of environmental impact mitigation, cost cuts, and improved dialogue with suppliers and other stakeholders. In addition, EPDs are used to enable a dialogue with public administrations for permitting licenses. Generally improved awareness and commitment among the staff have led to an increased use of life cycle thinking as an integral part in the planning for refurbishments and investments. EPDs are also mostly used to exchange information along the supply chain, to orientate investment decisions and to choose among different technical solution alternatives.

Dr. Bodlund concluded her presentation by making the following final statements:
1. The EU Electricity Directive introduces an obligation for retail suppliers to disclose their fuel mix and some aspects of the environmental impact of the different types of generation involved in the production of electricity sold to customers.
2. The possibility to provide information to customers.
3. EPDs are useful tools to orientate purchasing decisions.
4. To provide support for Sustainability Reporting.
5. Evidence for continuous improvement.

3.2.7 The experience at British Energy (Mark Johnson)

Mark Johnson (Environment Team, British Energy) addressed the topic of utility sector-specific approaches for communicating life-cycle information to different kinds of stakeholders.

British Energy is one of the largest UK electricity generators, with a total annual output of 67-74 TWh over the past five years and a station portfolio of 8 nuclear power plants and 1 coal-fired power station.

He showed a map of different stakeholders of British Energy, and proposed a categorization of main, general and environmental concerns of stakeholders. The latter include aspects such as:
2. Other emissions.
3. Renewable electricity.
4. Radioactive discharges.
5. Production of nuclear waste/spent fuel.

After providing a series of qualitative and quantitative information on life-cycle environmental performances of different energy technologies, Mr. Johnson focused his attention on the importance of information and communication to customers. In particular, he stressed the right for consumers to know the electricity mix composition, and the relevant emissions associated to it. In order to meet these requests, British Energy has developed different communication tools in order to enable a dialogue with its stakeholders: dedicated web pages, sustainable report, etc.

Some areas for future development include the adoption of EPDs in the mainstream. The main motivation for this is an increasing regulation in the area of electricity disclosure and, more generally, the need for a greater engagement with stakeholders, through a constant dialogue with various interested parties, i.e. industry/government and industry/public dialogue. Other important triggering factors are the growing community for ethical investment and the increasing scrutiny by NGOs.

Summarizing, British Energy thinks that there is an increasing requirement for companies to engage a wider range of stakeholders on environmental issues, and different approaches suit different stakeholders. EPDs are seen as precious tools to increase transparency and communication of life cycle information in the building and energy sectors.
3.2.8 The experience at Electricité de France (Denis Le Boulch)

Denis Le Boulch (EDF R&D) gave an overview of ongoing activities within EDF with respect to LCA and communication of life cycle information.

EDF is the largest European utility with a yearly production of 570 TWh (of which 490 TWh in France). EDF has a large R&D department with 2400 employees and offices/laboratories in France, Germany, California and London. EDF has a longstanding experience in LCA. At present, a team consisting of six members deals with LCA activities at the R&D division. The main areas include the study of methodological aspects, the application of LCA to EDF France electricity generation system and environmental assessment of different technologies and systems.

LCA-based results are used both for internal and external communication. As far as the latter is concerned, different uses and a different format are applied for different users.

For example, the Sustainable Development Division asks for credible data to be used for web communication to final consumers. These are presented under the form of the so-called ‘EDF web indicator’ – a single indicator profile presenting the CO2 emissions of EDF electricity generation mix, published monthly on the corporate website. EDF mix emissions are benchmarked against European average values. Figures are calculated with monthly production data and LCA results. The general methodology is validated by the 3rd party consultant PWC. It is worth highlighting that the internet is used for a real web dialogue with consumers, e.g. to respond to questions like “How do you consider the decommissioning phase?”

More specific requests for quantified environmental information may arise by skilled participants, such as business customers, environmental experts, public administrations, etc… In those cases, the format of provided information is under strategic control and is checked and decided on a case by case basis. Usually, information is provided in the form of inventory data, in general of the EDF kWh generation mix.

In any case, high credibility is always needed, independently from the skill level of the target recipient of information. Credibility is obvious, but essential for the company.

However, EDF is not currently involved in an EPD programme, because it considers the subject still too complex. Many specific questions about the environment exist and many specific tools (LCA being one of them) are suited to give appropriate answers. Thus, this complex subject might turn into a risky one, and the environmental life cycle communication could be considered more as a risk than an opportunity. Despite that, from a methodological research point of view, EDF R&D has been involved in the development of the PCR for electricity (2004), and belongs to GEDnet.

Before developing external communication, an increased effort towards internal communication is needed, in order to convince management and staff. With this respect, internal training is considered highly important. Training is used also to convince that LCA results can represent sale arguments.

The main challenge for EDF today is to overcome the paradox regarding the communication of life cycle information: is it a risk or an opportunity? Maybe internal triggering factors and/or external stakeholder pressure will help to solve this issue in the future.
3.3 Discussion

The presentations were followed by an intense and fruitful discussion. The summary of the main discussion points and conclusions is reported in this and the next session. These results are also merged with the outcomes of the survey of EPIS reported in chapter 2.

3.3.1 Effectiveness for change?

The discussion was actually triggered by the very direct question: Are life cycle communication tools effective, i.e. do they actually contribute to changing the behaviour of consumers?

The issue of measuring the market impacts of the diffusion of ISO-type I ecolabels and other EPIS is a complex one. Little information is available in economic terms, e.g. of increased market shares, revenues, etc. It is certainly one of the priorities for future research needs.

Based on the experience of the presenting companies the response to the above question is “not yet”. Both Gasser and Vattenfall reported a very modest direct impact on the market.

The discussion which followed showed the different focus among academic/research people within the LCA community and industry and business school representatives with respect to a set of issues and priorities. For instance the first group focuses more of its attention on consistency, completeness and reliability of information, whereas the latter gives more priority to the diffusion of information to customers, even if not fully complete and consistent. The latter highlighted the problem of time dimension: if consumers are not educated and do not correctly understand the issue, then even a perfect information tool is useless. As mentioned by Smith (2005), the challenge is to find the right balance between more/disaggregated complex information and the cognitive capacity of the recipient. As far as this is concerned, there is a wide consensus that ISO-type I labels are more appropriate for communication to final consumers, while EPD are more appropriate for business-to-business (B2B) communication.

Objects of the discussion included: Credibility; the role and limits of EPD; comparability and harmonization issues; user needs and format of life cycle communication; education; possible integration of life cycle communication tools; potential role of public administrations; priorities and next steps.

3.3.2 Credibility

All presentations emphasized the importance of credibility. As clearly stated by Le Boulch (2005) a high credibility is always needed, irrespective of whether the target recipient of the communication concerned is an expert or not.

Moreover, it is worth recalling Smith’s (2005) conclusion that both source and process (generating the information) credibility are needed for effective communication. While type-I labels in the present state of the art11 are already used which follow a process similar to type-III declarations (e.g. the German “natureplus”, see Klingele & Jeske (2005). It might be interesting to further discuss the potential of a combination of both labels and type-III during the basic one.

3.3.3 Role and limits of EPD

There was a strong statement that an EPD is actually not a communication platform (which has to be both credible and visible) but rather a credible information tool. This is also in line with the conclusions of the Type III Environmental Declarations International Seminar held in Tokyo in 2005 and the outcomes of the LIFE-Project DANTES (2005). Elaborating further on this observation and basing on previous work discussed within the Task-Force and presented at the 12th SETAC Case Study Symposium (Frankl & Fullana 2006), the following proposal was made: ideally, an EPD should always be accompanied by other communication interface tools, “translating” the information contained in the EPD into an appropriate format and language to be easily understood by specific target audiences (see also section 3.4). In other words it is proposed to use one EPD as common information basis ensuring transparency and process credibility but different communication formats and channels for different target groups, i.e. B2B, business-to-consumers (B2C), business-to-government (B2G) (see also Figure 15). This line of reasoning was further presented at the 16th SETAC Europe Annual Meeting (Frankl & Fullana 2008), collecting more comments.

The proposal obtained a wide consensus as far as its conceptual structure is concerned. However, the fundamental question was raised, whether an EPD is really necessary or if just a verified life cycle information basis with agreed structure is enough. More specifically, major concerns were expressed with respect to a set of limits of current EPD systems, e.g. related to:

- Format and understandability of information
- Choice and use of indicators for decision-making
- Costs and other barriers for SMEs
- Comparability
- Verification vs. certification
- Need for harmonization at international level

At present these issues strongly hamper the applicability of EPD in business and even reduce its credibility.

Format and understandability of information

The information currently reported in most EPDs is still too difficult to be understood by the majority of people. Results are often reported in tables and absolute values of mid-term life cycle indicators, which are generally not understandable for non-experts. The format and length of an EPD is generally not standardized and can be very variable which could possibly lead to further confusion. Moreover, information recipients need a benchmark, i.e. reference values to compare with.

A possible initial solution would be to standardize the format of EPDs as much as possible. Moreover, the complete information should always be presented by way of a four-page summary.
Furthermore, it was proposed to develop sector-specific “average” EPDs, which should serve as benchmark value for the specific product group. This kind of work might be supported and commissioned by the relevant industry association. This is actually what is happening in the French building sector.

This follows in a similar line with the indication of the recent survey on Consumer demands on type-III environmental declarations carried out in Denmark (Christiansen et al. 2006). Among other things, this study recommends to also present results in graphic form, comparing the impacts of the product with the ones from spending the same amount of money on an average product from the same product group.

Of course, any benchmark should carefully represent the whole spectrum of industry, i.e. should refer to a real average situation and not just to best available technologies and best practice.

Choice and use of indicators for decision-making

While the choice of relevant indicators for each product group is made in the PCR, the problem remains of how to understand what relative importance different impact categories have among each other. Often one opinion is better in one impact category but may be worse in others. Who decides and how? As far as this is concerned, it is worth recalling the results of the German survey, which show that 47% of the respondent architects would like to receive results in the form of a single score and the same share (48%) are ready to include specific “average” EPDs for benchmark. It also implies the need for a common agreed database for background processes and materials (see below).

Other approaches are also possible, e.g. the Swedish approach of “Stippris EPD”, which foresees simplified procedures for the access of SMEs to the EPD system.

Comparability of results

Despite certification, flexibility in (some) current EPD systems is too large. Different software programmes (and background databases) give different results12. As a consequence, results are not really comparable. This inherently reduces the credibility of the tool.

The proposed solution is that EPD programmes should provide a common and agreed modular background database, to be certified just once. Also calculation procedures should be common and certified once. This would allow SMEs to supply only their own data and reduce their costs. Moreover, this would also significantly limit the costs of certification (see also below).

In some EPD programmes this is already so. For instance, the AUB environmental declaration programme for the building sector in Germany has a consistent background database. The data set is dynamic, i.e. it will be updated each time a new and verified EPD provides new information. Also the Japanese Eco-Leaf IS0-III declaration system relies on a nation-wide common database.

The development of the EU European Reference Life Cycle Data System (ELCDS) with Inventory data and Impact Assessment factors being set up at the EC Joint Research Center in Ispra, within the European Platform for LCA (http://lca.jrc.ec.europa.eu/eplca/) will have a significant positive impact as a harmonized support tool for existing and future EPD systems. The latter should also refer to the UNEP/SETAC Global Database Registry, which has a global and more comprehensive scope (www.lci-network.de/db/registry).

Another issue is the comparability of results among different countries and EPD programmes (see below).

Verification vs. certification

The recently published ISO 14025 norm does not request mandatory certification. During the discussion the question was raised, whether certification is really needed. Some expressed the opinion that certification is too costly anyway. Others opposed that it is true if there is a certified background database.

The conclusion was that certification might be needed in some sectors. In others, the market (i.e. the competitors, NGOs, etc.) will make enough pressure. Therefore the issue of certification vs. verification is an issue to be tackled with in the PCR. In any case, third party verification is strongly recommended and first-party review is not considered appropriate to ensure enough credibility.

Need for harmonization at international level

With a rapidly increasing global market and society, the national structure and organization of eco-labelling and environmental product declarations systems actually raises a number of problems. In fact, since several key aspects are diverse in different EPD programmes and PCRs (e.g. scope of LCA, existence and quality of background database, format, verification and/or certification criteria, etc.), results related to the same product category actually differ from country to country. In short, different EPDs usually give incomparable results. In turn, this increases confusion on the part of customers and decreases process credibility. Clearly, there is a strong need for harmonization at international level. Action should be taken as soon as possible, because the longer the issue is left, the more difficult will it be to harmonize different programmes. To this end, the market is currently working on this issue, trying to harmonize both ISO-type III programme rules and PCRs.

It was highlighted from several parts that a truly global “average” EPD is needed. This is a call to the LCA community, and the UNEP/SETAC Life Cycle Initiative Task Forces to take immediate action to produce guidelines and obtain effective harmonization, first at regional (e.g. Europe, Asia) and eventually at worldwide level. What is needed are harmonized PCRs and sector-specific “average” EPDs for benchmark, all within a global framework supported by UNEP/SETAC.

Although it was not explicitly discussed at the meeting, very similar problems do exist for different ISO-type I ecolabel schemes, since product category classification and environmental award criteria are usually different (sometimes substantially different). The problem can actually be even worse than for ISO-type III declarations, because many ecolabelling schemes were founded a long time ago and are well established. Changes and harmonization are therefore a real challenge in this respect.
3.3.4 User needs and life cycle information for change

What are the user communication needs? Do the currently available and used EPIS meet them? Is the provided life cycle information appropriate to actually induce a change of behaviour of customers in the building and construction sector as well in the energy sector? The response to these questions is mixed. As already mentioned, the response according to the presentations held at the meeting would be “not yet”. A general, there is little information available on this question so far.

As for the building sector, it is well recalling the request of German architects for a tool integrating life-cycle information in their everyday working design tools (Jeske & Klingele 2005). Moreover, several participants at the discussion highlighted the need to look at the whole building level and not just at its components. This implies looking at the whole life cycle of buildings, including the use phase, which has often the most significant share of impacts. The forthcoming work of CEN TC155 goes precisely in that direction.

The recent study in Nordic countries identifies consumer demands on ISO-type III environmental declarations and makes the strong recommendation to present results in graphical form benchmarking the impacts of the product with the ones from spending the same amount of money on an average product form the same product group (Christiansen et al 2006).

Although little discussion was focused on this aspect, recent surveys (Frankl 2005, Menichetti 2006) show that companies are increasingly interested in showing progress, i.e. the environmental improvement of their own products. In current EPDs this is not done (although possible in principle in the section “other information”).

In general, it can be said that so far there is been more attention on the supply of life cycle information than on the demand-side. Overall, there is a clear need for further work in the area of identifying user needs and adopting the format and contents of life cycle information in order to induce a real change in the behaviour of consumers.

3.3.5 Next steps

The following answers were given to the direct question “Please choose the most important thing to do next”:
- Talk to and engage influential architects and try to exploit new communication tools;
- Develop the market, i.e. the most important thing is to understand how the process is being communicated and to explore what is driving the understanding of the different stakeholders;
- Develop a consistent framework for the construction sector, from single products to the whole building level; provide guidance of integration/interaction of other products/parts with building products;
- Help EC to ask business to provide LC information;
- Communicate experiences with the use of EPDs;
- Make the use of EPDs visible to architects. Integrate the info into public databases/portals;
- The task force should concentrate on describing current tools and recommending best practice within a global scope.

3.4 Conclusions and Future Research Areas

3.4.1 Main Conclusions

3.4.1.1 State-of-the-art of environmental product information and life cycle communication tools in the building and energy sectors

A clear outcome of both the survey and the workshop is that a wide range of environmental product information tools is used in the two sectors. In particular, the building and construction sector is very well represented in ISO-type I ecolabelling systems (e.g. in Germany 1944 products over 3650 labelled with the Blue Angel are products related to buildings and constructions). Furthermore, it is a very active sector in the development of ISO-type III declarations, for which several sector-specific EPD programmes exist. In turn, several energy companies are very active in the field of LCA and are promoting the use of EPDs. At the same time, ISO-type II claims and ISO-type I like guarantee labels are widely used to communicate to customers with respect to “green electricity” i.e. electricity supply from renewables and/or fulfilling certain environmental criteria. The differences between the two sectors might also be explained by the different scope and nature of the product category, i.e. a wide range of products in the case of the building sector and a commodity (electricity and/or heat) in the case of the energy sector.

The link with life cycle information obviously differs, i.e. it is limited in ISO-type II environmental claims, it is usually embedded in the criteria of ISO-type I ecolabels, and it is fully and explicitly expressed in the case of ISO-type III environmental declarations. The level of execution is quite sophisticated, e.g. in terms of combination of lexical and visual communication. Moreover, in the cases where quantitative information is provided, it is usually combined with qualitative information as well.

3.4.1.2 Who are “the users” of LC information? Which tools are used today to communicate with whom?

Demand for life cycle information is generally increasing because of growing legislation pressure, increasing NGO scrutiny, growing ethical investment community, and last but not least (slowly) increasing requests for information from customers. Relevant stakeholders are final consumers and business clients, public administrations and legislators, financial stakeholders, NGOs and other societal stakeholders at large. Different approaches suit different stakeholders and consequently different product-related communication tools are used to communicate with different stakeholders.

In the building sector, the main potential users of life cycle information are home builders, architects, private subjects and public authorities. The survey in the US shows that information is predominantly provided in the form of qualitative self-claims (Smith 2005). There is also some concern with respect to too generic information and sometimes bad and misleading claims being present on the market (Moedinger 2005).

The use of ISO-type I ecolabels for building and construction is also widely diffused, depending on the country. With the only major exception of China, this mostly occurs in developed economies, i.e. in several European countries plus Japan and South Korea.

Despite a significant increase of EPD activities in various countries, the diffusion and use of ISO-type III quantitative declarations is still slow.

However, the German survey shows that a potential demand from architects for quantitative information at all levels of the building cycles is very significant (Jeske & Klingele 2005). This is a very important observation because architects can ultimately play a major role with respect to the integration of environmental aspects in planning and design, irrespective of actual demand from their clients. In many cases they can propose innovative solutions and convince clients to adopt them.

In the energy sector, ISO-type I ecolabels are not widely diffused, i.e. only a few labelling schemes include the product group energy (electricity and/or heat). One example is the Swedish label Bra Miljöval, which is applied by Vattenfall. As mentioned in sections 2.4.2 and 2.4.3 also in the energy sector, the use of ISO-type II
environmental claims dominates communication to customers with respect to green electricity marketing (EDF also has its own brand for wind energy). In some countries, ISO-type I-like labels offer a higher level of credibility through third-party verification and guarantee committees, usually formed by environmental NGOs and consumer associations.

However, as illustrated by all three utilities presented at the workshop, the use of quantitative life cycle information is increasing. First of all, it is used in internal communication. Secondly, it is used for communication with planners and politicians, also responding to the increasing request of transparency from legislators. In the long term, all present utilities consider EPD as a valuable tool to respond to the demand for openness and accountability in the sector. Vattenfall also uses quantitative life cycle information for supply chain management. Though despite extensive reporting, so far very few customers on the market ask for Vattenfall’s EPDs. Big users are interested mainly in price; they just thank when they receive the EPD.

As a concluding remark it is interesting to see how the utilities use ISO-type I or II labels to communicate to final consumers, while they use tailored information based on LCA or EPD to target other stakeholders.

3.4.1.3 What are the priorities? – The need for a parallel strategy

As already mentioned, the discussion about priorities highlighted a different focus among research/academia/ LCA experts and industry. The former focused their attention more on the issue of credibility and a consistent framework of the tools, with a particular emphasis on the needs to improve EPDs and make them more affordable. On the contrary, while not contesting the validity of EPD data, some industry representatives clearly stated that the first priority is to involve market actors, i.e. increase and improve communication. As a valid example of this approach, it was mentioned that 7000 architects participated in the last meeting of the US Green Building Council last year.

Too much focus of discussion on EPD was challenged with respect to priority-setting: “Who cares? The important thing is how to communicate to the customer to change his/her behaviour, not if our info is (perfectly) reliable”; “Doing good is better than doing nothing – Doing good is better than never doing perfect”. In the USA, the government will do nothing. Customers will lead the search for (life cycle) information. Only 1% of customers ask for info: Why build an unasked-for-complicated system?

Both opinions are fully respectable and contain important elements of truth. This highlights the need for a parallel strategy:

- Leaders in business and industry should continue and further increase their efforts in marketing and use of Environmental Product Information Schemes even if their communication tools are imperfect. This has the objective of significantly widening the audience and increasing sensitivity and awareness of customers with respect to the environmental performance of products. Basing on the declarations of presenters about the next steps to be done, this is a top-priority.
- At the same time, the LCA community and researchers, in collaboration with industry, should make an effort to set up a consistent framework for life cycle communication tools, improve reliability of data and credibility of the process. Moreover, focus should be given to the setup of communication interfaces, e.g. suitable and understandable indicators, which satisfy user needs (see also section below). EPDs potentially have a major role to play in this process, although significant effort is needed in order to improve their:
  • Credibility and comparability (e.g. in terms of reliability of background data and consistent scope)
  • Affordability (e.g. in terms of decrease of costs and other barriers for SMEs)
  • Format and benchmarking (to increase their understandability).

Public administrators should support both strategies and facilitate a consistent approach, i.e. their convergence in the medium-long term.

3.4.1.4 Integration of communication tools – A possible solution?

On one hand EPDs are considered a valid and credible life cycle information basis, but their effectiveness as a communication tool and their affordability and diffusion are significantly hampered by a series of barriers. On the other hand, ISO-type I eco-labels and ISO-type II environmental claims are much more suited for communication to customers and stakeholders, but they suffer from other important limitations. In particular, ISO-type II claims rarely give a complete picture of environmental impacts and their credibility can be questioned in some cases. Moreover, all communication systems are not harmonized, neither as far as countries nor product categories and industry sectors are concerned. Therefore, at present it must be stated that comparability of products is only seldom guaranteed, and even then only in very specific circumstances.

Is a better integration of communication tools a possible solution for these challenges? Is this integration feasible and desirable? The response is: Yes. The proposal is to set up a strategy based on three major action lines:

1. Create a highly credible life cycle information basis, building on two main pillars of EPD, i.e. the involvement of stakeholders in the development, review and approval of PCRs and the 3rd party verification and/or certification. This is key to guarantee credibility and accountability.
2. Develop a set of target-specific “Communication interface tools”, which “translate” this information basis into a communication format better suited to the recipient’s understanding capacity. These tools will take into account the difference in target audience, as well as country and product group-specific aspects. Case-by-case, according to its own communication and marketing strategies, a company might use list of non-exhaustive, some are:
   - ISO-type I eco-labels, ISO-type I like certifications, “improved” EPD with benchmarking, marketing brochures, etc. for communication to consumers (business-to-consumers B2C)
   - ‘Improved’ EPD with benchmarking, ISO-type I eco-labels, ISO-type I like certifications, specific brochures, etc. for communication to public administrations (business-to-government B2G)
   - ‘Improved’ EPD (with or without benchmarking), ISO-type I like certifications, eco-design tools, marketing brochures, etc. for communication to clients (business-to-business B2B).

The term ‘Improved EPD’ stands for a declaration developed in an EPD programme, which overcoming the present barriers discussed in the previous chapters, e.g. which:

- Uses a consistent background database in creating comparability
- Has a standardized reporting format
- Reduces costs and increases affordability for SMEs
- Allows benchmarking with average sector value, Allows monitoring and reporting progress, etc.
- Improvement of cooperation and communication between involved scientific boards/bodies in type-I label managing boards (if applicable) and type III-declaration programme managers.

![Figure 21 - Proposed future integration of life cycle communication tools](image-url)

The term ‘improved EPD’ means an environmental declaration developed in an EPD programme, which overcomes the barriers of present programmes (as discussed in the previous sections).
The proposed approach envisages the following activities:
- On the information basis side:
  - The development of PCRs and average product group specific declarations.
  - The identification of users' needs in terms of complementary information and the production of data.
  - The progressive harmonization of PCRs among different systems.

- On the information use side:
  - The development of target-specific Communication interface tools (e.g. interface with ISO-type I or ISO-type III like criteria, eco-design tools, benchmarking of environmental declarations, etc.)
  - The progressive harmonization of ISO-type I label criteria with PCRs.
  - The progressive harmonization of ISO-type I labels between different countries.

Today, such an approach would allow companies to provide just life cycle information, as long as it is in the standardized format prescribed by the relevant PCR and it is third party verified/certified (according to the specific PCR requirements). This would also allow companies in the supply chain (in particular SMEs) to provide just gate-to-gate information.

In the future, with the improvement of EPD systems, the same companies might want to apply and to use EPDs as information basis, SMEs could also participate, profiling from the concept of modular EPDs, as described in the ISO 14025 standard.

Such an approach is actually followed by one branch of the building sector in Sweden (water, heating and ventilation), which developed two tools to assist information users (consumers). The first is an interpretable tool allowing users to better understand the information presented in the declaration and the environmental significance. The second is a decision making tool to assist users when choosing between potential suppliers of components, etc. However, the two tools have not yet been released and it is unclear whether they will be in the future. This reflects the difficulties of reaching consensus in terms of developing commonly agreed criteria.

In principle, the proposed approach and strategy applies to any product category. For some specific product groups, complementary information on health & safety, risk and life cycle costs may be added to satisfy users’ needs.

As far as the building and construction sector is concerned, the following observations can be drawn:
- As shown in the survey, health, safety and life cycle costs are important user needs, which must be included in the final communication tools.
- In several EU countries (i.e. Germany, France, UK, Netherlands) a sector-specific declaration programme exists, which has or is close to having all the characteristics of an ‘Improved EPD’ programme. Therefore, in those countries the use of EPDs is either already possible today or in the very near future.

A harmonization of PCRs among different systems (including cross-sectoral systems like the Swedish EPD system) is needed at European level, at least in the mid-term. This issue is currently addressed by CEN TC 250: WG3 on working on a PCR document for building products which should be the “master PCR” for the national programmes in the future. This might also be the starting point for a worldwide harmonization including in the process, among others, the Japanese EcoLeaf and the South Korean EDP programmes as well as other emerging programmes in other countries (e.g. China).

- A harmonisation of background data is also needed. Current work within the European Platform for LCA goes in that direction (Kreissig et al 2006). CEN TC 250 WG2 is also preparing a technical report on this issue, giving guidance and recommendations. Where applicable, reference to the UNEP/SETAC Global Database Registry is also recommended (UNEP/SETAC GDR 2006). Work towards harmonization of data within this initiative is expected in the future as well.

- A consistent and holistic framework “product-building” has to be established. Current ISO and CEN work is pointing in that direction.
- Environmental criteria of existing and forthcoming ISO-type I ecolabels should be harmonized with existing and future PCRs. The harmonization of the latter might also help the harmonization of ecolabels, first at European then at global level.

As for the energy sector, the following remarks hold:
- With the increase of distributed generation, health & safety and life cycle cost information might be increasingly requested by users.
- Risk is of relevant information for specific energy technologies (e.g. nuclear)
- No sector-specific EPD programmes exist.
- None of the existing National EPD systems can be considered an ‘Improved EPD’ programme, e.g. in terms of costs and affordability for SMEs, consistent background database, etc.)
- On the contrary, work on PCR harmonization is more advanced than in other sectors. The PCR of electricity (2004) was the first one to undergo a real open consultation at European level. It is now being reviewed again. An enhanced focus on distributed generation and renewable energy sources would be recommended.
- Harmonization of background data and comparability of results are important at regional level, but maybe less so at global level (e.g. electricity produced in the US will not be used in Asia).

- In the future, the few ISO-type I ecolabels including energy as a product category and the many ISO-type II like labels should take into account the developed PCRs.

3.4.1.5 Potential role of public administrations

Public administrations at both national and supra-national level can potentially play a major role in fostering the proposed strategy. Possible action lines identified at the workshop include:
- The setting-up of national and supranational LCA databases for background processes and materials. The EC has started to build a European reference LCA database (ELCD/EPLCA 2006).
- Other countries are exploring the opportunity to replicate this at national level. Finally, UNEP/SETAC is going to make a similar exercise with worldwide scope within the Global Database Registry (UNEP/SETAC GDR 2006).
- Foster the use of life cycle communication tools within a certain market by regulations. The most clear example is the one by the Catalan Government which issued new legislation in relation to life cycle information for the building and construction sector, effective in August 2006: “Decreto 21/2006, Regulation for the adoption of environmental and eco-efficiency criteria in buildings”. This new regulation introduces a very strong Top-Down approach, as it states that: “at least one whole family of products must be labelled through type I or type III EPD (ecolabelling in each new building)”. - Foster the use of life cycle communication tools being used within the framework of Green Public Procurement (GPP) initiatives. The potential dimension and impact of GPP is very significant.
- Authorities should support stakeholders to include EPDs into their decision-making process; they should ask for emissions info disclosure.
- As already mentioned, national Ecolabelling programme managers (which include ministry representatives in the Competent Bodies) should use PCRs in the process of criteria setting.
- Authorities should help giving importance to EPD. Focus the indicators set to be understandable/comparable.

One important indication which emerged during the discussion was that ISO-type I and ISO-type II should by all means remain voluntary tools. Authorities should make sure that LCA and the communication of life cycle information does not become a mandatory instrument. Rather, they should promote their use in business as an important means towards product innovation and support business to take leadership. This does not exclude that mandatory instruments may indirectly trigger the use of voluntary life cycle communication tools as is currently happening in the energy sector with the EU Directive on fuel disclosure [Directive 2003/54/EC] and might also occur with respect to the energy certification of buildings and the implementing measures of the framework directive on Energy Using Products [EuP DIR 2005/32/EC]. However, a clear distinction has to be made between the possible mandatory use of simplified Life Cycle Thinking tools (in various possible forms, within legislation measures aiming at reducing overall life cycle impacts of products) and the mandatory use of full LCA and EPIS fulfilling ISO standard requirements.

This was the opinion expressed by the majority of participants. However it is worth highlighting that some experts objected that a combination of mandatory and voluntary tools might be more effective.


16. For example, just one large Japanese utility participates in the EcoLeaf system. Despite “the on the way to EPD” and “stepwise EPD” procedures, no SMEs from the energy sector are included in the Swedish EPD system so far.
3.4.2 Needs for future research

The discussion and conclusions highlight several needs for further research in three main areas:
- The diffusion and effectiveness of life cycle information communication tools (the demand-side)
- The improvement of life cycle information tools (the supply-side)
- The limits of LCA and the need of complementary assessment tools and indicators.

Furthermore, the communication needs of other stakeholders should be addressed in more detail. In the case of the building sector, the crucial role of architects and building planners is recognized. The same type of analysis carried out in Germany should be extended to a wide set of countries.

Finally, the communication needs of investors and the financial sector in general has been quite unexplored so far. Given the influence of these stakeholders, this is also another key research field for the future.

3.4.2.1 Effectiveness of life cycle communication (demand-side)

In different countries an important uptake of EPS on the supply side can be observed, e.g. in terms of labelled product and awarded firms. However, there is much less information about the real impacts on the market, e.g. in terms of increase of sales and market share. It is very uncertain how the information is influencing the purchasing decision. The issue is complex because there are direct and indirect effects to be considered. Moreover, there is always a gap between consumer declarations and actual consumer behaviour. People tend to say one thing about their preference for good environmental information and better performing products, and another when it comes down to the actual decision of purchasing them.

Although some information exists (e.g. Rubik & Frankl 2005, EVER 2006), it does not refer to the two key industries: energy and building. This is certainly a major area for future research. The focus on market impacts was also the main object of the 2nd International expert workshop on “Sustainability Communication in the Building Sector in different World Regions – Connecting Life Cycle Information with Market Impacts”, organized by the UNEP/SETAC Task Force on Communication of Life Information in Stuttgart in December 2006 (for preliminary results see section 3.4.3).

Federal Government is very unlikely. However, this situation could be significantly different in the single States and/or at local level (e.g. with respect to GPP initiatives).

In any case, the possibility and opportunity of using life cycle information (or parts of it) within legislative mandatory tools, including mandatory EPS, should be further carefully studied and explored.

3.4.2.2 Improvement of life cycle communication tools (supply-side)

In the previous chapters, many aspects of existing life cycle communication tools to be improved have been identified and discussed. Main research areas in this specific respect include:
- The development of target-specific communication interfaces. One example of which is the development of eco-design tools for architects.
- The development of branch-specific reference database and of appropriate verification procedures.
- The analysis and exploitation of possible synergies between ISO-type I labels and ISO-type III declarations based on similar procedures and the same information basis.
- The potential role of inter-programme communication of scientific bodies/boards in type-I and type-III label processing to enhance consistency and credibility of both labels.
- The development of guidelines for SMEs with respect to existing/developing modular EPD programmes.
- The analysis of modularity in global B2B communication (problems and solutions).
- The harmonization of PCR and ISO-type I label criteria. As far as this is concerned, sector-specific priorities should be identified and a program of work established. For example, comparability of products really important at global level? It might well be for a set of building products, which are easily exported (e.g. insulation materials), but it has very little significance for electricity.
- The whole area of mutual influence of labels and trade.
- The possible use of life cycle information (or part of it) under various forms for mandatory legislative tools, including mandatory EPS (e.g. the energy label and building certification).

3.4.2.3 Limits of LCA and needs for complementary assessment tools and indicators

One aspect clearly emerging from the debate is that while current main life cycle communication tools almost always focus solely on environmental aspects, there is an increasing request for other information with respect to the economic, social and health dimensions. In fact, the whole area of “product sustainability information” is still to be developed. Future research is needed with respect to the integration of:
- Life cycle costing (LCC)\(^{17}\)
- Social aspects\(^{17}\)
- And health impacts

Some attempts at this are already done in specific sectors and companies (e.g. FSC certification and BASF eco-efficiency analysis), but a larger effort is required to develop a consistent and comprehensive framework for assessment and communication of product sustainability performance.

Another issue is related to the limits of LCA with respect to specific environmental issues and impacts. While LCA is fully satisfactory regarding “conventional” impact categories, such as global warming, ozone depletion, acidification, eutrophication, etc., it shows substantial limits in other areas. Despite considerable scientific progress, there is so far no commonly agreed methodology concerning the assessment of:
- Toxicological impacts
- Biodiversity losses

\(^{17}\) Significant work on LCC has been conducted within SETAC Europe at the level of the SETAC-LCA Working Group (Wiesenthal et al. 2006) and within the current DANTES program on Modelling and Evaluation for Sustainability (Wiesenthal et al. 2006).

As for biodiversity, several proposals exist but there is no general agreement on a methodology to be used in LCA studies. This is a very important issue for all bio-based products and services, including building products, electricity and heat from biomass and biofuels. It is crucial to address, assess and communicate properly the potential environmental impacts of renewable resources (both materials and energy) in a consistent and holistic framework, exactly as it is done for industrial materials, otherwise huge issues may arise in the long run. The forestry industry has already taken the issue seriously by developing sustainable forestry guidance and labels to ensure production is controlled. Despite several recent LCA studies, more effort is required at the level of agriculture products, especially in view of their greater use in future economy as raw material rather than food.

It is clear that further significant scientific research efforts are needed in all the mentioned areas.

In the meanwhile, it is paramount that complementary information (either qualitative or quantitative) is integrated in life cycle information tools, recognizing in a transparent way the limits of LCA rather than using it in an imperfect way. LCA cannot solve all questions and will give wrong answers if it is asked wrong questions. LCA is a very beneficial and effective decision-making support tool if it is correctly applied and used in combination with other assessment tools. (Future) life cycle communication tools must reflect this. This is precisely what is proposed in our conclusions (Figure 15). It is worth remembering that some current EPDs actually already incorporate such aspects under the item “other information”. For example, Vattenfall’s EPD on electricity include risk assessment (on nuclear) and biodiversity losses information. The challenge is to pass from information provided by one company to a commonly agreed methodology for reporting such aspects.
3.4.3 Preliminary results from the 2nd Expert Workshop “Sustainability Communication in the Building Sector in different World Regions – Connecting Life Cycle Information with Market Impacts”

A second international expert workshop was organized by the UNEP/SETAC Task Force on Communication of Life Cycle Information at the University of Stuttgart, on December 6th, 2006.

At the Stuttgart workshop, around 50 experts from all over the world were discussing the topic of “Sustainability Communication in the Building Sector in different World Regions – Connecting Life Cycle Information with Market Impacts”.

The results have shown a complex picture of how to communicate in different markets. Several presentations showed the need for communicating environmental information. Integrated approaches are implemented in a very successful way; an excellent presentation on the BASF Eco-Efficiency approach demonstrated the benefit for the involved parties.

When researching the role of LCA in environmental communication it became obvious that in the B2C sector, it has to be a trade between complexity and credibility. LCA helps to add credibility in advertising but the influence of the branding of the company is often much higher.

Some conclusions from the different regions are presented below:

- The American perspective has shown that LCA is on the way to being integrated in building assessment schemes like LEED V3 or GreenGlobe. The building assessment schemes seem to be the main driver for sustainability communication on the product level. Many material producers already have taken up the topic and provide environmental information. Nevertheless, to use this information in an efficient and consistent way, an EPD scheme harmonizing content and format is the most beneficial.

In Europe, the European Commission pushes the concept of EPDs as a complementary part of the technical information of the harmonized product standards. The construction product directive (CPD) addresses the topic by the essential requirement N° 3 – environment, health and safety. Since several EPD systems are already in place in Europe, the commission mandated European standardization (mandate M350) to avoid trade barriers by harmonized EPD systems. CEN TC 350 is writing European standards on EPDs for building products and the way how to use them in building assessment. Having said that, the European commission sees EPDs as a voluntary effort of the building and construction sector.

The Asian perspective gave a good insight view into the Chinese situation of the building and construction sector. There is a huge demand for building space; in the next 25 years China will more than double the available area in buildings. This leads to big problems with the availability of resources, the energy demand and the related environmental impacts since the energy supply in China is mainly based on coal. Only 3-5% of the new buildings are environmentally friendly or energy saving buildings.

Therefore the main challenge is how to lower the energy demands of the construction industry and to raise the performance of the new buildings. The life cycle approach helps to focus on the most important issues. Today a type I label for building products is implemented and used, in addition a type III EPD system is on the way, but more research on databases and certification procedures is necessary until the whole concept is applicable in practice.

The UNEP Sustainable Building and Construction Initiative (www.sbc.uni-stuttgart.de) is a new platform to foster sustainable development in this sector at international level. Key objectives are the implementation of the life cycle assessment approach in the building and construction sector and to move beyond recommendations towards implementation. The SBCCI partners with the UNEP-SETAC Life Cycle Initiative to allow consistent methodological approaches.

In the previous chapters the need to develop a parallel strategy with manifold objectives was highlighted. Such an approach follows four main lines of interventions:

1. Significantly enhancing communication and marketing of EPIS on the market, in order to strongly improve knowledge and awareness of customers and other stakeholders on life cycle environmental performances of products. This is recognized as a top-priority, even if present communication tools are imperfect.

2. Improving and harmonizing existing life cycle information tools, starting from their positive aspects. This includes important efforts to set up a consistent framework, improve reliability of data and credibility of process. Moreover, a strong effort towards harmonization is needed, first at regional then at global level.

3. Integrating the different communication tools, focusing on target-specific communication interfaces. This is highly needed to avoid double work, concentrate efforts and resources, while significantly improving understandability and effectiveness of communication to stakeholders.

4. Implementing a clear shift from pure environmental life cycle assessment towards a sustainability analysis of products. While several attempts and approaches exist, significant effort is needed to develop a consistent methodological approach.

Bearing these lines of action in mind, a set of recommendations can be drawn for a set of different stakeholders, including:

- Business and industry
- Policy-makers
- Research and Academia
- LCA and EPIS community (GEDNet, UNEP/SETAC, etc.)

The first general recommendation is that LCA, EPIS and other product information tools should be implemented as a combination of voluntary and obligatory instruments.

4 Recommendations

Business and industry

The primary purpose of EPIS, life cycle and sustainability communication tools is to become effective instruments bringing added value, competitive advantage and fostering innovation in business and industry. Therefore, industry has a major role to play in this respect.

Recommendations include:

- Industry should take the lead in marketing and communication of life cycle information. First-runners have to push forward dissemination of information, even with imperfect communication tools.

- At the same time, industry can play a key role in improving the reliability of data. Existing approaches dealing with specific data and confidentiality issues should be further improved. At the same time, it is crucial that industry contributes to the setting-up of 3rd party-verified reference background databases (this is already happening with the EU Platform for LCA).

- A particularly pivotal role can be played by industry associations: It is recommended that they develop product group-specific PCPs, produce “average” EPIS for benchmarking, develop templates to foster and make involvement of SMEs easier.

- Industry should collaborate with research, academia, LCA experts and EPIS programme managers to strive for harmonization of EPIS, first at regional and then at global level.

- It is recommended that industry look in more detail at the demand-side of life cycle information. The communication needs of specific user groups should be addressed in particular; not only customers but also other key subjects like the financial sector and investors.

Policy-makers

Public administrators at both national and supranational level can play a major role to improve and foster...
the use of EPIS and life cycle communication tools. This can be done at different levels, e.g.:
- Foster and encourage incentives for the use of life cycle communication tools, e.g. within the framework of Green Public Procurement.
- Find appropriate ways to support the participation of SMEs.
- Support and develop common background processes and materials or LCA database at national and supranational level (currently happening in Europe).
- Facilitate harmonization of EPIS worldwide.
- Support the integration of different communication tools, e.g. ISO-type I labels with ISO-type III declaration systems (Ministry representatives often make up part of national ISO-type I labelling managing boards). This might include using similar processes of EPD-PCR open consultation review and approval) to establish criteria of eco-labels.
- Ensuring more stringent controls and measures against bad claims.
- Support the integration of life cycle thinking and assessment in public education programmes and training.
- Make sure that the use of LCA and of EPIS remains voluntary instruments aimed at fostering innovation and competitive advantage. These instruments might help to define policy objectives (e.g. as it is foreseen by the EuP Directive on Energy using Products). However, this should be a result of deep stakeholder involvement and collaboration and not of a mandatory top-down approach.

**Research and Academia**

As highlighted in previous chapters, there are still important gaps in respect to both more basic scientific assessment issues and the development of user-friendly indicators and communication interfaces. Recommendations to research and academia include:
- Improve the scientific basis of problematic environmental impact assessment indicators still evident (e.g. toxicity, biodiversity, abiotic resource depletion).
- Improve the understandability of indicators.
- Collaborate with industry to improve data quality and availability.
- Collaborate with industry and other stakeholders to integrate LCA with LCC. In the case of the building sector this aims at closing the gap between architects' needs and the present state-of-the-art of the tools.
- Collaborate with industry and other stakeholders to develop appropriate target-specific communication interfaces. In the case of the building industry this includes the development of eco-design tools to be integrated into the usual workflow of architects and planners.
- Collaborate with industry and other stakeholders to develop and set up a consistent and comprehensive framework for sustainability product performance indicators.
- Increase the integration of Life cycle thinking, life cycle management and LCA in education and training programmes.

**GEDNet, UNEP/SETAC and LCA community**

The LCA community, GEDNet and the UNEP + SETAC Initiative play a key role with respect to:
- Harmonization issues of EPIS.
- Describing the state-of-the-art of life cycle communication approaches in different parts of the world.
- Providing guidance for best practice in different industry sectors at global level.

With this specific regards, the set of recommendations mentioned above is relevant to the activities of the Phase 2 of the Life Cycle Initiative (2007-2012), which is going to be structured in five main Work Area Interest Groups (see Figure 24):

- Life Cycle Approaches Methodologies (including data, methods, case studies, etc.)
- Life Cycle Approaches for Resources and Materials (including natural resources, chemicals, water, energy, etc.)
- Life Cycle Approaches for Consumption Clusters (structured in housing, mobility, food and consumer products)
- Life Cycle Approaches for Capability Development (including institutional empowerment, training, curricular development, etc.)
- Life Cycle Management in Businesses and Industries.

The Figure indicates the relationship among the WAGs. In this way it is expected that the impact of the Life Cycle Initiative will go beyond the work on methodologies and capacity building, to practical "applications" that make a difference in the real world and thus contribute more effectively to the ongoing international efforts to change unsustainable patterns of consumption and production.
5 References


For reference to Life cycle costing also refer to:

www.dantes.info/Publications/Publications-info/publ_State_of_the_art_LCA-LCD_tools.html, and

www.dantes.info/Tools&Methods/Environmental-valuation/environ_asses_lcc.html


5 References


Fullana P., Gazulla C., Frankl Pand Sammiter S. (2006) Type I and type III (EPD) ecoclassification in public policy: the example of Catalonia and the building sector. Oral presentation at the 13th SETAC Europe Case Study Symposium, Stuttgart, Germany, 7-8 December 2006


### Annex 1 - List of workshop participants

<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
<th>Country</th>
<th>Email Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrufí Marta</td>
<td>ADIGSA</td>
<td>Spain</td>
<td><a href="mailto:martaarrufi@gencat.net">martaarrufi@gencat.net</a></td>
</tr>
<tr>
<td>Baer Steve</td>
<td>Armstrong World</td>
<td>USA</td>
<td><a href="mailto:SRBaer@armstrong.com">SRBaer@armstrong.com</a></td>
</tr>
<tr>
<td>Bodlund Birgit</td>
<td>Vattenfall</td>
<td>Sweden</td>
<td><a href="mailto:birgit.bodlund@vattenfall.com">birgit.bodlund@vattenfall.com</a></td>
</tr>
<tr>
<td>Cardim Arnaldo</td>
<td>Politecnica de</td>
<td>Brazil</td>
<td><a href="mailto:Cardim@upe.poli.br">Cardim@upe.poli.br</a></td>
</tr>
<tr>
<td>De Haes Udo</td>
<td>CML</td>
<td>Netherlands</td>
<td><a href="mailto:udo.dehaes@cmi.leidenuniv.nl">udo.dehaes@cmi.leidenuniv.nl</a></td>
</tr>
<tr>
<td>Ellingsen Harald</td>
<td>SINTEF</td>
<td>Norway</td>
<td><a href="mailto:harald.ellingsen@sintef.no">harald.ellingsen@sintef.no</a></td>
</tr>
<tr>
<td>Fet Annik</td>
<td>Norwegian University</td>
<td>Norway</td>
<td><a href="mailto:Annik.Fet@iot.ntnu.no">Annik.Fet@iot.ntnu.no</a></td>
</tr>
<tr>
<td>Frankl Paolo</td>
<td>Ecobilancio Italia</td>
<td>Italy</td>
<td><a href="mailto:paolo.frankl@ecobilancio.com">paolo.frankl@ecobilancio.com</a></td>
</tr>
<tr>
<td>Fysdalndal Jeppe</td>
<td>LCA Center Denmark</td>
<td>Denmark</td>
<td><a href="mailto:jpf@force.dk">jpf@force.dk</a></td>
</tr>
<tr>
<td>Fullana Pere</td>
<td>ESCI</td>
<td>Spain</td>
<td><a href="mailto:pere.fullana@admi.esci.es">pere.fullana@admi.esci.es</a></td>
</tr>
<tr>
<td>Garcia Jaume</td>
<td>ESCI</td>
<td>Spain</td>
<td><a href="mailto:jaume.garcia@admi.esci.es">jaume.garcia@admi.esci.es</a></td>
</tr>
<tr>
<td>Gazulla Cristina</td>
<td>ESCI</td>
<td>Spain</td>
<td><a href="mailto:cristina.gazulla@admi.esci.es">cristina.gazulla@admi.esci.es</a></td>
</tr>
<tr>
<td>Jensen Allan Astrup</td>
<td>Force Technology</td>
<td>Denmark</td>
<td><a href="mailto:aaj@force.dk">aaj@force.dk</a></td>
</tr>
<tr>
<td>Jeske Udo</td>
<td>Forschungszentrum</td>
<td>Germany</td>
<td><a href="mailto:Udo.Jeske@ktc-zts.boku.de">Udo.Jeske@ktc-zts.boku.de</a></td>
</tr>
<tr>
<td>Johnson Mark</td>
<td>British Energy</td>
<td>United Kingdom</td>
<td><a href="mailto:mark.johnson@british-energy.com">mark.johnson@british-energy.com</a></td>
</tr>
<tr>
<td>Jungbluth Nais</td>
<td>ESU-services</td>
<td>Switzerland</td>
<td><a href="mailto:jungbluth@esu-services.ch">jungbluth@esu-services.ch</a></td>
</tr>
<tr>
<td>Kreissig Johannes</td>
<td>PE Europe</td>
<td>Germany</td>
<td><a href="mailto:j.kreissig@ipe-europe.com">j.kreissig@ipe-europe.com</a></td>
</tr>
<tr>
<td>Lacarn Mathieu</td>
<td>Cogema / Areva</td>
<td>France</td>
<td><a href="mailto:mlacarn@coegema.fr">mlacarn@coegema.fr</a></td>
</tr>
<tr>
<td>Lai Simona</td>
<td>Etex Group</td>
<td>Belgium</td>
<td><a href="mailto:Simona.Lai@etexgroup.com">Simona.Lai@etexgroup.com</a></td>
</tr>
<tr>
<td>Lavagna Monica</td>
<td>Politecnico di Milano/</td>
<td>Italy</td>
<td><a href="mailto:monica.lavagna@polimi.it">monica.lavagna@polimi.it</a></td>
</tr>
<tr>
<td>Le Bocq Agathe</td>
<td>Electricité de France</td>
<td>France</td>
<td><a href="mailto:agathe.le-bocq@edf.fr">agathe.le-bocq@edf.fr</a></td>
</tr>
<tr>
<td>Le Boulch Denis</td>
<td>Electricité de France</td>
<td>France</td>
<td><a href="mailto:denis.le-boulch@edf.fr">denis.le-boulch@edf.fr</a></td>
</tr>
<tr>
<td>Masoni Paolo</td>
<td>ENEA</td>
<td>Italy</td>
<td><a href="mailto:paolo.masoni@bologna.enea.it">paolo.masoni@bologna.enea.it</a></td>
</tr>
<tr>
<td>Menichetti Emanuela</td>
<td>Ecobilancio Italia / Univer-</td>
<td>Italy</td>
<td><a href="mailto:emanuela.m@ecobilancio.com">emanuela.m@ecobilancio.com</a></td>
</tr>
<tr>
<td>Mestre Anna</td>
<td>ADIGSA</td>
<td>Spain</td>
<td><a href="mailto:amestrem@gencat.net">amestrem@gencat.net</a></td>
</tr>
<tr>
<td>Moedinger Fritz</td>
<td>Gasser / TBE</td>
<td>Italy</td>
<td><a href="mailto:fritz.moedinger@gmx.net">fritz.moedinger@gmx.net</a></td>
</tr>
<tr>
<td>Nakaniwa Chie</td>
<td>JEMAI</td>
<td>Japan</td>
<td><a href="mailto:nakaniwa@jewai.or.jp">nakaniwa@jewai.or.jp</a></td>
</tr>
<tr>
<td>Osset Philippe</td>
<td>PWC / Ecobilancio</td>
<td>France</td>
<td><a href="mailto:philippe.osset@fr.pwc.com">philippe.osset@fr.pwc.com</a></td>
</tr>
<tr>
<td>Rebitzer Gerald</td>
<td>Alcan</td>
<td>Switzerland</td>
<td><a href="mailto:Gerald.Rebitzer@alcan.com">Gerald.Rebitzer@alcan.com</a></td>
</tr>
<tr>
<td>Reigo Lemila</td>
<td>EESTI ENERGIA AS</td>
<td>Estonia</td>
<td>reigo.lehnlienergia.ee</td>
</tr>
<tr>
<td>Rydberg Tomas</td>
<td>IVL</td>
<td>Sweden</td>
<td><a href="mailto:tomas.tyberg@ivl.se">tomas.tyberg@ivl.se</a></td>
</tr>
<tr>
<td>Samitier Salvador</td>
<td>Cat. Min. Environment</td>
<td>Spain</td>
<td><a href="mailto:wsamitier@gencat.net">wsamitier@gencat.net</a></td>
</tr>
<tr>
<td>Sarrias Maria José</td>
<td>Cat. Min. Environment</td>
<td>Spain</td>
<td></td>
</tr>
<tr>
<td>Saur Konrad</td>
<td>FiveWinds</td>
<td>Germany</td>
<td><a href="mailto:k.saur@fivewinds.com">k.saur@fivewinds.com</a></td>
</tr>
<tr>
<td>Saur Modahl Ingunn</td>
<td>Stiftelsen Østfoldforsknin-</td>
<td>Norway</td>
<td><a href="mailto:ism@stof.no">ism@stof.no</a></td>
</tr>
<tr>
<td>Schrinncke Eva</td>
<td>Five Winds</td>
<td>Germany</td>
<td><a href="mailto:e.schincke@fivewinds.com">e.schincke@fivewinds.com</a></td>
</tr>
<tr>
<td>Smith Timothy</td>
<td>University of Minnesota</td>
<td>USA</td>
<td><a href="mailto:timsmith@umn.edu">timsmith@umn.edu</a>; <a href="mailto:smithh63@umn.edu">smithh63@umn.edu</a></td>
</tr>
<tr>
<td>Weidema Bo</td>
<td>2.-G LCA Consultants</td>
<td>Denmark</td>
<td><a href="mailto:bow@lca-net.com">bow@lca-net.com</a></td>
</tr>
<tr>
<td>Zamaron Francisco</td>
<td>Det Norske Veritas</td>
<td>Italy</td>
<td><a href="mailto:francisco.zamaron@dnv.com">francisco.zamaron@dnv.com</a></td>
</tr>
</tbody>
</table>
Annex 2 - Workshop full presentations

Presentation 1  76
Presentation 2  83
Presentation 3  94
Presentation 4  103
Presentation 5  107
Presentation 6  127
Presentation 7  134
Presentation 8  148
Presentation 9  162
Presentation 10  169
“Sector-specific Approaches for Communication of Life Cycle Information To Different Stakeholders”  
International Expert Workshop, Barcelona 8 Sep. 2005

**UNEP/SETAC LCM/TF 3**  
**Communication of Life Cycle Information**

Paolo Frankl  
Università di Roma I “La Sapienza”  
Ecobilancio Italia

---

**TF Members**

- **14 members + additional m. (LCM/TF)**
- **Background Balance**
  - 6 Universities / Research institutes
  - 2 Consulting
  - 2 Large companies
  - 2 Industry association / public corporation
  - 1 Verifying / certifying company
  - 1 Consumers NGO
- **Regional Balance**
  - 8 Europe
  - 3 North America
  - 1 Latin America
  - 1 Asia
  - 1 Africa

---

**The real question: how to induce change towards more sustainable behavior?**

Stakeholders

<table>
<thead>
<tr>
<th>Comm. Tools</th>
<th>Who?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Target Groups</td>
</tr>
<tr>
<td></td>
<td>Real change</td>
</tr>
</tbody>
</table>

What are their needs?  
How to reach them?

1) Drivers  
2) Tools  
3) Effectiveness  
4) Implications

---

**Work Plan / Deliverables**

**TOR/ Def study**

- Sep. 2003: TF effective  
- 3rd q,2004: organize, support, document workshop

**Revised Work Plan**

- 25/2/04: Official launch  
- 22/4/04: Kick-off Prague  
- 15/7/04 1st draft chapter for LCM Handbook  
- 31/12/04 final draft chapter for LCM Handbook  
- Bologna, 10-12 Jan. 2005
1st deliverable 2004

- Chapter on LC communication within the UNEP Handbook on LCM (forthcoming) [A.A.Jensen & A.Remmen eds. 2005]
- Thanks to several TF members input!
  - Chie Nakanriwa,
  - Hamish Will,
  - Chris Van Rossem,
  - Annik Fet
  - Jeppe Frydendal
  - Gianluca Donato,
  - Lennart Karlson

Main questions review

- Which communication tools used in practice by industry and business?
- Distinguish communication tools vs. target stakeholders
  - Final consumers
  - Business clients
  - Financial stakeholders
  - Public administrators and policy makers
  - Other society stakeholders

Objectives 2005-06

- Report on recommended practice on communication of life cycle information
- Monitor possible international standardization efforts
- Further workshops in other regions
- Reach out to public and private sector initiatives
- Establish and co-ordinate international forum on sustainable product information schemes

Activities 2005 so far

- Monitoring of ISO DIS14025 and CD21930 standardization activities
- Participation in the Type III Environmental Declarations International Seminar, Tokyo, Japan, 15 March 2005
**Approach**

- Focus on specific product categories
- Involve industry and other stakeholders
- Identify success stories
- Evaluate Integration of tools
- Assess transferability of results

→ Proposal for a Workshop at Barcelona LCM
  2005
  7th or 8th Sep 2005

**Workshop Barcelona**

- 2 specific sectors
  – Building
  – Energy

- Expected deliverable: publishable report

- Possible future workshops on
  – Electronics
  – Health Care & Detergents
  – Paper products

**Workshop – Expected results**

For each specific sector:

- Who are “the users” of LC information
- What are their needs
- Which tools for whom used today
- Outlook: Expectations from industry and users
- Recommended practice

**Workshop – Some research questions**

For each specific sector:

- What communication format for whom?
- How to guarantee credibility?
  – Transparent and verifiable information
  – Involvement of stakeholders
  – The role of EPDs
- Integration of tools
SECTOR-SPECIFIC APPROACHES FOR COMMUNICATION OF LIFE CYCLE INFORMATION TO DIFFERENT STAKEHOLDERS

LCA INFORMATION IN MARKETING COMMUNICATIONS: Addressing Communication Effectiveness in the Building Materials Industries

Timothy M. Smith
Associate Professor & Director, FPMDI
Corporate Environmental Management
Department of Bio-based Products/Marketing & Logistics Management
University of Minnesota

Sergio A. Molina-Murillo
Research Assistant
Corporate Environmental Management
University of Minnesota

Communicating Environmental Information

- Following the scandals of Enron, Tyco, Adelphia, HealthSouth and others, an increasing emphasis has been placed on corporate accountability, meaningful disclosure, and transparency in reporting.
  - The last decade has produced rapid growth in external reporting in the form of annual corporate and environmental reports.
  - The Environment Agency of the UK reported that 89% of companies analyzed “discuss their interaction with the environment in their Annual Reports...[but] the vast majority lack depth, rigor, or qualification...”
    - Only 24% of companies make any quantitative environmental disclosures and only 12% make these disclosures within the audited sections of their reports.
- An apparent disconnect between investments in environmental assessment and reporting and the information finding its way to 30 second TV spots, half-page print advertisements, single column press releases, etc...
Some Critical Assumptions...

- Institutional and stakeholder theories indicate that firms are not always profit maximizers and that their policies often reflect external pressures for legitimacy (Prakash 2002; Hoffman 2000; Wood and Jones 1995; Carroll 1991).
- Customer perceived value theories argue that firms maintaining a relative competitive advantage around environmental performance benefit from communicating this advantage, if it is valued by customers (Woodrugg 1997, Gross 1997, Best 1999).
- We explore the marketing communications function (i.e. advertising, promotion, personal selling, etc.) as a potential value creation mechanism.
  - Some reasonably profitable segment exists for which environmental performance influences purchase decisions.
  - Firms often hold relative environmental advantage over competitors and truthfully attempt to communicate this advantage to the marketplace.
- With more effective environmental communications:
  - buyers gain awareness/knowledge important to informing their purchase decision;
  - suppliers benefit from product/firm differentiation manifested through price premiums, market share growth, improved price rigidity, etc...

Environmental/Health Ads in Builder Magazine 2004

- Heavy advertising media: roughly an ad every other page
- Reasonably strong environmental/health presence: 13% of ads.
Sea Gull Lighting

- Qualitative
- Lexical
- Third-party

Environmental/Health Ads in Builder Magazine 2004

- Visual modality along qualitative dimension but not quantitative.

Hurd Windows

- Qualitative Claim
- Lexical/Visual
- Third-party
LCA INFORMATION IN MARKETING COMMUNICATIONS

Dow Building Materials

- Qualitative Claim
- Visual
- Self-claim

LCA INFORMATION IN MARKETING COMMUNICATIONS

Typar HouseWrap

- Quantitative Claim
- Visual
- Self-claim

LCA INFORMATION IN MARKETING COMMUNICATIONS

Preliminary Findings...

- Many building products firms are attempting to communicate environmental messages in national campaigns.
  - Approx. 10% of ads contain an environmental message; probably a bigger number in media targeting architects more directly.
- Very little quantitative and/or disaggregated information communicated.
- Third-party certifications are being integrated into ads, but in very minor ways.
- Fairly significant sophistication with regard to mode of execution (visual, lexical, etc.).

The Future of Eco-Labelling

(Rubik and Frankl 2005)
Type I & II Labels: Eco-labels and Self-Claims

- CFC-free
- Biodegradable
- Uses less energy
- 100% recycled

LCA (Type III – like) information in Marketing Communications

Source: Global Type III Environmental Product Declaration Network
http://www.environdec.com/

- Questions become...
  - How is this information processed?
  - What influence does it have communication effectiveness?
**Consumer Processing of Communications** (Elaboration Likelihood Model)

- **Persuasion**: the attempt to induce change in the belief, attitude, or behavior of a person or group.

- **Core Assumptions and Statements**
  - Attitudes guide decisions and other behaviors.
  - While attitudes can result from a number of things, persuasion is a primary source.

- **2 Routes of Persuasion**
  - The central route involves message elaboration and is used to scrutinize ideas, determine their merit, and contemplate possible consequences.
    - LCA information is evaluated and value assessment made.
  - The peripheral route provides a quick accept or reject decision without deep consideration.
    - LCA information is not evaluated; value assessment made based on cues and associations sparked by LCA information.

**Conclusions**

- Effective environmental communication is not simply providing more information – something LCA does well!!!
  - It must be credible (the information itself and the process generating it, not just the source).
  - It must be actionable today (not a series of probability statements related to future generations).
  - It must be a balance between more/disaggregated complex information and the cognitive capacity of the recipient.

- All advertising is a self-claim! Type I labels help provide source credibility/legitimacy; Type III holds the potential to provide process credibility and temporal relevance. Communicating the right amount/format of this information becomes the critical question.

- Currently validating measures within a student population.

- Seeking partners/sponsors to explore impact on builder/architect communities.

**THANK YOU!**

timsmith@umn.edu
612-624-655

(Scientific American, June 2003)
ISO type III standardisation activities in the building sector

Why do we need a consistent approach?

A consistent approach is necessary for ...

... a modular use of EPDs for a building assessment
... comparison of indicators from 2 EPDs for the same product
... to avoid trade barriers

Today's situation:
Differences in the national approaches are existent.

Relevant for consistency are:

• System boundaries
• Methodology
• Background data

Status quo of EPDs at national levels

PWC study (2002) and recent comparisons have shown differences

• In the scope of the EPD systems
• In the methodology of the EPD systems

For background data no study available up to now, but differences are expected as well.
Type III standardisation activities relevant for in the building sector

**ISO:**
- ISO/DIS 14025
- ISO/DIS 14040 and 14044
- ISO/DIS 21930
- ISO/DTS 21931
- ISO 15686

**CEN:**
work of TC 350 based on the mandate M-350

---

**ISO/DIS 14025**

**Title:**
ISO DIS 14025: Environmental labels and declarations – Type III environmental declarations

**Objective:**
Provides the framework for EPDs

---

**ISO/DIS 14040 and 14044**

**Title:**
ISO/DIS 14040 and 14044: Environmental management – life cycle assessment

**Objective:**
Specifies the requirements and the procedures for life cycle assessment (LCA)

Source: ISO/DIS 21930 (March 2005)
ISO/DIS 21930

**Title:**
ISO/DIS 21930
Sustainability in building construction — Environmental declaration of building products

**Objective:**
- to describe the principles and framework for the environmental declaration of building products, including consideration of the building products expected service life, seen over a building entire life cycle.
- to form the basis for programmes leading to the environmental declaration of building products as described in ISO/CD 14025.

ISO/DTS 21931

**Title:**
ISO/DTS 21931
Sustainability in building construction —

**Objective:**
- to provide a general framework to improve the quality and comparability of building assessment methods
- to identify and describe issues to be taken into account
  - for new or existing building properties
  - in the design, construction, operation, refurbishment and deconstruction stages.

ISO 15686

**Title:**
ISO 15686
Buildings and constructed assets – Service life planning —
- Part 1: General principles
- Part 6: Guidelines for considering environmental impacts

**Objective:**
- Part 1: Methodology for forecasting the service life and estimating the timing of necessary maintenance and replacement of components
- Part 6 describes how to assess the potential environmental impacts of alternative designs of a constructed asset

Scope of CEN TC 350 (BT/WG174)
Horizontal standardized methods for the assessment of the integrated environmental performance of buildings.

- Voluntary horizontal standardised assessment methods for new and existing construction works
- Assessment of integrated performance of buildings over the (entire) life cycle of the construction works.
- Quantifiable performance aspects

Integrated Performance of Buildings
Framework Level

Environmental Performance
Health & Comfort
Life Cycle Cost
Building Level

EPD EPD EPD EPD EPD EPD
Product/Process Level

15.2.2005 Arlanda
**CEN TC 350 (I)**

Section I deals with the building level,
- framework for assessment of integrated performance of buildings
- calculation methods
- use of environmental product declarations on the building level

<table>
<thead>
<tr>
<th>Sections</th>
<th>Items</th>
<th>Responsible groups</th>
<th>Priorities</th>
<th>Expected documents (with target dates)</th>
<th>Supporting standards</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Use of environmental product declarations (on products, processes or services)</td>
<td>WG1 “Environmental Performance”</td>
<td>P2</td>
<td>EN (2009)</td>
<td>ISO/TS 21937</td>
</tr>
</tbody>
</table>

**CEN TC 350 (II)**

Section II deals with the construction product level,
- specific European product category rules for environmental product declarations
- communication
- methodology and data for generic data

<table>
<thead>
<tr>
<th>Sections</th>
<th>Items</th>
<th>Responsible groups</th>
<th>Priorities</th>
<th>Expected documents (with target dates)</th>
<th>Supporting standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section 2</td>
<td>Integrated performance of buildings – Environmental product declarations - Product category rules (on products, processes or services)</td>
<td>WG3 “Products”</td>
<td>P1</td>
<td>EN (2008, CEN 3 year rule) EN ISO 21930, as soon as ISO 21930 published</td>
<td>ISO 21930 ISO 14225</td>
</tr>
</tbody>
</table>

**CEN TC 350 (III)**

Section III deals with the description of the building life cycle

**ISO 15686**

Environmental

Socio-economic

EPD

ISO/DIS 21931

ISO/DIS 21936

Builting

Use of EPD of building products

Communication

Background data

Description of building life cycle

Supporting standards /
- ISO/DIS 14040 and 14044
- European Platform for LCA (European Reference DB)
Guideline for sustainable construction in Germany

Scope of the guideline

- The guideline is a working aid for the design, construction, maintenance, operation and use of federal buildings

but it wants to be an example for public construction activities as well

- The Round Table for Sustainable Construction consults the ministry in improving the guideline and bringing it into practical use.

- One perspective is the implementation of LCA in the planning stage

- Industry is supporting the approach to "transport" environmental information with EPDs from AUB

Guideline for sustainable construction

Building assessment

- Sustainability indicators <= developed by the Round Table for Sustainable Construction

- Assessment methods <= developed in research projects for LCC, social and environmental aspects

- Quantitative data <= environmental data: from EPDs, cost data: from stat. Sources and existing databases

- Qualitative data <= not fully developed yet on an operational basis, some information also from EPDs

Sustainable construction in Germany

How are EPDs linked in the approach
Annex 2 - Workshop full presentations

EPD program of AUB
Procedure within the AUB scheme

Procedure in 3 steps:

1. **Product Category Rules (yellow)**
   - Draft PCR by Product Forum
   - Verification by Advisory Board
   - Open consultation

2. **EPD (green/blue)**
   - Life Cycle Documentation, LCA, certificates for measured data
   - Check of completeness, consistency, plausibility, and data quality

3. **Verification of the EPD (red)**
   - by independent third party (advisory board/verifier)

Documents with requirements:
- General guideline (program)
- Product Category Rules
- PCR-Mineral Fiber Insulation

Documents for the EPD:
- EPD short form (2 pages)
- EPD full document
- LCA background report (non-public; -> for verifier)

EPD program of AUB
Example Rockwool: available documents

Development of the EPD

1. Requirements are published in the PCR
2. Life Cycle Documentation
   - Description of the product
   - Recommendations for application and end of life situation
3. LCA
   - Calculation of the LCA with consistent methodology and system boundaries
   - Publication of indicators
4. Certificates
   - based on defined test methodology

EPD program of AUB
Development of a PCR

Product Forum
Organisation and moderation by AUB

1. Development of a draft PCR
   - Producers and experts of a product group develop a draft PCR

2. Verification by Advisory Board
   - The Advisory Board represents stakeholders from government, NGOs, science etc.

3. Open Consultation by interested parties
   - Internet based discussion forum

4. Decision on acceptance of comments by Advisory Board

EPD program of AUB
Development of the EPD

Product Forum
Organisation and moderation by AUB

1. Development of a draft PCR
   - Producers and experts of a product group develop a draft PCR

2. Verification by Advisory Board
   - The Advisory Board represents stakeholders from government, NGOs, science etc.

3. Open Consultation by interested parties
   - Internet based discussion forum

4. Decision on acceptance of comments by Advisory Board
EPD program of AUB

Verification of the EPD

Advisory Board is responsible for the verification of the EPD.

The Advisory Board is selecting the verifiers.

The program holder (AUB) and the producer have no influence on the verification process.

Every EPD developed by a producer is verified individually.

Status

PCR-Documents with requirements:

- General guideline (program)
- Product Category Rules for various product groups:
  - Mineral Fiber Insulation, Particle Board, Bricks, Lime-Sand Stones,
  - Aero-concrete, Light mineral aggregates, Copper and Zinc,
  - new groups are planned: e.g. Gypsum Plasterboards and Fiberboards, EPS, Fibercement, Plaster, ....

EPDs:

- finalized EPD: Rockwool - Stonewool, Egger - OSB

LCA Basics and Benefits
Outline

- What is LCA?
- Why use LCA?
- What can it be used for?
- Business Benefits

Life Cycle Assessment

- LCA is a tool to measure, assess and manage the environmental performance of a product from raw materials through production, use, and end-of-life phases

The Product Life Cycle

cradle-to-cradle
earth-to-earth

Inputs

Raw Materials Acquisition

Manufacturing

Distribution

Use

Recycling

Waste Management

Outputs

Water Effluents

Airborne Emissions

Solid Wastes

Other Environmental Releases

Usable Products

MATERIALS LIFE CYCLE

INPUTS

Raw Materials Acquisition

Manufacture & Transport

Construction & Use

Reuse, Recycling, Disposal

OUTPUTS

Closed Loop?

LCA researchers quantify and characterize the inputs and outputs of every stage in a product’s life to assess its overall environmental performance.
How to do LCA according to ISO 14040

- **Goal & Scope Definition:**
  - Determination of scope and system boundaries
- **Life Cycle Inventory:**
  - Data collection, modeling & analysis
- **Impact Assessment:**
  - Analysis of inputs and outputs using indicators
- **Interpretation:**
  - Sensitivity analysis, Monte carol analysis, dominance analysis, etc.

Elements of Life Cycle Impacts

- Total Energy
- Global Warming Potential
- Total Mass
- Resource Depletion Index
- Smog Potential
- Acidification
- Eutrification
- Aqua Toxicity
- Land Toxicity
- Human Toxicity
- Ozone Depletion

Data Collection: Product System Boundary

<table>
<thead>
<tr>
<th>Main Production Sequence</th>
<th>Inputs</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>End-of-Life</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ancillary Materials &amp; Services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy Production</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Life Cycle Impacts by Product Type

- GWP
- Eutrification
- Acidification
- Energy
- Mass

- 109
- 109 w/rec. clgs.
- 769 w/20% wool
- 769
Why LCA is a useful tool

- Three attributes make LCA distinct and useful as an analytical tool:
  - whole system consideration – up to the total product life cycle
  - presentation of tradeoffs among multiple environmental issues
  - presentation of tradeoffs between different elements in the value chain, such as life cycle stages, economic actors

- In addition:
  - LCA can improve cost assessment, support communication and marketing, branding etc

Suppliers evaluating business with LC thinking & developing LCI databases

- Plastics (APME, APC efforts)
- Copper (ICA effort)
- Steel (Auto and Global efforts)
- Forest Products (CORRIM, etc.)
- Aluminium (Auto and Global efforts)
- Building Material Manufacturers
- Canadian Raw Materials database - glass, aluminium, steel, wood, paper, and plastics
- US LCI database project
- USGBC LCA into LEED 3.0

Building & Interiors Sector

- BEES v3.0
  - Increased visibility because of LEED
  - Still not robust in terms of data
  - Uses new TRACI US specific LC impact indicators
- Athena
  - More robust database, comprehensive tool, modeling tool
  - Models the entire buildings contribution to LCA
- US Green Building Council LEED standards
  - growing in use and number
  - driving suppliers - provides an opportunity for end-users to differentiate
  - Encourages the Recycle of Construction & Demolition waste
  - Encourages the selection of products with high PC Recycle Content
- LEED 3.0 will take a LCA view of the contributing credits

Building & Interiors Sector

- Energy's Office of Energy Efficiency and Renewable Energy, the GSA, the EPA and the U.S. Navy funded new publicly available LCI data for wide range of materials, energy, plastics
  - Based on ISO 14040 standard
  - Scheduled beta release was for May 2003
- Analysis:
  - Growing use of LCA in building design
  - Mfg. & material providers should share data with database providers and to customers in sector using LC data to make purchasing decisions
LCA, EMS & Performance Improvement

- LCA can be used to help determine the significant environmental aspects of your activities, products &/or services
- Boundaries are flexible, i.e.: facility aspects vs. product aspects vs. corporate aspects
- Can use LCA data to quantify, benchmark and ensure continual improvement of aspects

Marketing & Communication

- Using LCA data to provide information about your companies' products to customers and the marketplace in general
- Case studies on external corporate website
- Providing LCI profiles upstream in supply chain
- Present Quantitative environmental information
- Develop Environmental Preferred Declarations
- Use for Environmental Certifications

Sales Support

- For sales, LCA serves a close and immediate source of information, and as a means to structure communication of product virtues:
  - Example:
  - Specific and quantifiable product specification language
  - Ability to differentiate product from competitor
  - Align environmental goals with that of your customer

Product Planning

- LCA can help to assess product development options
- When combined with other important information, such as:
  - regulatory requirements,
  - customer requirements,
  - market pressures,
  - financial information,
  - risk assessment
  - human health considerations (toxics).
- This product information can provide a comprehensive product system picture
- Use as a Design for Environment tool
- Combines product development with process performance
**Life Cycle Impacts**

- Acidification potential (AP) [kg SO2-Equiv.]
- Eutrophication potential (EP) [kg Phosphate-Equiv.]
- Global warming potential (GWP 100 years) [kg CO2-Equiv.]
- Ozone depletion potential (ODP, catalytic) [kg R11-Equiv.]
- Photochemical oxidant potential (POCP) [kg Ethane-Equiv.]
- Terrestrial ecotoxicity potential (TETP) [kg DCB-Equiv.]
- Energy (net calorific value) [MJ]
- Mass [kg]

**Replace Raw Materials with Recycled Ceiling**

Impact of replacement of 1 ton of mineral wool by 1 ton of recycled post consumer ceiling tile:

<table>
<thead>
<tr>
<th>Impact</th>
<th>Mineral Wool</th>
<th>Post Consumer Recycled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acidification Potential</td>
<td>4.43</td>
<td>0.28</td>
</tr>
<tr>
<td>Eutrophication Potential</td>
<td>2.25</td>
<td>0.05</td>
</tr>
<tr>
<td>Global Warming</td>
<td>1,011</td>
<td>30.58</td>
</tr>
<tr>
<td>Ozone Depletion</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Smog Potential</td>
<td>0.14</td>
<td>0.04</td>
</tr>
<tr>
<td>Terrestrial Toxicity</td>
<td>669</td>
<td>13.28</td>
</tr>
<tr>
<td>Total Energy</td>
<td>10,685</td>
<td>420.03</td>
</tr>
<tr>
<td>Virgin Mass Utilized</td>
<td>20,869.45</td>
<td>37.17</td>
</tr>
</tbody>
</table>

**Results on a Functional Equivalency Basis**

- **INTERNAL**
  - Improved costs
  - Compare plant processes
  - Use for NPD screener
  - Similar to PSDR
  - Can use as a Sustainability Threshold
  - Use as a DfE (Design for Environment) tool

- **EXTERNAL**
  - LEED credits
  - Refute Recycle content with LCA
  - Credibility in the Green Community
  - Marketing Plan to result in increased share
Environmental Reporting

- Communications at the industry, company or local level
  - LCA can be useful to generate and structure public information about company products, including communication of case studies and reporting of product performance indicators.
- LCA can be used in the corporate annual report to adequately communicate environmental progress to stakeholders
- Alcan has used environmental LCA information in community relations

Range of LCA Applications

<table>
<thead>
<tr>
<th>Application</th>
<th>Audience</th>
<th>Scope</th>
<th>Degree of Quantification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corporate Strategy/Internal Communication</td>
<td>Internal</td>
<td>Increasing</td>
<td>Increasing</td>
</tr>
<tr>
<td>Product Design/Modification</td>
<td>Internal</td>
<td>Increasing</td>
<td>Increasing</td>
</tr>
<tr>
<td>Facility Siting/Operations</td>
<td>Internal</td>
<td>Increasing</td>
<td>Increasing</td>
</tr>
<tr>
<td>Public Information/External Communication</td>
<td>External</td>
<td>Decreasing</td>
<td>Decreasing</td>
</tr>
<tr>
<td>External Policy-making/Governmental</td>
<td>External</td>
<td>Decreasing</td>
<td>Decreasing</td>
</tr>
</tbody>
</table>

LCA – Overall Level of Effort

- With the right tools:
  - Life Cycle “screens” take a few hours
  - Quick studies can be completed in days or weeks
- Large studies can take many months
  - depending on collection of new data
- Once main operations are modeled, studies can be performed quickly
- Internal vs. External Studies

What can you expect as a result of LCA?

- Improved decision-making
- Opportunities for communication with end-users
- Improved relationship with stakeholders
- You can maximize the usefulness of past, present & future LCA's by using the data in multiple applications
- Efficiency in sustainability activities - using one database for multiple initiatives
Sustainable Business Management

What can we do to accelerate positive changes in products

Walk Away Messages

• All products/services have impacts of some kind – how best to reduce/mitigate impacts

• Each of us has to commit and engage to accelerate change - Cannot assume government and/or private enterprises will assume accountability alone

• Family/career/personal/community have to merge together - values have to translate into day-to-day actions

• Start by taking one action at a time

The Big Picture: an Environmentally Sound Industrial System


What Are Companies Doing?

1. Understand what they purchase, manufacturer, and how they impact the environment over the entire life cycle

2. Determine what is important – policies, core values

3. Prioritize which of those actions/products has greatest impacts – making sure there are no unexpected impacts

4. Identify those that you can directly control or influence

5. Take action immediately where possible

6. Develop longer term plans where immediately action is not possible due to technical, costs, or other reasons

Lets take a few examples
Shelter: A key function

<table>
<thead>
<tr>
<th>Need area or function</th>
<th>Direct and indirect energy use per person*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shelter</td>
<td>39 %</td>
</tr>
<tr>
<td>Food</td>
<td>18 %</td>
</tr>
<tr>
<td>Mobility</td>
<td>18 %</td>
</tr>
<tr>
<td>Personal care</td>
<td>9 %</td>
</tr>
<tr>
<td>Leisure</td>
<td>8 %</td>
</tr>
<tr>
<td>Clothing</td>
<td>6 %</td>
</tr>
<tr>
<td>Education</td>
<td>2 %</td>
</tr>
<tr>
<td>Total</td>
<td>100 %</td>
</tr>
</tbody>
</table>

*Average for Groningen/ the Netherlands as reported by Tukker (2003) based on data from Moll and Noordmans (2002)

The Building and Construction Sector Is Recognizing That the Impact of Building Construction and Operations Are Significant

• The USGBC estimates that buildings contribute to:
  – 36% of total energy use;
  – 65% of electricity consumption;
  – 30% of greenhouse gases emissions;
  – 30% of raw materials use;
  – 30% of waste output/136 million tons annually; and
  – 12% of potable water consumption.

• A systems and life cycle approach will support progress in reducing the footprint associated with buildings.

Together, we can improve the environment

Source: S. Baer, Armstrong
Greening your Building with Armstrong

Our Products and Services can help you:

• Build with Environmentally Preferable Products
  - Recyclable
  - Recycled Content (PC/PI)
  - Renewable Resources
• Divert Waste from Landfills
• Reduce Energy Used for Lighting
• Contribute to LEED Credits

Ceiling Tiles Diverted From Landfills

Since Start of Program Armstrong Has Recycled:

25 Million Square Feet Diverted From Landfills

Why Recycle Your Ceiling Tiles?

• immediate benefits for you
• long-term benefits for the planet

Replace Raw Materials with Recycled Ceiling

Impact of replacement of 1 ton of mineral wool by 1 ton of recycled post consumer ceiling tile:

<table>
<thead>
<tr>
<th>Impact</th>
<th>Mineral Wool</th>
<th>Post Consumer Recycled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acidification Potential</td>
<td>4.43</td>
<td>0.28</td>
</tr>
<tr>
<td>Eutrophication Potential</td>
<td>2.25</td>
<td>0.05</td>
</tr>
<tr>
<td>Global Warming</td>
<td>1,011</td>
<td>30.58</td>
</tr>
<tr>
<td>Ozone Depletion</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Smog Potential</td>
<td>0.14</td>
<td>0.04</td>
</tr>
<tr>
<td>Terrestrial Toxicity</td>
<td>669</td>
<td>13.28</td>
</tr>
<tr>
<td>Total Energy</td>
<td>10,685</td>
<td>420.03</td>
</tr>
<tr>
<td>Virgin Mass Utilized</td>
<td>20,869.45</td>
<td>37.17</td>
</tr>
</tbody>
</table>
LCA Impact of Recycled Ceilings (100 sq M)

- Energy Savings is equivalent to not using 60 gallons (US) gasoline to power a typical automobile
- GHG emissions reduction is equivalent to not driving a typical domestic car for 1500 miles
- Landfill avoidance of 1 ton of debris
- Total mass reduction of 10 Tons
  - Most mass reduction is due to water not used for processing raw materials
why EPD?

Products made out of raw materials that have to be organic - renewable - not release radiations - contentwise declared in a clear, comprehensible and unequivocal way that have been transformed (procurement, processing, recycling, disposal) observing an ORGANIC BIOPHYSIC CYCLE reflecting processes that are analogous to natural cycles (clean chemical processes); should the product contain any non totally organic compounds this have to be declared quantity and qualitywise.

Reference: http://www.bioevalitalia.org
why EPD?

1. For 41% of the population the main issue about which they do not feel informed about is the impact on health of everyday products;

2. 39% of the population believe that individual environment efforts do not have an impact as long as the big polluters (corporations and industry) do not do the same;

3. 39% of the population would like to reduce home energy consumption (electricity, heating, household appliances, etc.);

4. 24% of the population consider environmental aspects when making large expenditures (buying a car, heating systems, build a house, etc.).

Our EPD experience

1. Competing with other labels;
2. Big orders;
3. Small satisfactions;
4. Great delusions.

Competing with other labels

1. AUB;
2. Bioedilizia Italia.

Big orders

1. Olympics;
2. Parks;
Small satisfactions

1. AssoSCAI;
2. ANDIL LIFE III project;

Great delusions

1. Sustainability - no criteria;
2. EC legislation IPP;
3. SHE, Sustainable Housing Europe, Project.

Would we do it again?

1. Getting to know yourself;
2. Image;
3. Stakeholders;
4. Competitiveness.

Thanks for your attention
The User Needs – The German Experience

Dr.-Ing. Udo Jeske
Electrical Engineer, System Analyst

Dr.-Ing. Martina Klingele
Architect, LCA-Practitioner

Forschungszentrum Karlsruhe
in der Helmholtz-Gemeinschaft

Online-survey among architects
Interviews with consumer and environmentalist organisations

Results within a twin project:

- German Network on Life Cycle Inventory Data
  - User views within the building and construction sector

- Environmental Declaration of Building Products
  - Sector specific realisation of a type III declaration

Environmental Declaration of Building Products
– Sector specific realisation of a type III declaration

Research Project of Federal environmental Agency (UFOLAN) 203 95 31
Project Period: July 2003 - December 2005

Main goals: Support of existing approaches (methodical and as regards contents) to shape the Environmental Building Product Declaration in Germany

Project-Partners

<table>
<thead>
<tr>
<th>Subject Area</th>
<th>Standardisation</th>
<th>Product LCA</th>
<th>Building LCA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task</td>
<td>Living Document</td>
<td>Consultancy Program, Development, LCA</td>
<td>User Views</td>
</tr>
<tr>
<td>Contacts</td>
<td>DIN</td>
<td>Building Product Manufacturer</td>
<td>Planners, German Chamber of Architects</td>
</tr>
</tbody>
</table>

Forschungszentrum Karlsruhe
in der Helmholtz-Gemeinschaft
Online-Survey

Survey among planners who are members of German Chambers of Architects

Supported by the Federal Chamber of Architects

September 2004 – January 2005 1. Phase

Announcements in „Deutsches Architektenblatt“ September 2004 und December 2004

6900 calls per email (9 Bundesländer)

Technical implementation via Internet Portal of German Network on LCI-Data by Institute of Applied Informatics, FZK.

Information flow from producers to architects

developer (design tool)

manufacturer

database

planner, architect (building)

design tool

building product

EPD

LCA

Life Cycle Data / Tools

Environmental Declarations

Building as Product

Planning and Environment

Assess the importance of the planning phases with respect to their ecological relevance?

Which decisions concerning the usage of areas and resources, environmental pollution, and risks are made by the planner?

Do you make decisions based on environmental protection aspects during planning?

Why do you consider environmental protection criteria during planning?

How do you consider environmental aspects during planning?

Are you prepared to accept an additional planning expenditure as a result of ecological requirements?

Which owners order services to consider environmental protection (against payment)?

Which phases are relevant regarding environmental impacts, such that lifecycle data / calculation models are desirable?

For which building products do you wish to have ecological declarations or certifications?

How should building products be declared?

Should potential fumigations from building products into the interior be declared?

Do you know ecobalances with respect to architecture?

Should ecobalances with respect to architecture be set up?

Would you use ecobalancing as a method of decision-finding in the planning of buildings?

How / by whom should ecobalances be set up for buildings?

Do you mainly work on existing buildings or on new constructions?

Which data should be considered by a computer program for practical use?

Which ecologically relevant information should be provided by an ecobalancing tool for buildings?

On which level do you use / would you like to use cost/environment-related lifecycle data?

In which field do you work mainly?

Do you mainly focus on existing buildings or on new constructions?
Online-Survey
Forschungszentrum Karlsruhe in der Helmholtz-Gemeinschaft
Environment - Why?

Why do you consider environmental protection criteria?
- conviction
- enterprise standard
- required by law
- order by customer
- to be distinguished from others
- miscellaneous

Online-Survey
Forschungszentrum Karlsruhe in der Helmholtz-Gemeinschaft
Planning - How?

How do you consider environmental protection criteria?
- complying with legal requirements
- ecologically products in tender
- adopting exemplary solutions
- taking in care the using phase
- energy strategies exceeding the legal requirements
- using appropriate tools/checklists

Online-Survey
Forschungszentrum Karlsruhe in der Helmholtz-Gemeinschaft
Clients?

Clients ordering services to consider environmental protection (against payment)
- public authorities
- property developers / investors
- private builders / owners
- enterprises

Online-Survey
Forschungszentrum Karlsruhe in der Helmholtz-Gemeinschaft
Declaration - Which Products?

For which building products do you wish to have ecologically declarations or certifications?
- indirect materials (solvents, adhesives, ...)
- building materials (wall construction, insulation, roofing, ...)
- building panels (windows, doors, ...)
- finishing (paints, floor coverings, ...)
- heating, ventilation, air conditioning, refrigeration
- cleaning products, cleaning agents

01.09.2005 Udo Jeske ITC-Department of Technology-Induced Material Flows jeske@itc-zts.fzk.de Folie 13
01.09.2005 Udo Jeske ITC-Department of Technology-Induced Material Flows jeske@itc-zts.fzk.de Folie 14
01.09.2005 Udo Jeske ITC-Department of Technology-Induced Material Flows jeske@itc-zts.fzk.de Folie 15
01.09.2005 Udo Jeske ITC-Department of Technology-Induced Material Flows jeske@itc-zts.fzk.de Folie 16
Online-Survey in der Helmholtz-Gemeinschaft

How detailed EPDs should be?

- Comprehensive information: 26%
- Only some significant characteristic values: 66%
- Other: 8%

Should potential fugitons from building products into the little be declared?

- No: 2%
- Yes: 96%

Online-Survey in der Helmholtz-Gemeinschaft

Would you use ecobalancing as a method of decision-finding in the planning of buildings?

- Yes: 82%
- No: 18%

Online-Survey in der Helmholtz-Gemeinschaft

LCA – Decisionfinding

- In your case, the decision process is possible without acceptable effort: 72%
- If all others will do it: 8%
- If costs are not too high: 8%
- Because of this importance: 10%

Online-Survey in der Helmholtz-Gemeinschaft

LCA – Setup

How / by whom should ecobalances be set up for buildings?

- I would prefer: 21%
- LCA as supply of services: 66%
- n/a: 14%

Online-Survey in der Helmholtz-Gemeinschaft

LCA – Ecobalance

- Yes: 62%
- No: 33%
- n/a: 4%
Summary

Which information did we gain in general?

Response to the survey:
- Questions read carefully, duly and comprehensively answered
- Feedback sufficient as compared to other surveys
- Respondents are representative with respect to the ageing and enterprise structure of the chamber of architects
- Share in environmentalists appr. twice as high as compared to average population

Analysis of the survey:
- Survey allows for group specific analyses
- Two calls allow for more specific answers to motivation and response behaviour of the respondents
- Positive effect on the reliability of the survey.
Summary

Forschungszentrum Karlsruhe
in der Helmholtz-Gemeinschaft

Results of the survey

- Must to include the use phase into the planning of buildings already understood by architects
- Energy is focal point concerning environmental aspects in present planning, shown by a remarkable share in additional energy strategies without legal requirements
- Overwhelming request for environmental declarations of building products for all building levels.
- High interest in using life cycle related cost and environmental data in planning tools
- Willingness to use LCA-data in decision finding, if integrated in usual workflow to reduce work to acceptable levels (as strong condition)
- In contrast, there is only little use of already existing tools and guidelines

What should be done?

- Challenge: Gap closure of desire for use of life cycle related environmental / cost data and present state of the art
  - further development and marketing of suitable tools and utilities with high integration potential into the usual workflow of planners
  - reliable supply of data by manufacturers in cooperative action with science
  - further education of planners at university and on the job to use LCA – tools
- Sensitisation of investors for environmental concerns
Major trends on the European energy market

1. Continued step-wise liberalisation and creation of a transparent and interconnected European market
2. Continued privatisations of state and municipality owned companies
3. Increasing regulatory pressures
4. Increasing influence of the EU
5. Enhanced efforts to curb emission of CO₂ gases

Note: All current EU members are expected to have fully opened their electricity markets by 2007.

Five strategic ambitions

- Continued profitable growth
- The Benchmark of the Industry
- Number One for the Customer
- Number One for the Environment
- The Employer of Choice

Core values

- Effectiveness
- Openness
- Accountability

Organisation
Business Group Nordic

- **Nordic market**: Largest electricity generator with 20% market share.
- **Sweden**: All parts of the electricity value chain, excluding transmission. Particularly strong presence in generation and distribution. Also heat generation, distribution and sales.
- **Finland**: All parts of the electricity value chain, mainly distribution and sales. Also heat generation, distribution and sales.
- **Denmark**: Thermal power and wind power. Establishing a strong position in 2005.

Business Group Nordic – facts and figures

<table>
<thead>
<tr>
<th></th>
<th>2004</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net revenue, MEUR</td>
<td>4,400</td>
<td>4,700</td>
</tr>
<tr>
<td>Operating profit, MEUR</td>
<td>1,300</td>
<td>1,000</td>
</tr>
<tr>
<td>Investments, MEUR</td>
<td>590</td>
<td>390</td>
</tr>
<tr>
<td>Electricity generation, TWh</td>
<td>88.4</td>
<td>77.8</td>
</tr>
<tr>
<td>Electricity sales, TWh</td>
<td>53.9</td>
<td>54.0</td>
</tr>
<tr>
<td>Heat sales, TWh</td>
<td>7.6</td>
<td>7.9</td>
</tr>
<tr>
<td>Number of employees</td>
<td>8,646</td>
<td>8,541</td>
</tr>
</tbody>
</table>

- Electricity customers approximately 960,000.
- Network customers 1,278,000.

Experience at Vattenfall

Dr Birgit Bodlund
Presentation at the Barcelona Workshop September 2005

Electricity-generation systems
Extensive reporting

- Publicly available, for example:
  - Environmental report 2003, Ringhals AB http://www.ringhals.se
  - Vattenfall AB Generation’s Certified Environmental Product Declaration of Electricity from Hydropower http://www.environdec.com/reg/088/
  - Vattenfall AB Elproduktion’s Certified Environmental Product Declaration of Electricity from Ringhals AB http://www.environdec.com/reg/026/
  - Vattenfall AB Generation’s Certified Environmental Product Declaration of Electricity from Forsmarks Kraftgrupp AB (FKA) http://www.environdec.com/reg/021/
  - Certified Environmental Product Declaration of Electricity from Vattenfall AB’s Swedish Windpower Plants http://www.environdec.com/reg/044/

Vattenfall Generation Nordic Communication

Included parts in the LCA of a fuel-fired power plant

Fuel

- Peat extraction, drying and grinding
- Coal extraction processing, grinding
- Crude-oil extraction refining of light and heavy oil
- Biofuel – gathering, chipping of forest residues, grinding
- Transportation

Construction

Power plant

Renovation Operation

Ash management (peat, coal, biofuel )

Discommissioning

1 kwh el

Included parts in the LCA of hydropower

Construction

Reservoirs and dams

Operation and maintenance

Powerhouse

Operation and renovations

Operational waste

1 kwh

Functional hydropower plant

Reservoir and dams

Operation and maintenance

Operation and renovations

Operational waste

1 kwh
Ringhals' nuclear fuel cycle

LIFE CYCLE ASSESSMENT (LCA)
VATTENFALL'S ELECTRICITY IN SWEDEN

Average emission of fossil CO₂ (g/kWh) from Vattenfall
(total 5.8 g/kWh electricity)

Comparison to other activities
Emissions of fossil CO₂, g/kWh electricity delivered to household customer

- Hydropower
- Nuclear power
- Wind power
- Biofuelled CHP
- Biomass CHP
- 6. Member states shall ensure that electricity suppliers specify in or with the bill and in promotional materials made available to final customers:
- the contribution of each energy source to the overall fuel mix of the supplier over the preceding year;
- [b] at least the reference to existing sources, such as web-pages, where information on the environmental impact, in terms of at least emission of CO₂ and radioactive waste resulting from the electricity production from different energy sources, is publicly available.
- With respect to electricity obtained via an electricity exchange or imported from an undertaking outside the Community, aggregated figures provided by the exchange or the undertaking in question over the preceding year may be used.
- Member states shall ensure that appropriate mechanisms are put in place, e.g. by the supplier, to verify the reliability of the information on the fuel mix.

High-active radio-active waste, g/kWh electricity delivered to household customer

Vattenfall can apply for labelling for electricity ca 1 TWh, Bra Miljöval, “Good Environmental Choice”

But we have certified environmental product declaration for most of our electricity production, 95%
Certified Environmental Product Declaration EPD® catches more than LCA

- EPD® – Environmental Product Declaration – an information system to describe environmental properties of products and services based on facts
- Open for all products and services
- Based on ISO 14025
- Third party verified and certified
- An EPD® for electricity and district heat contains:
  - Life Cycle Assessment (LCA)
  - Study of impacts on biodiversity
  - Environmental Risk Assessment (ERA)
  - Radiology (nuclear power)

Welcome to read about:

Vattenfall AB Nordic Generation’s Certified Environmental Product Declaration EPD of Electricity from Vattenfall’s Nordic Hydropower

The content of this EPD is over 30 pages, with numerous colored pictures and tables.

Welcome to read about:

Certified Environmental Product Declaration of Electricity from Vattenfall AB’s Swedish Windpower Plants

The content of this EPD is over 30 pages, with numerous colored pictures and tables.

Advantages with EPD®

- Information to customers
- Tool when purchasing
- Environmental management
- Sustainability reporting
- Evidence for continues improvement
- Environmental licensing
Environmental actions 1

We found interesting habitats near the Lule River.
High water usage was identified at Forsmark. The remedial actions have led to a reduced use of water, chemicals and electricity.
Vattenfall Fuel AB uses the life-cycle assessments for the identification of the mining, conversion, enrichment and fuel production, which have high environmental impacts. The results are used in the dialogue with the suppliers.
A system for the recycling of material developed in co-operation with a cable manufacturer.
Vattenfall Distribution has developed a tool based on life-cycle assessments, which can be used when constructing new electricity transmission systems.
The environmental product declarations are used in permitting processes.
Reducing the risks for oil emissions to soil and water is now ongoing.

Environmental actions 2

Generally improved awareness and commitment among the staff have led to an increased use of lifecycle thinking as an integral part in the planning for refurbishments and investments.
For the waste incineration plant the environmental product declaration has been prepared at the same time as the plant has been built.
The analyses are also used for evaluating different technical solutions such as ABB’s generator Powerformer.
Transmission poles made of composite material compared to those made of wood.
Mobile switch yards compared to stationary ones.
Switch yards isolated with SF6 compared to those using air.
Different types of drilling techniques.
Solar cells for the electrification of summer houses in Sweden.
When purchasing wind power equipment, information is requested from the suppliers in order to facilitate evaluation from a life-cycle assessment point of view.

Conclusions

- LCA based information is useful and becoming common practice.
- Credibility is needed, and certification gives that.
- Focus on not just one environmental issue, but several.
- EPD® is one way, which Vattenfall Nordic countries have chosen for keeping track.
- Powerful tool in communication.
- Key value “Openness and accountability”

Thank you for your attention!

Birgit Bodlund

birgit.bodlund@vattenfall.com
British Energy

Sector-Specific Approaches for Communication of Life Cycle Information to Different Stakeholders

Mark Johnson,
Environment Team, British Energy
8 September 2005

- One of the Largest UK electricity generator
- Total Annual Output of 67-74 TWh over past five years
- Turnover of £1.5bn
- Station portfolio
  - 8 nuclear power stations, capacity of 9,568MW
  - 1 coal-fired station, capacity of 1,960MW
- Direct Supply Business (approximately half of turnover)
  - Largest industrial supplier
  - 1st for customer satisfaction ranking for 5+ years
- Approximately 5,200 staff

A wide range of stakeholders

Key areas of concern for our stakeholders

General concerns
- Cost
- Reliability
- Safety
- Security of supply

Environmental concerns
- Greenhouse gas emissions
- Other emissions
- Renewable electricity
- Radioactive discharges
- Production of nuclear waste / spent fuel
Environmental performance reporting

- Regulation
- Legal requirements
- EMAS
- ISO
- Industry overview
- Environmental reporting
- Website
- EPD

Voluntary action

Life-cycle CO₂ emissions for Torness NPP

- Extraction
- Conversion
- Enrichment
- Fuel fabrication
- Construction/decommissioning
- Operations
- Reprocessing
- Construction - waste facilities
- Operation - waste facilities

Total emissions 5.05 g/kWh

Source - EPD for Torness Nuclear Power Station, AEA Technology (for British Energy Group plc)

Carbon dioxide emissions by technology

- Coal - operational
- Gas - operational
- Nuclear - life cycle

Source - EPD for Torness Nuclear Power Station, British Energy Group plc
Informing customers

- Electricity consumed by technology
  - Coal
  - Gas
  - Nuclear
  - Hydro
  - New renewables
  - Other
- Emissions
  - Carbon dioxide
  - Radioactivity

From environment to sustainable development

Some areas for future development

- EPD in the mainstream
- Increasing regulation in the area of electricity disclosure
- Need for greater engagement with stakeholders
  - Greater industry/government dialogue
  - Ethical investment community growing
  - NGO scrutiny increasing
  - Greater industry/public dialogue

British Energy website

Sustainable development

Economic

Social

Environmental
Summary

- Increasing requirement for companies to engage a wide range of stakeholders on environmental issues
- Different approaches suit different stakeholders
- Companies must be open, transparent and credible e.g. through EPDs
- CSR is a holistic approach to company performance serving all stakeholders
- Websites offer opportunities for dissemination

Plan of the presentation

- EDF, EDF R&D, EDF R&D LCA team
- LC Information at EDF
  - two cases, two conclusions
- Conclusion and debate
EDF Group

- Electrical capacity: 120 GW
- Production: 490 TWh + 80 TWh out of France
- Exports: 73 TWh
- 46 million customers (16 million out of France)
- 170,000 employees

EDF R&D

- 2,400 employees, mainly engineers
- Localisation:
  - Les Renardières, Chatou, Clamart (France)
  - Karlsruhe (Germany)
  - Easenergy (California)
  - London
- Scientific skills applied to:
  - Production, Commercial development, Power networks & Environment

Our LCA team

- LCA activity is integrated to the R&D division
  - A 6 engineers team
- Main areas dealing with LCA:
  - LCA as a methodology to be studied
    - Skills and tools (TEAM software, EDF database, member of SETAC …)
  - LCA of EDF France electricity generation System (EGS), and of others systems
  - Environmental assessment
    - Nuclear, electric heating, cities, transport …

LCA of EDF France electricity generation

- LCA of EDF France Electricity Generation System (EGS):
  - Nuclear, hydraulic, coal, gas, fuel
  - Peer-reviewed studies
  - Presented in SETAC Hambourg 2003

Complete inventories for EDF kWh mix
23 fluxes + 1 impact extracted for internal communication
Electricity and Life Cycle environmental communication: analysis rules

- Different uses for different users
- Internal political choice
- Which results (one flux, one impact, ...?)
- Which functional unit (a specific power plant, an electricity mix ...)?
- Credibility

First case: corporate communication

- Web communication for final consumers
- Asked by Sustainable Development Division
- "Greenhouse effect indicator" EDF kWh
- High credibility needed

Second case: answers to a specific question from business customers, public administration, ...

- Technical questions from environmental experts, often knowing LCA
- Strategic control To be checked at each case
- In general, inventory In general, EDF kWh
- High credibility needed

FIRST CONCLUSION: a high credibility is always needed!

- "Obvious, but essential for a company, whatever the target is, expert or not"
Why don’t we go further?

EPD could be an excellent continuation, 
A communication which could be the same for all stakeholders
› Development : technical participation of EDF for the 
elaboration of the electricity PSR (2004, GEDnet)
› Question : why is there no decision yet ?
=> because of the complexity of the subject

Such a complex subject !

Environment is not well known
› Each people focus on his own field of activity and/or interest
› Different kind of « environment » exist => many specific questions, and 
many specific tools (LCA is one of them) to give appropriate answers

A complex subject => a risky subject ?

Conclusion 2

Today, environmental LC communication is more considered 
as a risk than an opportunity

=> before external communication, internal communication is needed (to convince internally)

- Importance of internal training : we teach :
  › one day-training, to explain what is LCA and what are other 
environmental assessment methods
    - LCA, Ecological footprint …
  › in each study, an everyday work …

Conclusion and debate

- Two key points, linked each other, to perform in LC communication
  › 1. Preserve technical quality for credibility :
  › 2. We have to convince that LCA results can be also used as sale 
arguments
  › We have to overtake the paradox : communication : risk or 
opportunity ?

Today, we explain what are environment, LCA, LCM, …
Tomorrow, some help ?
- the right man at the right place ?
- the pressure of stakeholders ?
Thanks for your attention!

Corporate communication: the EDF web indicator

Indicateur EDF 2004 (g eq CO2/kWh)

Monthly published on the EDF website
Calculated with monthly production data & LCA results
The general methodology has been validated by the consultant PWC
A real web dialogue (ex: how do you consider the decommissioning? ...)

EDF R&D – LCM Workshop – Barcelone 2005
About the UNEP/SETAC Life Cycle Initiative

The Global Life Cycle Initiative was established by UNEP and SETAC. Among other things, the Life Cycle Initiative builds upon and provides support to the ongoing work of UNEP on sustainable consumption and production, such as Industry Outreach, Industrial Pollution Management, Sustainable Consumption, Cleaner and Safer Production, Global Reporting Initiative (GRI), Global Compact, UN Consumer Guidelines, Tourism, Advertising, Eco-design and Product Service Systems.

The Initiative’s efforts are complemented by SETA’s international infrastructure and the publishing efforts in support of the LCA community.

The Life Cycle Initiative is a response to the call from governments for a life cycle economy in the Malmö Declaration (2000). It contributes to the 10-year framework of programmes to promote sustainable consumption and production patterns, as requested at the World Summit on Sustainable Development (WSSD) in Johannesburg (2002).

Our mission is 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 overall aim is to put life cycle thinking into practice worldwide and specific objectives are the following ones:

Enhance the global consensus and relevance of existing and emerging life cycle approaches methodologies; Facilitate the use of life cycle approaches worldwide by encouraging life cycle thinking in decision-making in business, government and the general public; Expanding capability worldwide to apply and to improve life cycle approaches. Objectives will be met through projects in five Work Area Interest Groups:

a. Life Cycle Approaches Methodology (e.g. including data, methods, case studies)
b. Life Cycle Approaches for Resources and Materials (e.g. natural resources, chemicals, water, energy)
c. Life Cycle Approaches for Consumption Clusters (structured in housing, mobility, food and consumer products)
d. Capability Development on Life Cycle Approaches (e.g. institutional empowerment, training also for business, curricular development)
e. Life Cycle Management in Businesses and Industries

For more information, see http://lcinitiative.unep.fr

Sponsors of the UNEP/SETAC Life Cycle Initiative

About SETAC

The Society of Environmental Toxicology and Chemistry (SETAC) is a professional society, in the form of a not-for-profit association, established to promote the use of a multidisciplinary approach to solving problems of the impact of chemicals and technology on the environment. Environmental problems often require a combination of expertise form chemistry, toxicology, and a range of other disciplines to develop effective solutions. SETAC provides a neutral meeting ground for scientists working in universities, governments, and industry who meet, as private persons not bound to defend positions, but simply to use the best science available.

Among other things, SETAC has taken a leading role in the development of Life Cycle Management (LCM) and the methodology of Life Cycle Assessment (LCA). The organisation is often quoted as a reference on LCA matters.

For more information, see www.setac.org