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Communicating environmental impacts of print products

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Hanna Pihkola, Maija Federley, Minna Nors, Helena Dahlbo,
Sirikka Koskela & Timo Jouttijärvi

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| Results from the LEADER project (Part 2)

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Hanna Pihkola, Maija Federley & Minna Nors

VTT

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Abstract

Within the paper and printing industry, product-based information is required for both internal and external communication. The aim of the LEADER project (2007–2010) was to study the environmental impacts occurring during the life cycle of print products. During the project, life cycle assessment and carbon footprint studies were conducted for five print products. To increase the usability of the results among the industrial stakeholders and funding parties, communication was selected as one of the focus areas of the project. One of the main areas of interest was how to present the results of the life cycle assessment and carbon footprint case studies in a manner that non-expert stakeholders can readily understand.

The objectives of the empirical part of the sustainability communication study were to identify the most relevant challenges related to the communication of environmental information, to gather ideas and tools for improving communication within the value chain of print products, and to get feedback on the drafts of the fact sheets that were under development.

In the study, a qualitative research approach was applied. Data was collected by organizing workshops and by interviewing representatives of the value chain of print products. In addition, a literature study on available tools and guidelines suitable for communicating about the environmental performance of print products was conducted.

Based on the empirical data, there were clear differences in how often the interviewees encounter questions concerning sustainability. Therefore the needs and also the ability to make use of new information and new tools vary greatly within the value chain. The environmental issues in the value chain of print products are for the most part communicated between companies, by professionals, and very few actors in the field have direct contact with the end-users.

The tools that are most frequently used include the Paper Profile, sustainability and corporate responsibility reports and the Nordic ecolabel. Additionally, meetings and informal discussions with both own personnel and customers as well as companies' own reports tailored for certain purposes play an important role in current communication of environmental information.

There was general agreement that the demand for sustainability information and communication will increase and that the actors in the value chain of print products should have more courage, be more proactive and cooperate with other stakeholders. Attitudes towards the development of environmental work and communication were positive, but the task was also regarded as complex and challenging. A common concern for the value chain is the current image of print products and overly simplified comparisons between printed and digital media that are presented in the media and among consumers.

Based on the findings of the empirical study and the literature review it was agreed that the most informative way to present the results of LCA and carbon footprint case studies would be to produce case-specific presentation materials in the form of printed and electronic brochures. The brochures, i.e. fact sheets, summarize some of the main results of each case study of this project. Additionally, the fact sheets include basic information about the research method, product properties, assumptions made in the study and life cycle stages included. Guidance for interpreting the results was also included. The fact sheets (together with the final reports of the project) can be downloaded from the project website: <http://www.vtt.fi/sites/leader/index.jsp>.

Preface

In 2002, the European Commission's Directorate-General for Enterprise published the results of a qualitative study evaluating the perceptions of Europeans about wood-based industries. In the study, consumers engaged in group discussions to evaluate the image of forestry, the wood processing industries, the furniture industry, the pulp, paper and board industry, and the printing industry. According to the findings, paper and board products were generally considered to be very useful, but as an economic sector, the industry was not very familiar to consumers. Additionally, the environmental impact of the sector was considered to be quite negative due to forest destruction caused by the use of large amounts of wood and the amount of air and water emissions created. Although it was noted that many improvements had been made, they were mostly considered to fall short. (European Commission 2002)

As for the printing industry, the consumers were more familiar with the sector and appreciated it due to the high standing of books and the press and communications in general. The industry's image was not severely affected by the use of wood raw material, probably because the sector is more remote from wood as a raw material. However, this industry's environmental impact was likewise considered to be rather negative, as consumers were concerned about the polluting and even toxic impacts of the inks and other chemicals used. (European Commission 2002)

In 2010, TNS Gallup in Finland conducted a survey focusing on consumer views on printed and digital media. Environmental impacts were also included. The study was commissioned by the Print Power and Two Sides campaigns in Finland and funded by the Finnish Forest Federation. Based on the study, the strengths of printed media products are related to (among others) the high recycling rate of products and both the usefulness of the products and their informative content. On the other hand, the environmental impacts of printed media were commonly regarded to be higher than those of electronic media. Printed

advertisements were considered to have a particularly high environmental burden. 43% of the respondents did not think about environmental impacts while consuming print media, but more than half (56%) would like to have more information about the subject. Then again, 59% of the respondents stated that environmental responsibility affects their activities. (TNS Gallup 2010)

The examples mentioned above reflect some of the challenges that are now facing the paper and printing industries and relate to both the environmental impacts of the industries and their products and communication about those impacts.

The report at hand presents some of the results of the LEADER project, which ran in Finland from 2007–2010. The aim of the project was to study the environmental impacts occurring during the life cycle of print products. In addition, communication about the environmental impacts related to print products was one of the focus areas of the project.

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1. Introduction

Chapter 1 presents the background and objectives of the LEADER project – which ran from 2007 to 2010 – and introduces the aim and contents of the report.

1.1 LEADER project 2007–2010

In 2007, KCL (Oy Keskuslaboratorio – Centrallaboratorium Ab) started a national-level research project in Finland called Lean Development with Renewable Resources (LEADER). The project was motivated by the increased concern over climate change as well as the introduction of the carbon footprint concept. At that time, the definition of “product carbon footprint” was not yet clear and calculation procedures involved a great deal of uncertainty.

Within KCL, research related to the environmental impacts of pulp and paper manufacturing and different paper products had been ongoing for years. Life cycle assessment was a central tool in evaluating the environmental impacts of products and technologies. However, most of the studies covered the product life cycle only up to the gate of the paper mill and information about the end use of products was often excluded. Greater interest towards the environmental performance of paper and print products from producers, customers (business) and consumers led to the need to expand the studies to cover the printing phase and end use of products. The LEADER project emerged in response to the lack of up-to-date data on printing processes or product end of life for the purposes of life cycle assessment in Finland.

The aim of the LEADER project was to study the environmental impacts occurring during the life cycle of print products. The scope of the project was focused on printed media products. The main products in the print media product group are newspapers, magazines, books and advertisements. Five case products were selected from among the printed media products:

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- Heatset offset printed magazine
- Coldset offset printed newspaper
- Sheetfed offset printed book
- Electrophotography printed photobook
- Rotogravure printed advertisement leaflet.

The selected case products differ from each other in several ways. By selecting different kinds of print products, the impacts of different paper grades and printing methods were included in the study. Since all these products have different manufacturing processes and uses, the purpose of the project is not to compare different print products, printing technologies or paper grades. Instead, the aim is to provide an overview of the environmental impacts of printed media products and the possibilities of reducing those impacts.

The objectives of the LEADER project were defined as follows:

- To create a holistic view of the environmental impacts of print products over their whole life cycle.
- To utilize LCA (ISO 14040-44) and carbon footprint (e.g. PAS 2050) methodology and calculations to identify the critical life cycle stages and processes in which the emissions can be reduced.
- To enable product-specific and/or manufacturing process-specific calculations with the evaluation of improvements on the European scale.
- To highlight positive aspects of fibre-based print products and to discuss challenges related to different calculation tools and sustainability evaluation methods.
- To evaluate and demonstrate new ways of presenting carbon footprint and LCA results.

The project was coordinated first by KCL and then by VTT. Previous results of the LEADER project (from years 2007–2009) have been presented and summarized in two intermediate research reports (Nors et al. 2009a and Nors et al. 2009b). In 2009, the research activities of KCL were merged with the Technical Research Centre of Finland (VTT). As a consequence, the coordination of the LEADER project was transferred to VTT.

The research work was conducted in cooperation with the Finnish Environment Institute (SYKE), Metropolia University of Applied Sciences, Finnmedia, several printing companies, suppliers, logistics companies and the paper manu-

facturers Stora Enso, UPM-Kymmene, Myllykoski and Metsäliitto. The project could not have been completed without the active participation of several paper and printing industry representatives and other actors from the print media value chain. Several cooperation partners from the industry have provided valuable information, data and comments during the project.

The project was funded by Stora Enso, UPM-Kymmene, Myllykoski, Metsäliitto, the Graphic Industry Research Foundation (GTTS) and the Finnish Funding Agency for Technology and Innovations (Tekes).

1.2 Aim and contents of the report

The main results of the LEADER project are presented in two research reports:

- Carbon footprint and environmental impacts of print products from cradle to grave – Results from the LEADER project (Part 1). VTT Research Notes 2560 (2010).
- Communicating environmental impacts of print products – Results from the LEADER project (Part 2). VTT Research Notes 2561 (2010).

In this report (Part 2), the focus is on challenges and development needs related to environmental communication in the value chain of print products. Due to increasing public interest in the environmental impacts of consumption, there is a growing need for information about the environmental performance of print products. Within the paper and printing industry, product-based information is required for several purposes:

- internal communication within different actors in the graphic arts industry and individual companies and
- external communication to customers and consumers.

During the LEADER project, life cycle assessment and carbon footprint studies were conducted for five print products. To increase the usability of the results among the industrial stakeholders and funding parties, communication was selected as one of the focus areas of the project.

One of the main areas of interest was how to present the results of the life cycle assessment and carbon footprint case studies in an informative manner for non-expert stakeholders. Life cycle assessments and carbon footprint studies provide thorough and detailed information on emissions and environmental im-

1. Introduction

pacts related to print products. A certain level of expertise in the studied processes, environmental issues and life cycle assessment is often required in order to analyze the results and their importance. Comparisons between different products and product groups are often requested, and comparisons are also a practical way of presenting the results. However, comparable data is seldom available, since the results are always dependent on the data and the assumptions made.

In the report, the challenges related to environmental communication in the print product value chain are discussed. The research methods used in the study are presented in Chapter 2. The report presents different tools and approaches that are available for communicating about the environmental impacts of print products. Relevant tools, standards and guidelines are presented in Chapter 3. The tools presented were selected based on a literature review and their applicability for paper and print products. In addition, the experiences gained from the empirical study were utilized to arrive at an understanding of the tools that are currently used within the paper and printing industry.

The results from the empirical part of the study are presented and discussed in Chapter 4. Qualitative research on the needs and challenges related to communicating environmental impacts and carbon footprints was conducted based on interviews with the actors in the print media value chain.

Based on the findings from the literature and from the empirical study, one of the main outcomes of the study comprises fact sheets that summarize the main results of the LCA and carbon footprint case studies. The case studies are presented and reported in detail in Part 1 of the LEADER research report (Pihkola et al. 2010). The development process of the fact sheets is presented in Chapter 4 of this report. The main findings of this report are analyzed and discussed in Chapter 5. A short summary of the main results and outcomes is presented in Chapter 6.

2. Method description

2.1 Empirical data

The objectives of the empirical part of the sustainability communication study were to identify the most relevant challenges related to the communication of the environmental information, to gather ideas and tools for improving communication within the value chain of print products, and to get feedback on the drafts of the fact sheets that were under development. For this purpose, a qualitative research approach was applied (Tuomi & Sarajärvi 2002). This method is suitable when the aim is to explore diverse viewpoints and gain a profound understanding of a subject, rather than test an existing hypothesis.

Data were collected by organizing group discussions and by interviewing representatives of the value chain of print products in three phases:

1. Workshop for researchers for outlining main features in the communication of sustainability research results
2. Workshop for representatives of the pulp, paper and printing industries and interest groups for defining challenges, tools and development needs in sustainability communication
3. Interviews with other actors in the value network in order to cover a wider scope.

A semi-structured theme interview method was applied in the study (Hirsjärvi & Hurme 2000): The themes of the interviews and some questions were prepared in advance but the course of each discussion was allowed to vary according to the individual interests of the participants and the observations made during the discussions. The following themes were however essentially covered in all the interviews and group discussions with the stakeholders:

2. Method description

- Current situation with regard to environmental information and communication: what kinds of questions arise, who asks for information and what kinds of tools are applied to support communication?
- What kinds of challenges relate to communicating environmental information?
- How should the environmental information, e.g. carbon footprint and LCA calculation results, be communicated and what kinds of tools could be developed for improving communication?
- Feedback on the drafts of the fact sheets for communicating the main results of the LEADER project in professional contexts, but for non-experts.

Altogether 31 persons representing different actors in the value chain of print products contributed to the data collection of the study (excluding the researchers of the project). The participants of the workshops and the interviewees are listed in Appendix A. All the informants were Finnish. The stakeholder workshops and interviews were organized between April and August 2010. Figure 11 presents the whole value chain with other parties related to the sustainability communication of print products. The number of informants from each sector of the value chain are also presented in the figure.

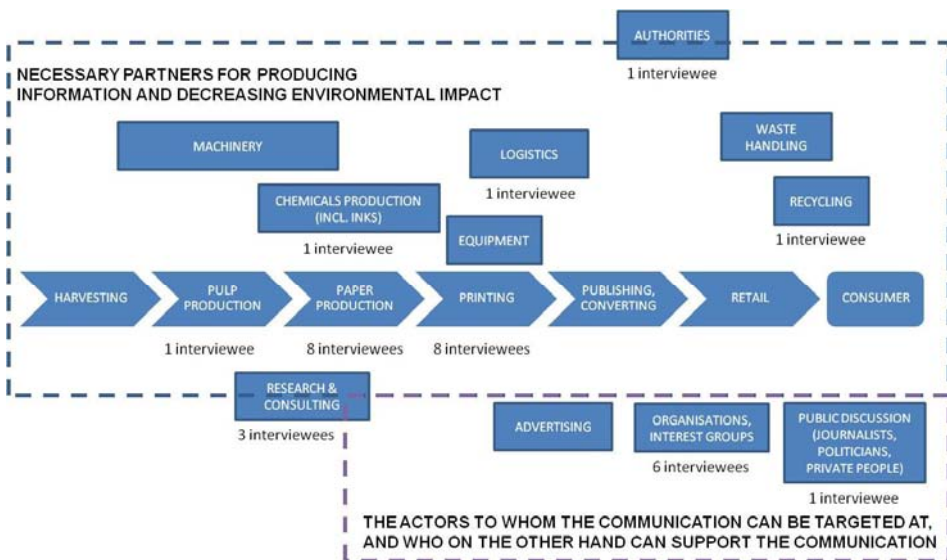


Figure 1. Scheme of the parties involved in the sustainability communication of print products.

The recorded interview data were transcribed, then categorized with the ATLAS.ti program and analyzed. The discussions in the workshops were documented in the summaries produced during the sessions and in the memos that were compiled after the workshops. A summary of the findings of the interviews is presented in Chapter 4. The interview quotations that are presented in Chapter 4 were translated from Finnish to English by the writers of the report. In some cases minor modifications have been made in order to condense the phrases but the goal has been to reproduce the original statements and ideas as faithfully as possible.

3. Tools for environmental communication

Demands for environmental communication related to products are increasing. The European Commission has launched several policies and initiatives that aim to promote voluntary communication related to the environmental and social performance of products. In the Green Paper for Promoting a European Framework for Corporate Social Responsibility, the Commission has defined corporate social responsibility as "*a concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis*" (European Commission 2001).

Communication is a central issue when engaging with stakeholders. Environmental communication is a process that includes several aspects and requires different kinds of tools. The needs and resources available for communication depend on the company in question and the demands of its customers and other stakeholders. Environmental communication has been defined as a process of sharing information to build trust, credibility and partnerships, to raise awareness, and for use in decision making. Because of these various meanings, environmental communication is broader than mere reporting (ISO 14063).

Environmental communication is closely related to the use of assessment methods, tools and reporting practices that produce the basis for communication. The tools that can be used for evaluating and communicating the environmental information related to paper-based print products fall primarily into one of four categories: environmental labels, forest certification, environmental declarations and environmental management systems. In addition, there are product-based assessment and research methods – such as life cycle assessment and carbon footprint – that are used as information sources for many of the mentioned tools. In the following chapter, the available tools, standards and guidelines related to the environmental and sustainability communication of paper and print products are presented in brief. Furthermore, they are summarized in Appendix B.

3.1 Ecolabels

The International Organization for Standards (ISO) divides ecolabels into three categories (ISO 14025), all of which have different purposes, target groups and sources. There are also significant differences within each category:

- Type I – predetermined requirements and third-party certification
- Type II – self-declared environmental claims by the producing company, and
- Type III – environmental declarations based on lifecycle assessments; no set requirement limits, but the figures are third-party certified.

Table 1. The three ecolabel categories and their characteristics (See Tonteri et al. 2003).

Type I ISO 14024	Type II ISO 14021	Type III ISO/TR 14025
Environmental Labels	Environmental Claims	Environmental Declarations
Selected criteria as hurdles, demonstrating environmental excellence	Single issues describing specific environmental characteristics	Life cycle performance data, aim is continuous improvement
Life cycle thinking	Life cycle thinking	Life cycle assessment
<ul style="list-style-type: none"> ✓ Mandatory certification ✓ Issued by private or public, accredited institution 	<ul style="list-style-type: none"> ✓ Issued by manufacturer ✓ Certification possible 	<ul style="list-style-type: none"> ✓ Mandatory 3rd party validation ✓ Certification possible ✓ Issued by private, accredited institution
Public product group based criteria	Claims must be based on available public initial information	Initial information data should be available except private company information
like: Swan Label, European Eco-Label	like: Recyclability, Compostable	like: Environmental Product Declaration

A reputable ecolabel is a simple and effective way to enable consumers to make environmentally sound purchases. The organization behind the label sets all the requirements and limits and assesses the product's environmental impact. An independent third party checks whether the product fulfils the requirements. Products that do not meet the requirements are easy to identify since they are not

permitted to carry an ecolabel. The Nordic Ecolabel (Swan) and the EU Ecolabel (Flower) are the most widely adopted ecolabels. Several national ecolabels are also in use, such as Bra Miljöval (Sweden) and Blue Angel (Blaue Engel, Germany). In Sections 1.1.1 and 3.1.2 of this report, the Nordic and EU ecolabels are presented in more detail because they have established or are establishing criteria for printed products. The basic structure of the ecolabelling systems (based on LCA) is presented in Figure 2.

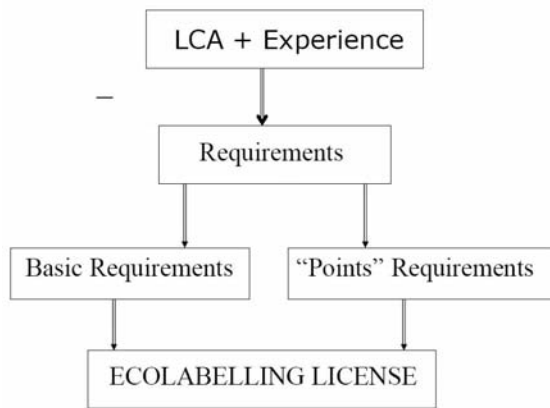


Figure 2. Basis for the ecolabelling.

3.1.1 The Nordic Ecolabel

The Nordic Ecolabel (The Swan) is the official ecolabel in the Nordic countries. According to ISO terminology, the Nordic Ecolabel is a Type I ecolabel. This means that there is a set of predetermined criteria for the product, and an independent third party must assess the product before it can be awarded the ecolabel. The Nordic Ecolabel complies with the recognized ISO standard for ecolabelling, ISO 14024.

The criteria are based on an analysis of the environmental impacts of the product during its entire lifecycle. The criteria are revised and successively tightened, often every three to four years. In this way, the Nordic Ecolabel distinguishes the most environmentally sound alternatives on the market and promotes progress towards sustainable products. Besides environmental requirements, the Nordic Ecolabel also sets requirements on good quality and function. The criteria of the Nordic Ecolabel cover both printed matter and printing services.

Nordic Ecolabelled *printed matter* must fulfil requirements with respect to forest management, pulp and paper production, printing and waste management (Nordisk miljömärkning 2009). The wood that is used to make the paper must come from sustainable forestry. Fibres derived from forest environments meriting protection must not be used. At least 20 per cent of fibre must come from certified forests (unless 75 per cent of the raw material comprises recycled fibre or wood chips). Forest certification means that forest management is governed by standards with particular rules, and that an independent control body verifies compliance with these. The standards must be adapted to local conditions and fulfil Nordic Ecolabelling requirements. Currently, some standards within the FSC and PEFC systems (see Section 3.3) are approved.

The requirements set by Nordic Ecolabelling for pulp and paper mills include low energy consumption and stringent emission limits, such as for substances that can cause acidification or eutrophication or affect the marine environment. Mills must also limit their use of environmentally dangerous chemicals. Waste must be sorted at source and dealt with in an environmentally sound manner.

Printing companies must eliminate the use of environmentally hazardous chemicals and minimize energy consumption. The requirement of low energy consumption during paper production and printing is important for reducing climate impacts. Nordic Ecolabelled printed matter must be printed on paper fulfilling Nordic Ecolabel requirements.

The Nordic Swan Ecolabel for the printed matter product group has already attracted over 400 company licences (2007). It is their most successful ecolabel product group to date in terms of licence numbers. These include licences for several major Scandinavian newspapers, many books and magazines as well as licences for stationery and catalogues. There are many Nordic Ecolabelled paper products within each product group. A list of Nordic Ecolabelled products can be found at www.svanen.nu.

The Nordic Ecolabelling scheme covers *the printing company's production of printed matter*. The printing materials used by the printer must consist primarily of paper. The printing company can freely choose what printed matter can be Nordic Ecolabelled. In practice, the customer (e.g. publisher) who orders the printed matter often decides on the use of an Ecolabel on the product. Printing companies may exempt certain printing methods by agreement if they form a marginal part of production (e.g. test printing) and if the company's marketing does not give the impression that all of its output is Nordic Ecolabelled. Printing companies may, by agreement with the ecolabelling organization, also exempt

the production of certain types of printed matter that have specific production requirements (e.g. safety printing).

The ecolabelling licence is valid for as long as the criteria are fulfilled and for as long as the criteria remain in force. The criteria may be extended or adjusted. If so, the licence will be extended automatically and the licence holder will be notified. A follow-up inspection may be performed or arranged by the ecolabelling organization. Such inspections cover all the requirements specified in the criteria document.

3.1.2 The EU Ecolabel

The EU Ecolabel (the Flower) is the direct equivalent in the European Union to the Nordic Ecolabel in the Nordic area. The label was established in 1992. The principles behind the EU Ecolabel are the same as for the Nordic Ecolabel. It is a Type I label with predetermined criteria and third-party assessment. The criteria are established by national “responsible bodies” appointed by each European Member State in collaboration with the European Commission. The criteria are based on an analysis of the environmental impacts of a product during its entire lifecycle. The criteria are valid for 3–5 years and subsequently tightened.

The requirements for paper and paperboard used in printed products address forest management and pulp and paper production. The current EU Ecolabel criteria requires that at least 10% of the raw material in printing and copying paper comes from certified forests. These criteria are, however, currently being revised and in the revised criteria document (Revision of EU Ecolabel copying and graphic paper criteria 2010) much more stringent requirements are set for the fibres used in these papers. According to the proposal, all virgin fibres shall be covered by valid forest management and chain of custody certificates issued by an independent third party certification scheme such as FSC, PEFC or equivalent. If these schemes allow mixing of certified material and uncertified material in a product or product line, the proportion of uncertified material cannot exceed 50 % and should be covered by a verifiable system ensuring that the fibres are legally sourced and do not come from protected areas or areas in the official process of designation for protection, old growth forests and controversial sources (European Commission 2010, Revision of EU Ecolabel copying and graphic paper criteria 2010).

Emission requirements are set on pulp and paper production. Stringent limits are set for emissions of acidifying substances and greenhouse gases to air, as

well as for emissions of chemicals and eutrophic substances to water. There are also requirements on energy use, hazardous chemical substances and waste management.

The availability of products carrying the EU Ecolabel varies between European countries. Information on labelled products and where these are sold can be found in the Ecolabel catalogue, www.eco-label.com. The Ecolabel is currently available in 26 product categories, and most of the licences have been awarded to tourist accommodation services (37%). In the group of copying papers, 14 licences have been awarded. (For more information, see http://ec.europa.eu/environment/ecolabel/about_ecolabel/facts_and_figures_en.htm#facts)

The EU Ecolabel has criteria for the ecolabelling of copying and graphic paper and tissue paper. There are however **no official criteria for printed matter** as yet. The work for "*establishing the ecological criteria for the award of the Community Ecolabel to printed paper products*" has been led by the Swedish competent body, Ecolabel Sweden. The final draft for the Ecolabel criteria was completed in 2005 (European Commission 2005).

The product group "*printed paper products*" shall comprise any printed product made of paper, paper board or paper-based substrates. Examples of eligible items include envelopes and other paper stationery, exercise books, pads, binders, folders, catalogues, magazines, books, booklets, leaflets and forms. Inserts, covers and any printed paper part of the final printed paper product are included in the scope. If different printing technologies are used, each technology must fulfil the criteria specific for that technology. The product group shall **not** cover printed tissue papers, printed paper products used for packaging and wrapping or printed paper products produced by using metal-complex inks based on lead, chromium (VI), nickel, cadmium, copper (excluding copper-phthalocyanine), cobalt of greater than 0.1% (w/w) and mercury.

The eligible applicants for the product group "*printed paper products*" include printing houses, printing house customers, such as publishers, and paper converters. The applicant must provide the relevant declarations, certification/documentation and or test/sample results for assessment against the requirements of the EU Ecolabel.

The draft criteria for printed paper products, following significant redrafting and changes to address industry concerns, are not particularly stringent. They are seen as well balanced and have the support of all Member States. The criteria award the Ecolabel on the basis of a points system, allowing flexibility in how the criteria are met, thereby broadening the scope for achievement.

3. Tools for environmental communication

For consumer information, where the EU Ecolabel is shown the following text must also be displayed:

- This product is recyclable
- It is printed using environmentally friendly paper
- Emissions of chemicals to air and water have been limited, and so have greenhouse gases.

Costs of ecolabels to companies

The ecolabels have different ways of charging the companies for the rights to use the label. The Flower charges 0.15% of the turnover for the labelled product with a maximum fee of €25,000 and reductions for SMEs and EMAS. For printed paper products which have been awarded the Swan, the fee is 0.3% in Sweden and 0.4% in the other Nordic countries of the turnover of the labelled products. The annual fee for a printing office on the amount of paper used is €1.5 per tonne of paper. In both cases the maximum fee is €30,000 and the minimum €50, with no reductions available.

3.1.3 Environmental product declarations

Environmental declarations contain relatively detailed figures about the products' environmental performance. Accordingly, environmental declarations are primarily aimed at professional purchasers who have in-depth knowledge of the relevant environmental aspects and the time to analyze the declarations. Environmental declarations are based on data that a company produces through life cycle assessments. EPD (environmental product declaration) is a Type III label according to ISO standard (ISO 14025) and complies with the standards for life-cycle assessment (ISO 14040 and ISO 14044). The data are reviewed by an independent body. EPD is illustrated in Figure 3.

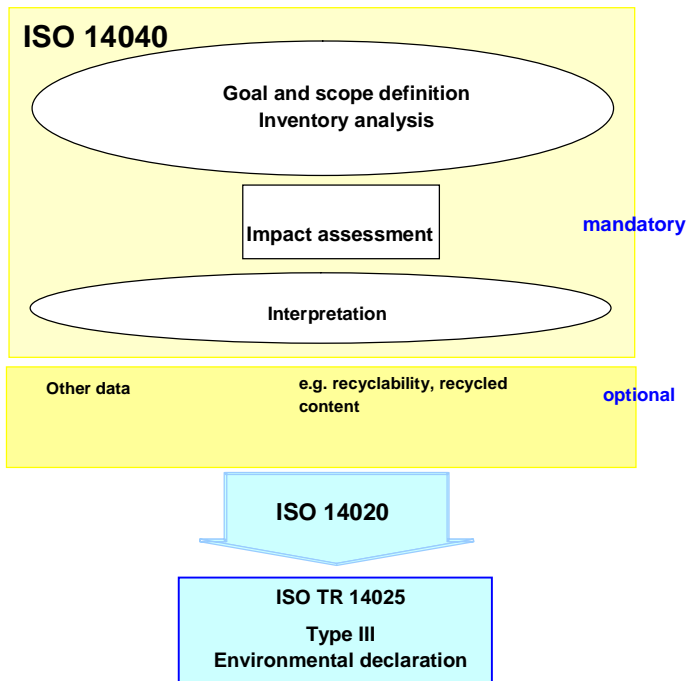


Figure 3. The standards relating to environmental declarations (ISO14025).

An EPD specifies how the product influences various environmental problems, such as climate change, acidification and eutrophication. EPDs for paper include the environmental impact of both forestry and production processes. However, it is hard to address chemicals and environmental toxins through such declarations. A harmonized, international EPD system is being developed. The Swedish Environmental Management Council has a leading role in this effort. There are currently few paper products with an environmental declaration following the international EPD system.

3.1.4 Paper Profile

Paper Profile is a product declaration that has been developed by nine major European paper manufacturers. The system was launched in 2001. A declaration is based on the information disclosed by the company itself, but an independent control body may verify it. There are common rules for the collection, calculation and presentation of data. The declaration covers the origin of the wood, the environmental impact of paper production and information on the company's

environmental management system. Paper Profile makes no claims as to enabling the direct comparison of the environmental performance of different products. The founders of the system emphasize for example that different manufacturing methods have different environmental aspects and that environmental issues differ with location. Unless verified by a third party, the Paper Profile can be considered to belong to the group of Type II ecolabels – self-declared environmental claims by the producing company (according to ISO 14025).

3.2 Climate labels

As climate change and global warming are of high concern, they drive growing demand for carbon footprint information on products and services. A carbon footprint (or carbon label, carbon profile) reflects the overall amount of greenhouse gas (GHG) emissions associated with a product or service during its whole life cycle. These climate change impacts are one of the key impact categories included in life cycle assessments (LCA). Hence, a carbon footprint is a life cycle assessment in which the analysis is limited to emissions that have an effect on climate change.

There are several processes aiming at an international carbon label or carbon footprint. One of the first carbon labels in the world was the Carbon Trust¹ Carbon Reduction Label (UK). The Carbon Trust Carbon Reduction Label is one option that companies have for communicating compliance with PAS 2050 carbon footprint guidelines (for more information about PAS 2050, see Chapter 3.5.2). The label shows the carbon footprint of the product (given in g CO₂ equivalents) assessed according to PAS 2050. It also presents the unit against which the footprint has been calculated (e.g. detergents: per wash). In addition, it states the company's commitment to reduce product emissions over time. It can also include an explanation of the footprint (breaking the footprint into life cycle phases of the product), a comparison to footprints of alternative products in the category and tips for consumers on how they can reduce the product's emissions by changing the way they use it. (Carbon Trust 2008)

Several companies have chosen to communicate their product carbon footprints using the Carbon Reduction Label. The retail company Tesco has labelled products such as detergents, potatoes, orange juice and light bulbs. Other com-

¹ The Carbon Trust was set up by the UK Government in 2001 as an independent company tasked with accelerating the move to a low carbon economy.

panies using the label include Walkers (crisps), Continental clothing (B2B t-shirts), Haymarket (Ends and Marketing magazines) and Dyson (hand-dryers). These companies have chosen to use a variety of different formats and media for communication, but the core information is consistent: the carbon footprint number, verified by the Carbon Trust and the company's commitment to reduce product emissions.

The carbon reduction labels have several formats, which can include different information. This means that it is usually difficult or impossible to compare products on the grounds of the label. In case a carbon reduction label is provided with all the information that can be incorporated, it enables consumers to compare different products for similar uses and indicates possibilities for reducing emissions through different usage patterns. It also points out the significance of e.g. different life cycle phases such as the production phase and the use phase and steers her to focus on optimizing or minimizing the emissions from the most important phase.

A different type of label initiative started in 2008 in Switzerland. The independent association climatop labels the most climate friendly products with their label «approved by climatop». In contrast to the label of Carbon Trust, this label does not indicate the carbon footprint of a specific product, but rather labels those products out of a comparable group of products which have at least 20% lower GHG emissions than other products in the same category.

Beside the fact that it has to be proven that the product in question has a lower climate charge, the product also has to fulfil several environmental and social standards. The whole life cycle of the product is included in the calculation. Therefore it is crucial to have a profound knowledge of the ingredients, the production processes, the means of transportation, the energy supply in the manufacturing industries as well as the energy source, up to the average lifetime of the product and its recycling alternatives. Concrete amounts of CO₂ can be assigned to all those single steps with data sourced from Ecoinvent, the leading international database.

The *climatop* label is a supplier-independent quality brand and therefore it also enhances competition between different suppliers. A certified product can use the label for two years. Afterwards, recertification is necessary to extend its validity. Climatop-licensed products are listed on the web pages of climatop together with a fact sheet showing the products included in the comparison and a peer review of the life cycle GHG emission calculations verifying that the calculations are compatible with the LCA standard ISO 14040. Examples of the li-

censed products are an organic fair trade sugar from Paraguay and laundry detergents. (For more information, see Climatop 2009.)

Both the carbon reduction label and the *climatop* label are based on life cycle data and certified by a third party. Climatop labelling enhances competition between different suppliers and thereby accelerates the development of products with low carbon emissions. The amount of products included in the comparison is currently very limited, but climatop has the potential to be a good system.

Sweden is working on climate labelling for food. Products with at least 25% greenhouse gas savings will be marked in each food category, starting with plant production, dairy and fish products. The label is a joint initiative by the Federation of Swedish Farmers, two food labelling organizations and various dairy and meat cooperatives (Euractiv 2009). Also, the climate declaration originates in Sweden (Climate declaration 2010). It has been introduced within the framework of the international EPD system. The climate declaration is simply an extract from an environmental product declaration. It was adopted in 2007. In 2008, the system included 89 EPDs and six climate declarations. (Nissinen and Seppälä 2008).

Opportunities for developing a climate label for products have been considered in Finland as well (see, e.g. Nissinen & Seppälä 2008). The Climate Bonus project studied possibilities for developing a verified carbon footprint system together with a personalized monitoring, feedback and reward system for households and retailers. (Perrels et al. 2009; Usva et al. 2009)

The main challenges related to the development of carbon labelling systems lie in ensuring that the reliability, accuracy and traceability of these carbon footprints are good enough to maintain credibility for consumers, retailers and producers. The approval of carbon footprints should be based on transparent and comparable methods, and impartial third-party verification, whereas the comparison of carbon footprints at product level would be only eligible for carbon footprints that have a sufficiently narrow margin of uncertainty (Perrels et al. 2009).

3.3 Forest certification and chain of custody certification

Currently, there are over 50 forest certification schemes operating at both international and national level (see, e.g. CEPI 2000). In Finland, the best-known schemes are PEFC and FSC. The Forest Stewardship Council (FSC) is an international initiative to promote sustainable forestry by addressing ecological, social and economic aspects. The Programme for the Endorsement of Forest Certification (PEFC), like FSC, is a system for the certification of sustainable forest management.

When considering the environmental impacts and sustainability of paper and print products, the use of sustainably managed raw materials is considered to be one of the key issues among many consumers (see European Commission 2002). During the last few years, the use of forest certification labels within the group of printed products has increased. Both PEFC and FSC only set requirements on forest management and traceability. No environmental requirements are set on the subsequent stages of manufacturing such as pulp and paper production or printing.

The standards for FSC-certified forests vary from country to country. In Finland, PEFC certification has so far been more popular among forest owners and the availability of FSC-certified wood from Finland has been nonexistent. However, new criteria for the FSC standard in Finland were jointly agreed upon by different stakeholders in autumn 2010. The standard includes 54 criteria and 204 indicators concerning the economic, environmental and social sustainability of forestry and it covers the whole of Finland. FSC certification according to the new standard will start in 2011 after the approval of the international FSC organization. The new standard is expected to increase the availability of FSC certified wood in Finland. (FSC Finland 2010)

In addition to forest certification schemes that are intended for forest owners, chain of custody certificates (CoC) are tools that are available for printing houses. Chain of custody certification allows the printer to label products with the FSC or PEFC trademarks. The certification shows that the supply chain of the raw material can be followed and tracked from the forest to the consumer, including all stages of processing and distribution (see, e.g. <http://www.fsc.org/pc.html>).

3.4 Other tools

3.4.1 Eco-Benchmark

The Eco-Benchmark approach was developed in a research project carried out by the Finnish Environment Institute SYKE (co-ordinator), the National Consumer Research Centre, MTT Agrifood Research Finland and the Finnish Game and Fisheries Research Institute. The Eco-Benchmark approach is an attempt to clarify LCA results to consumers (see Nissinen et al. 2006; Finnish Environment Institute 2009). It is an evolving tool for describing the environmental impacts of consumption. The Eco-Benchmark aims to help consumers to understand:

- Which products and choices are important for the environment?

3. Tools for environmental communication

- Which alternatives are best for the environment?

The Eco-Benchmark takes into account five important environmental impacts, which are weighted (i.e. given priorities) according to their importance. The scale is based on the per capita daily total environmental impacts of Finland, which are set at 100 (see Figure 44). In addition, five products are placed on the Eco-Benchmark, serving as additional benchmarks alongside the scale itself. In Figure 44, next to the actual Eco-Benchmark, you can see the various environmental impacts (aggregated) of the benchmark products. The environmental impacts of these products are calculated according to the estimated typical daily use of Finnish consumers. A similar figure can be used to show the environmental impacts of any consumer product or service for which an LCA has been conducted.

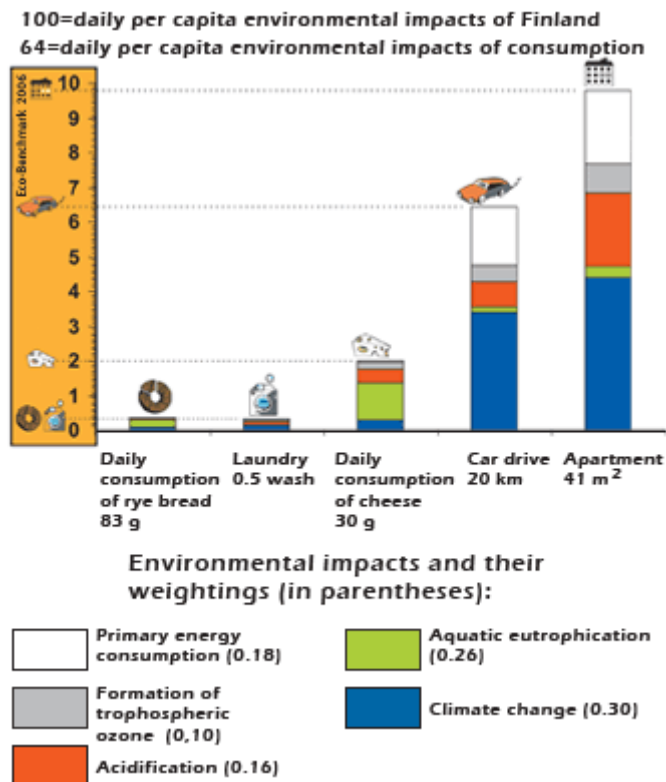


Figure 4. The elements of the benchmarking: the ruler, the scale and the benchmark products. Together they form the 'Eco-Benchmark'. In addition, the aggregated environmental impacts of the benchmark products are shown here. (Nissinen et al. 2006; Finnish Environment Institute 2009)

In addition to the aggregated presentation, it can often be valuable and informative to show the values for each environmental impact class, as in Figure 5. The ruler is not shown in these figures, only the scale, in order to differentiate them from the basic presentation format, which aggregates the various environmental impacts. These two presentation types are suggested to be used in combination.

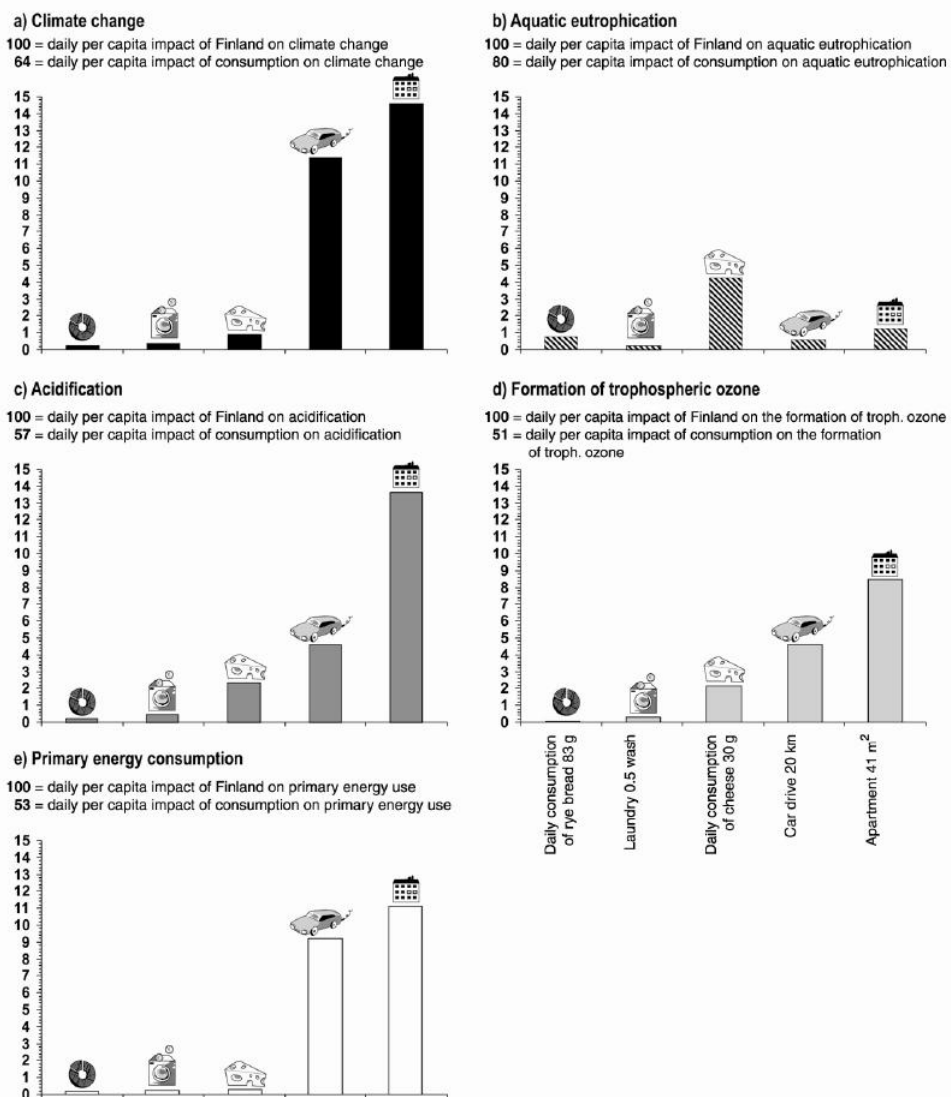


Figure 5. The various environmental impacts of the benchmark products. The benchmark in Figure 4 aggregates all these impacts. (Nissinen et al. 2006)

3. Tools for environmental communication

The total daily environmental impacts per person (= scale) are calculated on the basis of the annual emissions and energy consumption in Finland. For example, eutrophication effects have been calculated on the basis of the annual emissions of nutrients from industry, agriculture and human settlements. It is worth noting that a large share of Finland's emissions and energy consumption are caused by the production of export products. On the other hand, imported products cause emissions too, but these are not included in the calculations. In the case of climate change, estimating these using the input-output method has resulted in a value of 64 for the impact of consumption on climate change (see Figure 5, part A).

The best available life cycle assessments for consumer products were selected for the Eco-Benchmark. The project group evaluated tens of life cycle assessments thoroughly, paying attention to how carefully they were compiled. The benchmark products include:

- rye bread (83 g/person/day, about two slices)
- cheese (30 g/person/day, about four slices)
- the daily laundry (half of a machine-wash in 40°C/person/day)
- housing (one day of living in a heated flat, 41 m²/person) and
- a car trip (20 km/person/day).

The number of published life cycle studies for consumer products is still limited. It is hoped that producers will publish more information on the environmental impacts of their products on product packages and on their websites.

The Eco-Benchmark considers five important environmental effects, which have been weighted (i.e. given priorities) according to their relative importance. The weights are based on the views of almost a hundred environmental experts on the significance of different environmental problems in Finland. The impact categories considered are:

- Climate change, which refers to global warming caused by greenhouse gases.
- Ozone formation in the troposphere (the lower levels of the atmosphere), which is caused by emissions of hydrocarbons and nitrogen to the air. Ozone and other so-called photo-oxidants cause breathing problems, damage to plant leaves and reduced grain harvests. These pollutants also contribute to smog, although the Nordic countries do not suffer from this problem.

- Acidification is caused by emissions of sulphur dioxide and nitrogen compounds to the air and has adverse effects on fish species and other organisms as well as on the fertility of forest soil. Acid deposits also damage building surfaces and other materials.
- Eutrophication is caused by emissions of phosphorus and nitrogen to waterways. Emissions of decomposing substances that cause oxygen depletion can also contribute to eutrophication. Eutrophication leads to changes in species, to algae blooms and to excess shoreline vegetation.
- Energy consumption, in this context, refers to all energy use throughout the product life cycle. The environmental problem here is the depletion of energy stocks. A special concern is the decline of fossil fuel stocks (depletion of non-renewable natural resources).

Criticism has been levelled against the Eco-Benchmark approach on that it does not strictly follow the international guidelines on communicating the results of life cycle assessment studies. For example, according to the standards environmental impacts should only be compared between products with the same function. Furthermore, weighting different environmental impacts against each other and aggregating the results should not be used when comparative assertions are disclosed to the public.

3.4.2 WWF Paper scorecard

In 2007, the World Wildlife Fund launched its own system for environmental declarations called the Paper Scorecard. The scorecard is intended to serve as an environmental guidance for paper purchasers and it includes a guidance document. A purchaser who is willing to use the scorecard sends the scorecard questionnaire to suppliers. Different answers are awarded different points. The paper manufacturer completes the questionnaire and a certification body verifies the answers. The questionnaire contains questions addressing the origin of fibre, contributions to climate change, the emission of chlorine compounds, emissions of oxygen-consuming organic waste to water, the dumping of waste materials and environmental management. This tool aims to allow the purchaser to compare different products on the market using point scores. There are no fixed levels by which to assess a product. (For more information, see e.g. WWF 2010.)

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In autumn 2010 WWF announced the publication of a new tool called Check Your Paper, which is intended to replace the current Paper Scorecard. At the time of writing this report, the new tool had not yet been launched.

3.4.3 Environmental management systems

In addition to ecolabels and environmental declarations, several systems have been created for giving consumers information on the sustainability of the production chains of companies. An environmental management system (such as EMAS or ISO 14001) is not a product label but may appear in the information provided by a paper producer. As the name suggests, such schemes concern systems, procedures and work methods within a company to ensure that environmental issues are dealt with in a systematic manner. There are no set requirements or lowest limit levels for environmental performance. The company itself sets its goals for “continual improvement”.

From the communication point of view, EMAS systems require the company to publish its environmental policy and a yearly environmental report. ISO 14001 requires the company to publish its environmental policy. For more information about the environmental management systems, see http://ec.europa.eu/environment/emas/index_en.htm or <http://www.ymparisto.fi/default.asp?node=181&lan=fi>.

3.4.4 Corporate responsibility reporting

There are several reporting frameworks available for sustainability reporting. Corporate responsibility or sustainability reporting is typically conducted on a yearly basis, and the report covers all actions of the company. As distinct from the previously mentioned product-based tools, corporate reporting has a wider scope, covering all products and business activity at the company level.

Currently, the Global Reporting Initiative (GRI) guidelines are the most widely used guidelines in sustainability reporting (KPMG 2008). The current version of the reporting framework is the G3 Guidelines, published in 2006. The publicly available G3 Guidelines include environmental, social and economic indicators that are divided into core indicators and additional indicators. Each company should report the core indicators. The additional indicators can be utilized to provide more information. If data for a specific indicator is not reported, it should be explained why the information is missing. (GRI 2006)

The GRI guidelines can be applied to all branches of industry and they provide a general framework for reporting sustainability performance. The aim of the guidelines is to harmonize the disparate reporting methods and thus improve the comparability of sustainability reports. In addition to common guidelines, the GRI includes industry-specific sector supplements. A sector supplement is a tailored version of the G3 Guidelines, containing commentary and specific indicators designed for the given sector. Currently, sector supplements are available for the following sectors: Electric utilities, financial services, food processing, mining & metals and non-governmental organizations (NGOs).

Additionally the development of sector supplements is ongoing for several sectors, including the media sector. According to the GRI website, the motivation for the media sector supplement is that *“the media sector faces its own unique sustainability challenges, such as content issues, transparency and accountability, as well as eco-efficiency of materials used in the production of the circulated media, among others.”* (Global Reporting Initiative 2010)

The aim of the Media Sector Supplement is to increase the relevance of the G3 Guidelines for the sector, while at the same time satisfying demands from various stakeholders about transparency and accountability. In the current draft, the media sector was broadly defined to include entities involved in content generation and the provision of content distribution platforms including the following media subsectors for news or entertainment purposes: Film and Video, Music, Television, Radio, Video Games, Books, Press, Web Media. In addition, it is mentioned that the supplement may be of limited applicability to those involved in: Advertising & Design Related Activities, Telecommunications & Web Technology, Public Relations, Printing Activities. (Global Reporting Initiative 2010)

The first commenting round for the Media Sector Supplement draft was organized in 2010 and the final draft should be available for commenting in early 2011. The release of the final supplement is expected in mid-2011. The first draft was very preliminary in nature. Based on the content of the draft, it is difficult to estimate whether the supplement can actually provide relevant guidance for all the media subsectors now mentioned in the draft.

3.5 Standards and guidelines

As described in the previous chapters, several of the product-based tools for environmental management and communication are based on the utilization of life cycle assessment or require covering the whole life cycle of products. Typi-

3. Tools for environmental communication

cally, the research methods that are applied as the basis for communication include some definitions and guidelines on how the results can be interpreted and used. The following chapters present relevant standards and guidelines for environmental communication. When presenting the standards, the support that they provide to communication activities is given particular consideration.

3.5.1 Life cycle assessment standards

Life cycle assessment (LCA) is a product-based research method that analyzes the environmental aspects and potential impacts across the product life cycle from cradle to grave, including raw material acquisition, production, use, end-of-life treatment, recycling and final disposal. Life cycle assessment is a technique that has been developed to gain a better understanding of the potential environmental impacts of products. LCA can be used to facilitate:

- identifying opportunities to improve the environmental performance of products in different life cycle stages
- informing decision-makers in industry, government or non-government organizations (for example, for the purpose of strategic planning or product design)
- selecting relevant indicators of environmental performance
- marketing products (for example, making an environmental claim or applying for an eco label). (ISO 14040:2006).

The ISO 14040 and ISO 14044 standards address some of the requirements for carrying out an LCA. The four phases of LCA are the goal and scope definition phase, inventory analysis, impact assessment and interpretation (ISO 14040:2006, ISO 14044:2006).

An LCA study is structured around a functional unit that defines what is being studied. Thus, LCA is a relative approach. The scope, system boundary and level of detail of an LCA calculation depend on the subject and the intended use of the study. Thus the depth of the study can differ depending on its goal. As a consequence, the results of different LCA studies cannot be compared with each other without careful consideration of their functional units, system boundaries and assumptions related to calculations.

The ISO standards on LCA are mainly focused on describing the principles of LCA, the calculation procedures and the interpretation of the results. The stan-

dards do not include actual guidelines on communicating the results. Instead the standards provide strict rules and guidelines on the comparative claims that can be made based on LCA studies intended for public use. According to the standard, an LCA study that is intended for public use should be verified by a third party using a so-called critical review process. In the critical review process, an independent third party or panel of experts provides a statement concerning to what extent the study in question complies with the demands stated in the ISO 14040 and 14044 standards as well as the possible flaws of the study. The results of the critical review (the statement) are published together with the results of the study.

3.5.2 Carbon footprint standards

A carbon footprint (CF) describes the overall amount of carbon dioxide (CO₂) and other greenhouse gas (GHG) emissions (e.g. methane (CH₄) and nitrous oxide (N₂O), etc.) associated with a product or service during its whole life cycle, including the extraction of raw materials, the manufacture of goods, their use by final consumers and recycling after use, energy recovery and ultimate disposal. The causes of these emissions are, for example, electricity production in power plants, heating with fossil fuels, transport operations and other industrial and agricultural processes.

The carbon footprint is quantified using indicators such as the Global Warming Potential (GWP). As defined by the Intergovernmental Panel on Climate Change (IPCC), a GWP is an indicator that reflects the relative effect of a greenhouse gas in terms of climate change considering a fixed time period, such as 100 years (GWP100). The GWPs for different emissions can then be added together to give one single indicator that expresses the overall contribution to climate change of these emissions.

Even though the LCA methodology is standardized by ISO 14040 and 14044, the carbon footprint calculation procedure needs separate guidelines to cover carbon-specific features. Currently, the PAS 2050 issued by BSI can be regarded as the most credible and internationally recognized guidance, since ISO standardization work is still ongoing.

PAS 2050

Publicly Available Specification (PAS) 2050 ‘Specification for the assessment of the life cycle greenhouse gas emissions of goods and services’ is the first widely recognized guidance for carbon footprint calculation. It was published in October 2008 by BSI (British Standards Institution). The development of PAS 2050 has been co-sponsored by Carbon Trust and the UK Department for Environment, Food and Rural Affairs (Defra).

PAS 2050 is based on life cycle thinking as defined in the ISO 14040 series (LCA standards). PAS 2050 specifies requirements for identifying the system boundary, the sources of GHG emissions associated with goods and services that fall inside or outside the system boundary, the data requirements for carrying out the analysis, and the calculation of the results. It does not include category provisions for goods and services; however, it is determined that category-specific provisions for goods and services, developed in accordance with ISO 14025:2006, will be adopted where available. It is one of the intentions of PAS 2050 to allow for the comparison of GHG emissions between goods or services, and to enable the communication of this information. However, it does not specify any requirements for communication.

Although PAS 2050 is now available, there is still a lack of detailed guidance for the carbon calculations and information included in the labels for different product groups (PCR, product category rules). PAS 2050 is used, for example, for the production of the Carbon Reduction Label that is provided by the British Carbon Trust (see also Chapter 3.2)

ISO 14067 Carbon footprint of products

The development of an ISO standard for carbon footprints (ISO 14067 Carbon footprint of products – Part 1: Quantification and Part 2: Communication) started in January 2009, and the standard is slated for publication in 2011. According to the principles of standardization, the development of the ISO carbon footprint standard will not be based on any of the current guides, although they are taken into consideration. It is expected that once published the ISO standard will become the most important and globally used guidance.

The standardization work is based on LCA standards ISO 14040 and ISO 14044. Similarly to PAS 2050, all fossil GHG emissions will be included in carbon footprint calculations. Part 1 of the standard will be focused on the sys-

tem boundaries and calculation rules and Part 2 on the communication of the carbon footprint results. One of the expected aims of the standard is to try to improve and provide guidance related to the comparability of published carbon footprint results.

In addition to product carbon footprint, the development of ISO 14069 “Quantification and reporting of GHG emissions for organizations (Carbon footprint of organization) – Guidance for the application of ISO 14064-1 standard” is currently ongoing. The standard will likely include a section on reporting results but there are currently no plans to include separate guidelines related to communication, as in the product carbon footprint standard. It is estimated that the standard will be published in 2012.

3.5.3 ISO 14063 Environmental communication

ISO 14063 “Environmental communication. Guidelines and examples” is part of the ISO 14000 series related to environmental management. It is a guidance standard on general principles, policy, strategy and activities concerning both internal and external environmental communication. The standard is intended for all organizations whether or not they have an environmental management system in place. According to the standard, environmental communication can be defined as “*a process that an organization conducts to provide and obtain information, and to engage in dialogue with internal and external interested parties to encourage a shared understanding on environmental issues, aspects and performance.*” (ISO 14063)

The standard also lists general principles of environmental communication and provides guidance for developing an environmental communication policy and strategy and for planning environmental communication activities. According to the standard, the principles of environmental communication include:

- **Transparency.** Processes, data and assumptions related to environmental communication should be made available to all interested parties (taking into account the needs for confidentiality).
- **Appropriateness.** Information should be relevant and understandable to the interested parties.
- **Credibility.** Environmental communication should be conducted in an honest and fair manner and the information should be produced using recognized and reproducible methods and indicators.

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- **Responsiveness.** The communication should be open and responsive to the needs of interested parties.
- **Clarity.** The communication and language used should be understandable to the interested parties. (ISO 14063)

3.5.4 ISO 26000 Guidance on social responsibility

ISO 26000 is a guidance standard that provides guidelines on concepts, terms, principles and practices related to social responsibility. The standard is aimed at all types of organizations, including companies, public organizations and non-governmental organizations. The overall aim of ISO 26000 is to assist organizations in contributing to sustainable development, and to promote common understanding in the field of social responsibility. One of the issues discussed in the standard is communication related to the social responsibility of an organization.

According to the standard, communication is critical to many functions of social responsibility. These include e.g. helping to engage in and create dialogue with stakeholders, addressing legal and other requirements for the disclosure of information related to social responsibility and providing information on the impacts of the organization's activities and products.

Communication can be conducted by many different methods and the standard lists many examples of possible means and types of communication. The main idea is that communication should be conducted at appropriate intervals and that the organization should report on its social responsibility performance to the stakeholders affected. The stakeholders also include internal stakeholders, such as employees. Additionally, some characteristics of communication relating to social responsibility have been listed (ISO 26000). According to the list, the information related to social responsibility should be complete, understandable, responsive, accurate, balanced, timely and accessible. Most of these characteristics underline the importance of considering the needs and interests of the stakeholder group to which information is provided.

The characteristics related to information about social responsibility have many similarities with the principles of environmental communication listed in ISO 14063. ISO 26000 refers to stakeholders while in ISO 14063 stakeholders are named as interested parties.

4. Environmental communication in the value chain of print products

The objective of the sustainability communication study in the project was to evaluate and demonstrate alternative ways to present LCA and carbon footprint results, and to propose some guidelines for enhancing the communication. In order to be able to cover a wider scope of communication needs and to gain an insight into the current situation in the field, a qualitative study involving several stakeholders was carried out on the subject.

The following chapters provide an overview on the findings of the study: viewpoints on challenges and demands from the different actors in the value network, the currently utilized tools in sustainability communication and ideas for improving communication. The data were collected in workshops and interviews as described in Chapter 2.1. The gathered material was also utilized in the development of brief summaries of the project's results, "Fact sheets". They are intended to help in responding to observed needs and challenges, and to enhance the communication of the research results. The development process is described in Chapter 4.4. All the fact sheets are available on the project's website: <http://www.vtt.fi/sites/leader/index.jsp>.

4.1 Demand for sustainability communication increases

The interviewees were first asked to describe the current situation of their sustainability communication: what kinds of questions they are posed with, to whom they provide information and what kinds of tools are utilized. In general it seems that inquiries about environmental information are not yet so common for most of the stakeholders.

4. Environmental communication in the value chain of print products

“The customers pose questions to some extent – and it is apparent that the number of questions will increase. We should make preparations and find out answers to some questions in advance. So far our main emphasis has been on meeting the regulations set by authorities, etc.”

There were clear differences between the interviewees with respect to how often they encounter questions concerning sustainability; naturally, this depended on the company and the assignment the interviewee worked on. Pulp and paper producers have in general worked on sustainability for a longer time and also have allocated more resources to it in comparison to e.g. smaller printing houses. They have also been forced to react earlier to environmental matters due to pressure from civic organizations and the general public. Therefore the needs and also the ability to make use of new information and new tools vary greatly within the value chain.

“All kinds of questions – but so far not that many questions concerning the water footprint. But questions about carbon footprints and general environmental performance are common, and we’re increasingly often asked about ethical issues. And the origins of wood, that remains as a regular topic.”

“Just one or two times that I know of there has been a question concerning the carbon footprint. Otherwise the questions mostly have to do with operational safety or safe use, like smell or potential skin reactions, not the environment.”

Currently available tools for sustainability communication are presented in Chapter 3. In the discussions, only a few of these tools were mentioned as being in frequent use. The paper producers generally utilize **Paper Profile** for providing information on their products. Some companies publish **sustainability and corporate responsibility reports**. The Nordic **Swan label** was also named in many discussions, as were ecolabels in general. The interviewees stated it is good that there are common standardized ways to declare sustainability efforts, but also expressed some concerns about them.

“But I’m worried about the cost-benefit efficiency of the labels – because it always costs something for the company to gain a license, but there are relatively many organizations granting labels, some of which are really trustworthy and have well-established procedures, but some of which just hand out labels to anyone.”

Meetings and informal discussions with both own personnel and customers, and **tailored reports** for certain purposes (internal or for customers), play an important role in current communication of environmental information. Those are definitely meaningful and influential ways to communicate with close cooperation parties and internally in the company, but the disadvantage is that they are time-consuming and limited in coverage.

“Each customer has their own model and own form – someone must collect and adjust the data and fill it in, and maybe even calculate case-specifically some figures.”

The environmental issues in the value chain of print products are for the most part communicated between companies, by professionals. Information is mostly offered to or requested by a direct customer. Currently, publishers are the most active ones within the value network to demand for information or certificates for their products. However, the subject as a whole is not yet as much in focus in Finland as it is in central Europe.

“The way it probably works is that the pressure first comes from the European publishers and retail, and then it expands here to influence the big paper suppliers to begin with and only after that trickles down to Finnish customers.”

There was general agreement that the demand for sustainability information and communication will increase. The interviewees commonly emphasized that the actors in the value chain of print products should be more proactive and cooperate with other stakeholders. Also, existing information should be utilized more actively in communication. Attitudes towards the development of environmental work and communication were positive, although the task was regarded as complex and challenging.

4.2 Both efforts and courage are needed

Discussions about the challenges in sustainability communication dominated all the interviews and group discussions. All the interviewees stressed that the messages should be clear and concise not only for the consumers, but also for the majority of the personnel of the companies. On the other hand, there was also demand for information that could be used in comparisons of products and which would support sustainable choices. Due to the difficulties in comparability

4. Environmental communication in the value chain of print products

(Pihkola et al. 2010), such information cannot be expressed with simple numerical values and brief descriptions.

“The problem with this consumer communication is the same as with any corporate responsibility communication – on the one hand, these phenomena are terribly complex and interdependent, but on the other hand, you have to develop simple and interesting messages about them.”

The discussions concentrated mainly on the carbon footprint but almost all of the interviewees emphasized that a wider perspective should also be presented. The carbon footprint is only one of numerous environmental aspects that should be taken into account. If the consumers are familiar with CF information and for the most part are only provided with it, there is a risk that some relevant information will be disregarded and the overall effect will not be favourable.

“It may be confusing that as long as you select one type of indicator you may even be able to compare products. But that then represents only one part of the environmental impacts; it would be important to communicate this to people to ensure that they are not misled.”

A common concern for the value chain is the image of the print products among consumers and their overly simplified comparisons between printed media and digital media.

“It seems that the general public thinks that looking at a website is either completely or almost eco-friendly, whereas newspapers and magazines are considered non-ecological.”

Many hoped for thorough scientific research results on comparisons of the environmental impacts of print and digital media so that such discussions would be based on facts instead of hasty impressions. On the other hand, some interviewees were worried about the polarization of the discussion, and recommended that the efforts should be targeted at developing own operations and communication.

“We should communicate about our own activities and results, and not start making too many comparisons with for example television or such – we should just take care of our own businesses.”

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Another concern is that very few actors in the field have direct contact with consumers, and those who are closest to consumers may not have a particular interest in the sustainability communication of the print media. This further complicates the development of uniform consumer communication concerning print products. Close cooperation with other stakeholders in the value chain and joint campaigns were suggested as means of promoting communication.

“It would be crazy for us all [stakeholders] to communicate separately to consumers, but of course we should cooperate, deliver information and build arguments that they [the end product producers and retail] could then maybe use for the end product.”

In addition to challenges in the activation of consumer communication and in getting the information to circulate throughout the value chain, the credibility of the communication was also contemplated. The campaigns and studies financed by the stakeholders of the print product are not necessarily regarded as objective. Networking, cooperation and research carried out by independent actors were emphasized for enhancing credibility.

“Naturally, the source of funding for the study makes a difference to its credibility. But for example timber construction has gained quite a lot of support due to discussions with various experts, politicians, researchers and policymakers who have then backed the issue, and therefore the message has become more convincing ... And of course we need to be able to show the references, facts and figures that the results are based on, if required.”

One obstacle to more active communication that was also mentioned is a fear of “exposing” oneself to criticism: If a company publishes results or starts a public discussion on the environmental impacts of its products and operations, other organizations, consumers or media may enter into the debate with a negative attitude and dispute the results. Such publicity could have a negative impact on the public image of the company, even when the company has verified grounds for its arguments.

“It is sometimes difficult to find a balance here: There is clear pressure on us too to be proactive and prepare a great deal of information. But then again, we are told to hold back due to hesitations that we should not say anything unless we are absolutely certain [of all the facts].”

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In summary, the most frequently mentioned challenges and obstacles in sustainability communication were:

- laborious calculations and assessments
- need for messages that are concise and interesting, but nonetheless include detailed information
- comparability of the results of LCA and CF calculations
- presentation of the results in a wider perspective and in an accurate context
- lack of credibility when a company announces favourable results concerning itself
- confrontation between printed and digital media
- activation of consumer communication
- fear of drawing critical attention.

4.3 Convergent proactive communication

The interviewees described the features of good sustainability communication in fairly similar terms. According to the discussions, the sustainability communication of a print product should be:

- clear
- simple
- sufficiently diversified
- open
- informative
- positive
- bringing out other important values, like domestic production and renewability
- proportional to other everyday activities
- useful to a consumer for making environmentally conscious choices
- convergent.

Generic but practical ideas on how to fulfil these requirements are harder to accomplish, but some suggestions can be made. Ecolabels or certificates were generally considered to be good means of presenting sustainability information in a

clear and simple manner since they are usually based on objective and transparent criteria.

“The Nordic ecolabel is still quite a valid and good label in the sense that it is in any event grounded on a great transparent tool.”

However, since the labels do not express information in a context that is specific to a certain product, ideas for developing new kinds of symbols or markings were contemplated in many discussions. There would be demand for novel, simple ways for offering information in a wider perspective, thus enabling more detailed comparisons of products and more informative communication. Presenting mere numerical values from LCA calculations is not recommended, not only due to the reasons explained in the previous chapters, but also because people tend to interpret the figures too literally which may lead to irrelevant comparisons. For example, profile illustrations and traffic lights representing the environmental impact of a product were suggested.

“I don’t like the idea that competition between products in the stores would be based on some numerical values because I don’t believe that they could be determined in a sufficiently comparable way. It should be expressed, not by an exact figure, but by a magnitude or a colour code so that the people would understand that there’s no point in trying to compare products merely on the basis of exact numbers.”

In the current situation, however, the most viable solution was generally thought to be the use of commonly available tools whenever feasible; furthermore, other means should be used to take an active stance in communicating about the interests and efforts of a company in its environmental work and responsibility. Especially bold communication initiatives were called for. The interviewees felt that in general the branch tends to be overly cautious and modest in its communication.

“On the other hand, is there a point in being too ambitious? The upshot could be that no comparisons would be made at all if everything cannot be covered right away.”

“Above all it takes courage if you want to succeed in international competition, because I believe that we have anyway taken better care of things here than in many other locations.”

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All the interviewees, including those not directly representing the value chain, emphasized that the value chain should actively send convergent messages about the environmental work and sustainability of print products. This emerged as one of the key themes in the discussions about how communication should be developed. Many of the interviewees brought up communication and education targeted at the company's own personnel and direct customers as an essential starting point in achieving closer collaboration and more effective communication within the field, which would then in time also contribute to consumer communication.

“We should not just respond to inquiries and such, but become a cooperation partner to our customers so that we could offer information actively and anticipate upcoming demands.”

Many of the interviewees thought that even basic information about environmental matters would be useful for initiating more proactive communication and education within the value chain. Project fact sheets were generally considered to be suitable for this purpose. (The development process and the evaluation of the fact sheets by the interviewees is presented in more detail in the following chapter.)

“Our sales personnel would need something like this [fact sheet] so that they would know the basic facts if a customer starts to talk about carbon footprints.”

Based on the data from the workshops and interviews it can be concluded that there is substantial demand for information related to sustainability among the stakeholders of the print products, although many of the actors had not yet received requests for information from customers. There is a wide consensus within the field that this is a topical subject and that proactive efforts should be initiated in cooperation with the other stakeholders. Although more advanced tools and more detailed information definitely need to be created, it was emphasized that a great deal of useful information already exists and that it should be communicated more effectively.

4.4 Communicating LCA and carbon footprint results – Development of the fact sheets

The overall aim of the LEADER project was to study the environmental impacts occurring during the life cycle of print products. The main research method was life cycle assessment (including carbon footprint) and five case products were studied (see Chapter 0 & Pihkola et al. 2010). With the help of the case studies, one of the main objectives of the project was to create a holistic view of the environmental impacts of print products over their whole life cycle. Life cycle assessment was selected as a research method, since it is a comprehensive and standardized method developed to gain a better understanding of the potential environmental impacts of products. According to the ISO 14040 LCA standard, LCA can help also in environmental communication, such as:

- informing decision-makers in industry, government or non-government organizations (for example, for the purpose of strategic planning or product design),
- marketing products (for example, making an environmental claim or applying for an eco label). (ISO 14040:2006)

LCA covers the whole life cycle of a product, and requires a large amount of information on inputs and outputs used in all stages of the product life cycle. Due to the detailed nature of the method, LCA also produces a large amount of specified information and results. The study is structured around a functional unit that determines what is being studied (e.g. one tonne of magazines). Because each LCA study is built according to a certain product life cycle, the results of the study also have to be interpreted in the context of this life cycle and in relation to the goal and scope of the study in question. Because the data and assumptions used in the study are related to a specific product and specific life cycle, careful consideration is needed before making any general conclusions based on an LCA case study. Thus the results are very sensitive to the assumptions made. Also for the same reason, the comparability of different LCA studies is challenging.

As a conclusion, LCA is an effective method when studying the potential environmental impacts of a product, but the results are not useful as such for the purposes of company or stakeholder communication, such as marketing. Because it was recognized that there is a growing need for up-to-date environmental information about print products, communicating the results of the LCA

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and carbon footprint case studies was selected as one of the focus areas of the LEADER project.

To increase the usability of the project results, transparent and detailed reporting of case definitions, system boundaries, made assumptions and results achieved was considered important. However, due to the detailed nature of the information produced in the result report, it was evident that to gain wider attention among industry representatives, other means of communicating the research results would also be required. It was decided that communication materials would be produced for non-expert stakeholders, summarizing the main findings of the case studies.

Firstly, a researcher workshop was held among the sustainability researchers of VTT and SYKE to consider the most important aspects that should be included in the material. Secondly, a literature study related to available tools and guidelines was conducted. The main findings of the study are presented in Chapter 3. Many of the available (product-based) tools, such as the ecolabels, climate labels and environmental product declarations, are based on the use of LCA results. Information covering the life cycle of products is also required by recent European policy initiatives, such as the Integrated Product Policy (IPP) approach and Green Public Procurement (see European Commission 2003).

Ecolabels are commonly used tools in the group of printed products, but the downside of ecolabels from the communication point of view is that the label as such does not provide information about the environmental aspects related to the product. Rather, the label reflects whether a product complies with certain criteria, but these criteria are not presented on the label.

The environmental product declaration system (EDP) is generally considered to be more informative, since the declaration provides information about the impacts in different life cycle stages. The system is perhaps more suitable for business-to-business communication, and so far EPDs have not become very popular among paper-based products. The Eco-Benchmark approach (see Chapter 3.4.1 and Nissinen et al. 2006) is an attempt to provide comparable information about different products in relation to the impacts of daily consumption activities. The Eco-Benchmark uses LCA results from different studies and uses normalization and weighting to enable comparison of the results. This approach is very interesting and informative for the end user, but very laborious and requires the availability of several high-quality LCA studies from different product groups.

Examples found from the literature provided valuable input and guidelines, but it was considered that none of the studied approaches was suitable as such for the purposes of communicating the results of the project.

Due to the relative nature of the results of LCA and carbon footprint studies, it was evident that more information than a mere label was required. For example, in the case of a carbon footprint, a carbon footprint result disclosed as a single figure is not very informative. To be able to evaluate and interpret the result, a certain amount of background information is required. The additional information is necessary for evaluating the quality and comprehensiveness of the result. Without such information, the result does not really describe the environmental performance of the product. (See also Pihkola et al. 2010.)

Thus (from the researcher point of view), the main challenge related to communicating the LCA and carbon footprint results is the amount of background data and results presented. If too much information is included, the results can easily become confusing for the recipient, unless he or she is familiar with both the LCA method and the life cycle of the product. If too little information is included, the result is easily misinterpreted and does not provide a correct impression of the environmental performance of the product. In the worst case, this might lead to unfavourable decisions from an environmental point of view.

In the case of the LEADER project, the main target group for the research results comprised representatives of the paper and printing industry and other actors in the print media value chain. Thus it was expected that the industry actors in general are familiar with the production processes, techniques and product properties. The main characteristics related to the product life cycle and the differences between different types of print products were considered to be well known. However, most of the actors are not familiar with the methodology related to life cycle assessment and carbon footprint calculation. Similarly, knowledge of the environmental performance of products is usually held mainly by persons actively working on environmental aspects within the industry (see also Chapter 4.3).

During the project and the empirical data collection, it became clear that there was a need for basic level information that could be used as background material for internal communication within the industry actors and within single companies. In addition, material was needed for business-to-business communication. As mentioned in the previous chapter (4.2), most of the actors in the print media chain are not directly in contact with consumers. As a conclusion, and according to the objectives of the project, the main target groups for the communication of

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the research results were defined to include the industrial and business actors within the value chain of print products.

To be able to increase the understanding of the critical aspects related to the environmental performance of print products, it was considered important to provide basic information about the research methods and calculation procedures together with the actual results. Thereby, the understanding of how to interpret and use the results could be increased. This was particularly important in the case of carbon footprints, which became one of the most talked about environmental indicators in a very short period of time. Understanding the basic principles of the calculation methods also promotes the use of the research results in corporate communication.

Based on the data acquired from the literature, other product groups and the experiences gained during the project, it was decided that for the purposes of the project, the most informative way to present the results would be to produce case-specific presentation materials in the form of printed and electronic brochures. The brochures, i.e. fact sheets, summarize some of the main results of each case study. Additionally, the fact sheets include basic information about the research method, product properties, assumptions made in the study and life cycle stages included. In addition, guidance for interpreting the results was included. Because one of the topics of most interest has been product carbon footprints, it was decided that the fact sheets would focus on the carbon footprint results. Those cases which included life cycle assessment results, a second fact sheet describing the principles of LCA and the environmental impacts related to the case product's life cycle was produced.

The content and the usability of the fact sheets was evaluated by the actors in the print media value chain and selected experts during the workshop and theme interviews. In general, the fact sheets were favourably received by all the informants, since they considered that there was little information available describing the whole life cycle of products. Due to the greater complexity of the method and results, the facts sheets on the environmental performance of products were generally considered more difficult to digest, whereas the carbon footprint fact sheet was considered to be easy to read.

Varying opinions were presented on the style and layout of the fact sheets. Some of the informants would have appreciated a more commercial and simple approach to the contents, and stronger arguments that would be more easily adopted by the potential end-users or consumers as well. On the other hand, it was considered that a neutral style and informative content would increase the

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credibility of the contents and results presented. Figures and graphics were considered to be useful, but it was also considered important to provide enough information and guidance for interpreting the figures in the text.

Based on the comments received, both the contents and the layout of the brochures were updated and modified. Altogether eight fact sheets describing the carbon footprints and environmental impacts of the case products were produced. The fact sheets are listed in Table 2.

Table 2. Fact sheets produced in the LEADER project.

Case product	Fact sheet contents	
	Environmental impacts (LCA)	Carbon footprint
Coldset offset printed newspaper	X	X
Heatset offset printed magazine	X	X
Electrophotography printed photo book	X	X
Gravure printed advertisement leaflet		X
Sheetfed offset printed book		X

All the fact sheets (in English and Finnish language versions) can be downloaded from the project website: <http://www.vtt.fi/sites/leader/index.jsp>.

5. Main conclusions and discussion

5.1 Conclusions

One of the main motivations behind the study was to develop new ways to present LCA and carbon footprint results to non-expert stakeholders. The stakeholders in this case are the industrial actors working in the value chain of print products. When considering the general demands and guidelines related to the type and quality of environmental communication, the information should be clear and understandable for the recipient, it should be based on facts (ISO 14063; ISO 26000; Kuluttajavirasto 2002) and preferably cover the whole life cycle of the product (ISO 14025; European Commission 2003).

Based on the empirical part of the study, the demands for environmental and sustainability information that are emerging among the actors in the print media value chain have many similarities with those mentioned in many of the guidelines reviewed in the literature part. Many of the informants emphasized the need for clear and consistent messages, but stressed that the information must be based on facts or scientific results. Thus the informative value of environmental communication was emphasized, and attitudes towards actions that could be considered as greenwashing were generally negative among the informants. Even so, it was considered that it is difficult for the end-users or consumers to evaluate what kind of information is based on facts and what is mere lip service.

On the other hand, insufficiency of fact-based information was also highlighted as one of the main obstacles hindering communication activities. Many of the interviewees felt that communication has been too careful or limited in the past because too little fact-based information has been available.

Additionally, fear of exposing oneself to criticism – even if the information would be based on achieved improvements – was often mentioned as a factor hindering communication activities within the field. Another challenge for

communication is that many of the actors in the value chain are not in direct contact with the consumers or end-users of the product. Still, influencing public opinion and the attitudes of consumers towards the environmental performance of printed products was often mentioned as one of the most important goals of environmental communication. Other important target groups for communication were other actors and persons working within the value chain.

When considering the impressions of consumers, one of the practical challenges for communication is that the environmental performance of print products is often related to specific production technologies, raw materials or product properties that are not easy to communicate to persons who are not familiar with the production processes in question. Although paper-based print products are familiar to all consumers, the processes related to the manufacturing of these products are generally not well known (see European Commission 2002).

Even though the challenges related to environmental communication dominated in the empirical data and discussions, it can be stated that the general attitudes towards providing environmental information and more active communication were positive. It was also agreed that the need for environmental information is likely to increase in the future. There were also quite strict demands concerning the information that the actors would like to provide for their customers, co-workers and the end users of products. Consequently, it can be concluded that the interests and attitudes of the actors within the value chain provide a good starting point for developing environmental communication activities within the field.

When considering the tools that are currently available for communication purposes, life cycle assessment provides detailed information about the potential environmental performance of a product. LCA or similar tools are also required for providing the information that is now required for most of the ecolabels, emerging climate labels, environmental product declarations and European policy initiatives (such as the IPP or Green public procurement). The challenges in communicating the LCA results are related to either oversimplifying the results or overloading the recipient with information. Thus, it is essential to balance the amount of information according to the interests and expertise of the recipient.

At the same time, the comprehensiveness of an LCA study is also one of the strengths of the method. According to a recent study conducted in the US, LCA information can even be used for advertising purposes in enhancing the credibility of the message, which in turn can favourably influence perceptions of the company and the brand. The effect was particularly evident among environmen-

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tally sensitive and aware recipients, and especially in business-to-business communication (Molina-Murillo & Smith 2009).

In communicating the LCA and carbon footprint results, providing enough information about the assumptions and system boundaries used in the study is essential for the correct interpretation of the results. This is essential especially in a business-to-business context and a company's internal communication, where all parties are familiar with the product and production technologies in question.

Based on the case studies conducted within the LEADER project (see Pihkola et al. 2010), the information that should be provided in the context of the results includes:

- What are the life cycle stages included in the study?
 - Is the product delivered to the customer?
 - Are waste handling and recycling included?
- How is the product manufactured?
 - What kind of paper is used?
 - What is the printing method applied?
 - Are all relevant raw materials included?
- What kind of energy profile (including electricity, heat and fuels) was used in the study?
 - Country of origin?
- What is the size of the end product?
 - Weight and number of pages
- What is the functional unit applied in the study?
 - Weight, surface area (printed area), number of pages, time spent reading, readers-per-copy, times of reading etc.

As was demonstrated by the case results on fibre-based print products, the assumptions and system boundaries have a great impact on the results. Therefore the issues mentioned above are critical for the transparent reporting and communication of the results. These issues are also highlighted in the fact sheets that were developed during the project (the background and development process are described in Chapter 4.4).

The fact sheets were developed for the purposes of business-to-business communication within the value chain of print media. The aim of the fact sheets is to provide the actors of the value chain with basic information about the environmental performance of products based on LCA and carbon footprint case

studies, covering the whole value chain of products. In addition, the aim is to increase understanding of the research methods (LCA and carbon footprint) and critical issues in interpreting the results. Understanding the basic principles of the research methods is expected to increase the usability of the results and to promote more active communication. It is hoped that the fact sheets will provide the actors of the value chain with a starting point for developing their communication practices in a more proactive direction. Additionally, the fact sheets could be used as educational materials in internal communication.

To sum up, the actors in the print media value chain are willing to develop more active means of environmental communication. Some tools and initiatives for promoting internal communication within the value chain are already in use but there is room for further activity and development. Improved understanding of environmental impacts throughout the value chain and within all actors working in the companies is essential for providing a common message to external stakeholders, such as customers, consumers and end-users of products.

However, communication towards consumers poses further challenges. Coordinated activities and common approaches within the paper and printing industry are required in order to develop consumer communication and provide consumers with up-to-date information about the environmental performance of products. Results of LCA and carbon footprint case studies can be used as background information also in consumer communication, but the contents and the message need to be further modified and targeted. Additionally, providing examples of the impacts of print products in relation to other products or daily activities is helpful in illustrating the results.

5.2 Discussion

Based on the findings of the study, there is a need for more extensive information on the environmental performance of products throughout the print media value chain. When considering what can be done to improve the current situation, environmental communication should be thought of as an area of strategic development. Within individual companies, this can mean in practice that environmental training and communication could be an area where systematic practices are implemented. Examples of possible actions include:

- Communication of sustainability info as part of internal trainings, meetings and/or procedures at a suitable level for the company.

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- Proactively offering information to customers and discussing their needs.
- Utilization of available material and general information on environmental matters.
- Communication of planned/started projects, progress and efforts in general (not just finalized results).
- Preparing for the demand for more detailed information (e.g. product-specific energy and water consumption).

Another topical challenge related to consumer communication and business-to-business communication is the controversy of printed versus electronic media. Based on the interviews and workshops, the greatest diversity is seen in opinions of the digital vs. print issue. Some of the actors prefer to focus only on communicating progress within the field of printed matter, and preparing better arguments and materials that could be used for highlighting the positive aspects of print products. Comparing electronic and printed media was not necessarily seen as a fruitful way to proceed. On the other hand, many of the actors considered that more information about the environmental impacts of electronic media is required in order to enable comprehensive comparisons of the two media. Having up-to-date information about both aspects was seen as a necessary starting point for the discussion.

In both cases, good knowledge of the environmental performance of printed matter and print media is essential. Conducting an all-inclusive comparison between electronic and print media is difficult due to many differences in the products. Additionally, it is likely that the environmental impacts of these two types of products differ from each other in many of the impact categories.

Rather than just comparing different types of media, perhaps future discussions should be directed towards considering the media sector as a whole. While more and more products are becoming available in electronic form and online, it is still likely that in future, most consumers will select a combination of different types of media products, using both printed and electronic content. Thus, there is a need for different types of media products. And in many cases, the two media share the same process of content creation and editorial work. Consequently, common aspects and areas of mutual interest can also be found. With up-to-date information on the environmental impacts of the media sector as a whole, the products (whether printed or electronic) can be developed to best serve the needs that they fulfil while creating the lowest environmental burden.

6. Summary

The aim of the LEADER project (2007–2010) was to study the environmental impacts occurring during the life cycle of print products. Due to increasing public interest in the environmental impacts of consumption, there is a growing need for information about the environmental performance of print products. Within the paper and printing industry, product-based information is required for both internal and external communication.

During the project, life cycle assessment and carbon footprint studies were conducted for five print products. To increase the usability of the results among the industrial stakeholders and funding parties, communication was selected as one of the focus areas of the project. One of the main areas of interest was how to present the results of the life cycle assessment and carbon footprint case studies in a manner that non-expert stakeholders can readily understand.

The objectives of the empirical part of the sustainability communication study were to identify the most relevant challenges related to the communication of the environmental information, to gather ideas and tools for improving the communication within the value chain of print products, and to get feedback on the drafts of the fact sheets that were under development.

In the study, a qualitative research approach was applied. Data was collected by organizing workshops and by interviewing representatives of the value chain of print products. In addition, a literature study on available tools and guidelines suitable for communicating about the environmental performance of print products was conducted. Altogether 31 persons representing different actors in the value chain of print products contributed to the data collection of the study (excluding the researchers of the project). The stakeholder workshops and interviews were organized between April and August 2010.

There were clear differences in how often the interviewed actors encounter questions concerning sustainability. Therefore the needs and also the ability to

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make use of new information and new tools vary greatly within the value chain. The environmental issues in the value chain of print products are for the most part communicated between companies, by professionals, whereas very few actors in the field have direct contact with the end-users. This was seen as one obstacle to more active consumer communication.

The tools that are most frequently used include the Paper Profile, sustainability and corporate responsibility reports and the Nordic Swan label. Additionally, meetings and informal discussions with both own personnel and customers, and case-specifically tailored reports, play an important role in current communication of environmental information. The disadvantage is that they are time-consuming and limited in coverage.

There was general agreement that the demand for sustainability information and communication will increase and that the actors in the value chain of print products should be more proactive and cooperate with other stakeholders. Attitudes towards the development of environmental work and communication were positive, but the task was also regarded as complex and challenging.

In general, discussions about the challenges in sustainability communication dominated all the interviews and group discussions. All the interviewees emphasized that the messages should be clear and concise not only for the consumers, but also for the majority of the personnel of the companies. Due to the difficulties in comparability, such information cannot be expressed with simple numerical values and brief descriptions.

A common concern for the value chain is the current image of print products and overly simplified comparisons between printed media and digital media among consumers. Scientific research results on comparisons of the environmental impacts of print and digital media were hoped for, so that such discussions would be based on facts instead of hasty impressions. On the other hand, some interviewees expressed their concern about the polarization of the discussion, and recommended that the efforts should be targeted at developing own operations and communication.

Risk of becoming subjected to criticism was mentioned to be one obstacle to more active communication. On the other hand, it was also stressed that more courageous communication is needed throughout the value chain in order to effectively disseminate environmental information and for improving the public image of the industry and the print products.

During the project and the empirical data collection, it became clear that there was a need for basic level information that could be used as background material

for internal communication within the industry actors and within single companies. In addition, material was needed for business-to-business communication.

LCA is an effective method when studying the potential environmental impacts of a product, but the results are not as useful for the purposes of company or stakeholder communication, such as marketing. To increase the usability of the results, transparent and detailed reporting of case definitions, system boundaries, made assumptions and results is important. Understanding the basic principles of the calculation methods also promotes the correct use of the research results in corporate communication.

A challenge related to communicating the LCA and carbon footprint results is the amount of background data and results presented. If too much information is included, the results can easily become confusing. If too little information is included, the result is easily misinterpreted and does not provide a correct impression of the environmental performance of the product.

Based on research and experiences gained within the project, it was decided that for the purposes of the project, the most informative way to present the results would be to produce case-specific brochures. The brochures, i.e. fact sheets, summarize some of the main results of each case study. Additionally, the fact sheets include basic information about the research method, product properties, assumptions made in the study and life cycle stages included. In addition, guidance for interpreting the results was included.

The fact sheets (together with the final reports of the project) can be downloaded from the project website: <http://www.vtt.fi/sites/leader/index.jsp>.

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Appendix A: List of workshop participants and interviewees

Mika Hakamäki, Kuluttajavirasto
Eeva-Liisa Heinaro, Myllykoski
Leena Hytönen, Myllykoski
Saara Itävuori, Aikakausmedia
Timo Jokinen, Ifolor
Satu Kaivonen, Sanomapaino
Hanna Kalliomäki, Hill & Knowlton Finland
Jyrki Kela, Erweko
Sirpa Kirjonen, Sanomalehtien liitto
Katja Koljonen, Maaseudun tulevaisuus
Lasse Krogerus, Viestinnän Keskusliitto
Mika Kuisma, Helsingin kauppakorkeakoulu
Anne Lihvonen, UPM
Päivi Luoma, Metsäteollisuus ry
Irma Löfström, Paperinkeräys Oy
Ari Määttä, Sun Chemicals
Ritva Mönkä, M-real
Tuomas Niemi, UPM
Ari Nissinen, Suomen ympäristökeskus
Jutta Nuortila-Jokinen, UPM
Hannele Parkkinen, Itella
Jussi Pekkarinen, Alma Media
Rina Raikamo, StoraEnso
Mika Ruuskanen, Edita
Jari Saari, DMP
Hannu Saarnilehto, Sanomapaino
Kirsi Seppäläinen, Botnia
Katariina Tanner, StoraEnso
Tiina Vuoristo, Metsäteollisuus ry
Jaana Villikka, Viestinnän Keskusliitto
Joni Väisänen, Hansaprint

Appendix B: Summary table – Tools for environmental communication

There are several environmental labels, certification schemes, standards, guidelines and other tools. This table summarizes the tools that are presented in more detail in VTT Research Notes 2561 "Communicating environmental impacts of print products".

SUMMARY	Chapter	General Information	Description	Third party certification:	Development and criteria	Validity /published	Web sources
Ecolabels	3.1		Category etc.	private or public accredited institution			
 Nordic Label	3.1.1	The Swan	Type I, complies with ISO 14024, requirements for environmental, good quality and function	Mandatory	Public criteria documents for product groups, including papers and print company's production of printed matter and printing services	Criteria are revised every three to four years	www.nordic-ecolabel.org www.swanen.nu
 EU Ecolabel	3.1.2	The Flower	Type I, complies with ISO 14024, requirements for environmental, good quality and function	Mandatory	Public product group based criteria, no official criteria for printed matter, new criteria for copying and graphic paper accepted in EUEB 2010	Criteria are valid for 3-5 years	www.eco-label.com
 Environmental product declaration	3.1.2	EPD	Type III according ISO 14025. Environmental declarations contain figures about the product's environmental performance and are based on data produced through LCA.	Mandatory validation, certification possible	In Sweden EPD programme has been set up and international EPD system is being developed. Initial information data of EPD should be available.		www.environmentalproductdeclarations.com
 Paper profile	3.1.4	Paper profile	Type II when it is not verified by a third party - according to ISO 14025. A product declaration based on company's own information.	Verification possible by independent control body.	Developed by several major European paper manufacturers. Paper profile has common calculation guidelines.		www.paperprofile.com
Climate labels	3.2	General information	Description	Third party certification:	Development and criteria	Validity /published	Web sources
 Carbon Trust Carbon Reduction Label		One of the first carbon labels	Carbon footprint of the product assessed according to BS: PAS2050	Yes. Verification by Carbon Trust.	Label was created by the Carbon Trust, an independent UK company	Every two years, the product must be reassessed, a reduction achieved and certified.	www.carbon-label.com
 Climatop Label		One of the first carbon labels	It labels those products out of comparable group of products which have at least 20% lower GHG emissions than other products from same category. Calculations are compatible with LCA ISO 14040.	Yes.	Label was created by independent association Climatop in Switzerland	A certified product can use the label for two years before the recertification	www.climatop.ch
Forest - and Chain of custody certification	3.3	General information	Description	Third party certification:	Development and criteria	Validity /published	Web sources
 PEFC		PEFC - forest certification scheme	A international system for the certification of sustainable forest management.	Yes.	Programme for the Endorsement of Forest Certification. Set requirements on forest management and traceability.		www.pefc.org
 FSC		FSC - forest certification scheme	A international system for the certification of sustainable forest management.	Yes.	The Forest Stewardship Council. Set requirements on forest management and traceability. Standards for FSC certified forest vary according to countries.	New FSC for Finland 2010.	www.fsc.org
Chain of custody		CoC	Chain of custody certificate shows that the supply chain of the raw material can be followed and tracked from the forest to the consumer	Yes.	Certified CoC systems are used to ensure that wood comes from certified forests. They are established and audited according to rules set by the relevant forest certification system, e.g. PEFC or FSC	The CoC certification allows the printer to label products with FSC or PEFC trademarks.	www.fsc.org www.pefc.org

Examples of some other tools	3.4	General information	Description	Third party certification:	Development and criteria	Validity /published	Web sources
Eco-Benchmark	3.4.1	Mittatikk	Aim of Eco-Benchmark approach is to clarify LCA results to consumers including five important environmental impacts of different products/services in Finland.		Eco-Benchmark approach of a research by several Finnish Institutes (co-ordinator SYKE ie. Finnish Environment Institute)	2009	www.ymparisto.fi
WWF Paper Scorecard	3.4.2	Paper Scorecard	Scorecard is aimed as an environmental guidance for paper purchasers (with a guidance document). Aim is to allow comparison of different products on market using the point scores.	Yes.	World Wildlife Fund's system for environmental declarations. WWF announced a new tool publication called Check Your Paper, to replace Paper Scorecard (08/2010).	2007	www.panda.org
Environmental management systems- EMAS	3.4.3	EMAS	EMAS (Eco-Management and Audit Scheme) is a voluntary environmental management system under which companies/organisations evaluate, manage and continuously improve their environmental performance. Aim is to ensure that environmental issues are systematically managed.	Yes.	No set requirements and company itself sets goals for 'continual improvement'. System requires the company to publish its environmental policy and a yearly environment report. For organisations operating in the European area (EU EEA)	The latest revision (EMAS III) came into effect on 01/2010.	http://ec.europa.eu/environment/emas/about/su_mmary_en.htm
Environmental management systems- ISO14001	3.4.3	ISO 14001	Environmental management system to enable an organization to develop and implement a policy and objectives which take into account legal requirements, other requirements and significant environmental aspects.	Yes.	No set requirements and company itself sets goals for 'continual improvement'. System requires the company to publish its environmental policy.	published 2004	www.iso.org www.sfs.fi
Corporate sustainability reporting - GRI	3.4.4	Global Reporting Initiative GRI	There are several frameworks available for CSR. Most widely used guidelines in sustainability reporting, which includes environmental, social and economic indicators. GRI can be applied to all branches of industry.		Current version is G3. Common guidelines and there are some industry specific sector supplements. Media sector supplement is currently under development.	G3 published 2006, First published 2000.	www.globalreporting.org
Standards and guidelines	3.5	General information	Description	Third party certification:	Development and criteria	Validity /published	Web sources
Life cycle assessment	3.5.1	ISO 14040:2006 ISO 14044:2006	ISO - standards are base for several environmental tools. LCA is for evaluation of product's potential environmental impacts throughout life cycle from cradle to grave.	LCA that is used for public comparative claim should be verified by third party using Critical review process	ISO 14040-44:2006 standards address the requirements for carrying out a product based LCA. LCA is a relative approach.	published 2006	www.iso.org www.sfs.fi
Carbon footprint	3.5.2		Calculation based on LCA standards. Carbon footprint evaluates the potential GHG emissions of a product, process or company throughout the life cycle.		Among development works of ISO standardization are CF of product ISO 14067 and CF of organizations ISO 14069. Estimated to be published years 2011-2012.	Ongoing development of ISO	www.iso.org www.sfs.fi
Carbon footprint	3.5.2	CF guideline BSI:PAS2050	PAS2050 is Publicly Available Specification for Goods and Services, an international guideline for Carbon Footprint. CF evaluates potential GHG emissions of a product, process or company throughout the life cycle		PAS2050 was published 2008 by British Standards Institution. PAS2050 is based on life cycle thinking and it is used for e.g. the production of the Carbon reduction Label.	published 2008	www.bsigroup.com
Environmental communication standard	3.5.3	ISO 14063	Guidance standard related to general principles, policy, strategy and activities for internal and external environmental communication.		Environmental communication. Guidelines and examples' is part of the ISO14001 series related to environmental management. Aimed for all kind of organizations.	published 2006	www.iso.org www.sfs.fi
Guidance on social responsibility	3.5.4	ISO 26000	Guidance standard providing guidelines on concepts, terms, principles and practices to social responsibility.		Aimed for all kind of organizations.	published 2010	www.iso.org www.sfs.fi



Author(s) Hanna Pihkola, Maija Federley, Minna Nors, Helena Dahlbo, Sirkka Koskela & Timo Jouttijärvi		
Title Communicating environmental impacts of print products Results from the LEADER project (Part 2)		
Abstract Within the paper and printing industry, product-based information is required for both internal and external communication. The aim of the LEADER project (2007–2010) was to study the environmental impacts occurring during the life cycle of print products. During the project, life cycle assessment and carbon footprint studies were conducted for five print products. To increase the usability of the results among the industrial stakeholders and funding parties, communication was selected as one of the focus areas of the project. One of the main areas of interest was how to present the results of the life cycle assessment and carbon footprint case studies in a manner that non-expert stakeholders can readily understand. The objectives of the empirical part of the sustainability communication study were to identify the most relevant challenges related to the communication of environmental information, to gather ideas and tools for improving communication within the value chain of print products, and to get feedback on the drafts of the fact sheets that were under development. In the study, a qualitative research approach was applied. Data was collected by organizing workshops and by interviewing representatives of the value chain of print products. In addition, a literature study on available tools and guidelines suitable for communicating about the environmental performance of print products was conducted. Based on the empirical data, there were clear differences in how often the interviewees encounter questions concerning sustainability. Therefore the needs and also the ability to make use of new information and new tools vary greatly within the value chain. The environmental issues in the value chain of print products are for the most part communicated between companies, by professionals, and very few actors in the field have direct contact with the end-users. The tools that are most frequently used include the Paper Profile, sustainability and corporate responsibility reports and the Nordic ecolabel. Additionally, meetings and informal discussions with both own personnel and customers as well as companies' own reports tailored for certain purposes play an important role in current communication of environmental information. There was general agreement that the demand for sustainability information and communication will increase and that the actors in the value chain of print products should have more courage, be more proactive and cooperate with other stakeholders. Attitudes towards the development of environmental work and communication were positive, but the task was also regarded as complex and challenging. A common concern for the value chain is the current image of print products and overly simplified comparisons between printed and digital media that are presented in the media and among consumers. Based on the findings of the empirical study and the literature review it was agreed that the most informative way to present the results of LCA and carbon footprint case studies would be to produce case-specific presentation materials in the form of printed and electronic brochures. The brochures, i.e. fact sheets, summarize some of the main results of each case study of this project. Additionally, the fact sheets include basic information about the research method, product properties, assumptions made in the study and life cycle stages included. Guidance for interpreting the results was also included. The fact sheets (together with the final reports of the project) can be downloaded from the project website: http://www.vtt.fi/sites/leader/index.jsp .		
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