Consumer demands on Type III environmental declarations

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Foreword

This report is prepared for ANEC by 2.-0 LCA consultants, Amagertorv 3, 1160 Copenhagen K., Denmark (www.lca-net.com) in the period 2005-06 to 2006-02 for a budget of 16000 EUR.

It identifies the main consumer concerns on Type III environmental declarations[1, 2], and recommends how to address these. The recommendations are intended to support ANEC's input to the political debate on Integrated Product Policy and into European and international standardisation work. The report includes 10 example Type III environmental declarations (EPDs), demonstrating how the recommendations can be implemented in practice.

Franz Fiala and Guido Hoff have supervised the work as representatives for ANEC.

In this report the abbreviation EPD is used for Type III environmental declarations, as defined in ISO 14025. Definitions of key terms e.g. from ISO 14025 have been included as footnotes. EPD is an abbreviation of "Environmental Product Declaration" and is used among others by the national EPD programme[3] in Sweden (and the "copies") in Italy and Norway.

Copenhagen, 2006-02-20

[1] Environmental label, **environmental declaration** = claim which indicates the environmental aspects of a product or service (NOTE An environmental label or declaration may take the form of a statement, symbol or graphic on a product or package label, in product literature, in technical bulletins, in advertising or in publicity, amongst other things.) [ISO 14020:2000]

[2] **Type III environmental declaration** = environmental declaration providing quantified environmental data using predetermined parameters and, where relevant, additional environmental information (NOTE 1 The predetermined parameters are based on the ISO 14040 LCA series of standards which is made up of ISO 14040, ISO 14041, ISO 14042 and ISO 14043. NOTE 2 The additional environmental information may be quantitative or qualitative.) [ISO/FDIS 14025]

[3] **Type III environmental declaration programme =** voluntary programme for the development and use of Type III environmental declarations, based on a set of operating rules [ISO/FDIS 14025]

List of content

Executive summary and recommendations

We have analysed the main consumer concerns on EPDs, structured under four headings:

- Comprehensibility and comparability of the environmental information
- Reliability of data
- Completeness of the environmental information
- Adequate stakeholder involvement

The analysis results in a number of recommendations for consumer demands on standardisation for each of these items.

Ten example EPDs have been produced to demonstrate how the recommendations can work in practice. These examples are placed in Annex 3.

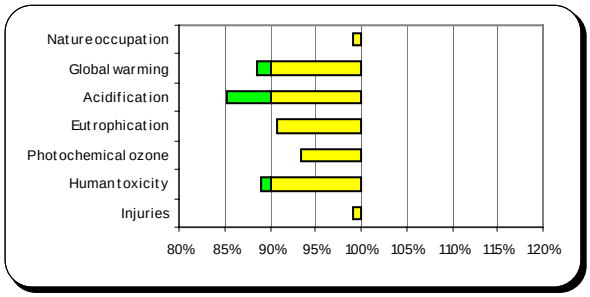
Comprehensibility and comparability of environmental information

Current EPDs include environmental data for a number of environmental impact categories, typically in tabular form, but no information is provided on whether the scores are high or low compared to other products. Few consumers will be able to relate the numbers to any real environmental impact, and to judge the importance of the numbers.

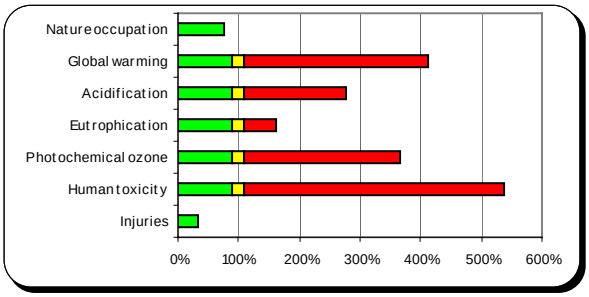
We recommend supplementing the numerical information with a *graphical presentation* in which the environmental impact of the product is compared (*normalised*) to the environmental impact of a reference product.

To provide both kinds of information, we recommend using two graphs:

- one where the impacts from the product are compared to the impacts from spending the same amount of money on an average product from the same product group, allowing to show even minor variations between comparable products.
- one where the impacts from the product are compared to spending the same amount of money on an average consumer products, allowing comparisons of all products, also across product groups, and having the advantage that the data from different EPDs are additive. This graph also highlights the environmental performance of the product group as such.



Impacts from Product A relative to the impacts of spending the same amount of money on "an average product from the product group".



Impacts from Product A relative to the impacts of spending the same amount of money on "average consumer goods".

The colours indicate how far the impact is from the average by using green (better for the environment than average) and red (worse for the environment) – and yellow to indicate that

the difference is smaller than 10%, which is the typical minimum difference that an LCA can determine with certainty.

Comparing the impacts of “the same amount of money spent” on different products makes it possible to compare products also when the physical characteristics are different and when the functional units are not expressed in comparable terms. Furthermore, it reduces the bias of price differences: When comparing two products, which have the same function but different prices, the consumer will save money by buying the cheaper product, and these saved money will be spent for other consumption. To reflect the full environmental impacts of the purchase decision, the impacts from this additional consumption should be included in the "product system" of the cheaper alternative. Normalising to the price is a way of taking this effect into account.

Such normalised graphical information is additional, compared to existing EPD programmes. The main advantage is that perception of graphical information is quick, and allows the lay user to assess the relative severity of the environmental impacts from the product. It still does not allow assessing the absolute severity of the product, which would require a weighting *across* impact categories, i.e. the use of a generally recognized single-score impact assessment method. Weighting is not used in current EPD programmes, as there is no single weighting method that is generally recognized. However, we recommend that efforts be made towards a generally agreed method for expressing environmental impacts in a single-score, which would allow the graphical presentation to be simplified, comparable to the current energy-labelling.

ISO 14025 contains a list of required content, but does not specify the order of presentation, nor any specific lay-out. We recommend that the graphical information be *placed on the front page of the EPD* together with the product specification, including the functional unit, a small picture, and key performance characteristics. This is the reference information that the consumer will need to be able to quickly compare two products. Also the recommendations for use and disposal, which can be very important for the overall environmental impact, should be placed on the front page. Technical detail may then follow on the subsequent pages. For easy reference between individual EPDs, we recommend a specific order of the required content.

Furthermore, we suggest some *additional requirements for content*, compared to ISO 14025:

- In relation to the product definition and the functional unit, the geographical boundaries shall be given for the market on which the EPD is valid, when the use and disposal stages are environmentally important.
- Product life cycle information shall include information on the source of data for the overall life cycle (typically a standard database) as well as for specific data which may have been used for each stage of the life cycle.
- Materials and chemical substances above 0,1% of weight of the product shall be given, also indicating eventually content of substances eligible to labelling according to EU legislation on hazardous substances. (0,1% has been chosen as a typical "lower" labelling requirement; for specific substances even lower levels can be substantiated).

Synergy with other eco-labelling programmes shall be investigated when developing Type III Product Category Rules (PCRs) and applied, i.e. any applied label shall be mentioned in the EPD. It is recommended to align the list of environmental aspects and impacts of the EPD – the parameters – with the similar list of criteria parameters of e.g. Type I eco-labels.

The issue of products containing *hazardous substances and materials* is complicated, since the individual companies in the product chain, which are responsible for the EPDs, seldom have more information available than what is required by law. We recommend development of more detailed guidelines on Additional Environmental Information especially information on use and disposal. Furthermore, the synergy with Safety Data Sheets (SDS) should be investigated, including how to apply information from SDS in development of EPDs.

Reliability of the data

We recommend that the standards should require the EPD programme operator[4] to maintain a *background database* to be used for all processes in the Life Cycle Assessments (LCAs) for which the individual company or LCA practitioner does not supply specific data. Advantages of this approach are:

- Increasing the reliability and comparability of the EPDs.
- Cost savings for the EPD developers.
- Increased accessibility to the EPD system for small and medium sized companies.

The database should cover all product groups at a generic level. Basing the database on a general Input/Output database covering the entire economy can ensure this. The database may further be supplemented by default product group specific data supplied by the stakeholders involved in developing the PCR (Product Category Rules)[5].

We recommended that *site-specific data be required* for "gate-to-gate" activities, i.e. for "Our production", and also for other processes before and after "Our production" when the overall results are sensitive to the quality of these data. The PCR shall specify the extent to which specific (new) data are required for individual processes, stages or environmental parameters of the EPDs.

We recommend that the standard require that the data used for the underlying LCAs shall reflect the environmental consequences of purchase of the declared product. This can be done by requiring the *use of consequential modelling* for the site-specific part of the LCA (typically that where data are supplied by the individual company) and by adjusting the background database to consequential modelling, at least for sectors with important constraints on specific technologies or production routes.

Completeness of environmental information

The ISO 14025 provides a list of possible impact categories, but this list is not mandatory, which means that each programme operator and PCR group may choose a different list of impact categories, thus limiting comparability between EPD programmes and/or product groups. More difficult environmental issues, such as biodiversity impacts from land use, injuries, and toxicity, have often been neglected in current LCA practice, which means that the impact categories that are included in current EPD programmes are not necessarily chosen for their environmental importance, but rather for their availability.

We recommend that the standards establish *a generic minimum list of mandatory impact categories*. While being open for future revisions, we recommend that the mandatory list for the time being be made up of the following 7 impact categories, chosen for their importance, based on an analysis of the current burden of environmental impacts caused by European consumption:

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[4] **Programme operator** = body or bodies that conduct a Type III environmental declaration programme (NOTE A programme operator can be a company or a group of companies, industrial sector or trade association, public authorities or agencies, or an independent scientific body or other organization.) [ISO/FDIS 14025]

[5] **Product category rules** (PCR) set of specific rules, requirements, and guidelines for developing Type III environmental declarations for one or more product categories [ISO/FDIS 14025]

- Nature occupation
- Global warming
- Acidification
- Nutrient enrichment
- Photochemical ozone formation
- Human toxicity, including particles and carcinogens
- Injuries

For a specific product group, other impact categories than the 7 generic ones may be demonstrated to contribute significantly to the current burden of environmental impacts caused by European consumption, in which case the programme operator shall enforce that these impact categories are included under the heading of “Additional environmental information”, alongside other issues that are especially relevant for the customer of a product, such as content of hazardous substances, emissions during use, directions for proper and environmentally conscious use and disposal, which should be specifically declared.

Adequate stakeholder involvement

Even when consumer representatives are formally invited to participate in the procedures used to determine the requirements relating to the above-mentioned items, consumer representatives have limited resources to participate in such work. Therefore, it is in the interest of consumer organisations that *the need* for stakeholder involvement is minimized by the application of objective, science-based procedures for determining Product Category Rules and the content of specific EPDs.

We recommend the use of an *EPD programme board based verification procedure*[6]. The board of the EPD programme shall function as the third party[7] review panel for PCRs, as well as commissioner for the verification of data and EPDs, using qualified and professional verifiers, with the option of eventually delegating some of the verification to self-control with spot-checks.

This recommendation will - without placing large demands on consumer involvement in all details of the procedures - fulfil the requirements of ISO 14044 for third part review by a panel of interested parties of any LCA “intended to be used in comparative assertions intended to be disclosed to the public” (even though it appears to be still in discussion whether an EPD is a comparative assertion in the sense of ISO 14044).

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[6] **Verification** = confirmation, through the provision of objective evidence, that specified requirements have been fulfilled [ISO 9000:2000]

[7] **Third party** = person or body that is recognized as being independent of the parties involved, as concerns the issues in question [ISO/IEC Guide 2:1996] (NOTE "Parties involved" are usually supplier ("first party") and purchaser ("second party") interests.) [ISO 14024:1999]

1 Introduction

This introduction gives a brief overview of the objectives, target group and intended use of the results of the study together with summaries of recent publications on environmental information on products.

1.1 Objectives, target group and intended use of results

The objective of the study is to address the main consumer concerns on Type III environmental declarations (EPDs), in particular with respect to comprehensibility and comparability of the environmental information, reliability of the data, completeness of the environmental information, and adequate stakeholder involvement. For each of these concerns we identify a set of criteria that can be incorporated in a standard or used in the preparation of detailed rules for an EPD (typically in the Product Category Rules). Furthermore, we demonstrate, through 10 example EPDs, with particular emphasis on construction products and energy using products, how these criteria can result in declarations that accommodate consumer concerns.

The target group for the study is ANEC personnel involved in standardisation and policy debate with respect to environmental declarations.

The results are intended to support ANEC's input to the political debate on Integrated Product Policy (IPP) and into European and international standardisation work. For example, the study results can be used in the future framework for European Type III environmental declarations through the new Technical Committee set up by the European standardisation organisation, CEN, which will be responsible for the development of voluntary horizontal standardised methods for the assessment of the sustainability aspects of new and existing construction works.

1.2 EPD programmes

EPDs programmes exist or are under development in a number of countries. Engelund et al. (2005) includes a brief summary – in a slightly edited form as follows. A list of existing PCRs can be found at the homepage of the Global Network on Environmental Declarations, GEDNET, www.gednet.org.

> In **Sweden**, an official system for type III environmental product declarations called EPD (Environmental Product Declaration) has been developed and established. The system is voluntary and can be used worldwide by all interested companies and organizations. At the moment, interested parties from 7 other countries have joined the EPD system at various levels[8]. The Swedish EPD system is the most developed type III product declaration type in the world. In Sweden, EPDs have primarily been developed for energy-heavy products such as refrigerators, washing machines, pumps etc. 18 PCRs are finished and 3 under development.
>
> An environmental profile declaration similar to the Swedish EPD is used in the **Canadian** pulp and paper industry. The declaration is called EPDS, Environmental Profile Data Sheet, and is certified by Terra Choice Environmental Services, Inc. The EPDS is a standardized reporting form, which offers measurement data and explanatory comments related to a list of environmental attributes that cover the lifecycle of pulp and paper products. It provides pulp

[8] Countries with existing EPD programs: Sweden, Belgium, Poland, Finland, Italy, Japan, Denmark and South Korea. In Norway, an EPD program is underway.

and paper producers with a credible and cost-effective way of measuring and reporting on the environmental performance of individual products and the mills that produce them. The data requirements of the EPDS are very similar to what is generally required in an EPD.

The **Japanese** eco-label EcoLeaf is designed to present comprehensive information in a quantitative form on lifetime environmental impact by the product or service, without making any judging statement by any set criteria - it is entrusted to the reader. EcoLeaf is run by JEMAI (Japan Environmental Association for Industry). By encouraging companies to participate, the EcoLeaf program aims at encouraging them to plan and then to develop eco-conscious products and services. This will give consumers a stronger awareness of eco-conscious practices and allow them to choose and use environmentally friendly products. By facilitating communication of environmental information between producers and consumers, EcoLeaf aims at creating a relationship of mutual trust, thereby contributing to the creation of a sustainable society. The system is very similar to the Swedish EPD system with Product Specific Criteria (PSC) similar to PCR for each product type. At the moment, PSR has been developed for 44 product categories and 5 are under development (www.gednet.org).

NHO - Confederation of **Norwegian** Business and Industry - has initiated the EPD work in Norway in 1989, starting development of a programme almost identical to the Swedish EPD-system. A formal organisation was established in 2002 (Næringslivets Stiftelse for Miljødeklarasjoner) in co-operation with The Federation of Norwegian Construction Industries, BNL. 9 product categories were included in the test phase and – presently there are 3 published PCRs and 3 under development (www.epd-norge.no).

In 1998, the **Korean** Ministry of Environment and KELA (Korean Environmental Labelling Association) initiated the type III product declaration, EDP - Environmental Declaration of Products. The system is very similar to the Swedish and the Japanese systems regarding the development of PCR, the lifecycle perspectives etc. At the moment, EDP is mainly prepared for electronic appliances. One EDP is developed for toilet paper as well. Presently 22 PCRs have been prepared (http://www.edp.or.kr/).

Italy has adopted the Swedish EPD system and presently there are 17 finished PCRs and 14 under development (www.gednet.org). Other countries like Belgium, Poland and Finland have also adopted the Swedish EPD system, but no data is available from GEDNET.

In **Denmark**, a project has been initiated to establish a privately organised environmental declaration system[9]. The Danish system will be voluntary and internationally oriented so that if and when EU guidelines and ISO standards are established, the Danish system is already coordinated with these efforts. The construction of the system will take place in 2004-2006 during which concrete guidelines for the preparation of and control with environmental product declarations will be prepared. A template will also be prepared for the content and layout of an environmental product declaration. An organization will be established along with a business plan for the future running and development of the system, including a suggestion for financing. Finally, the system and its guidelines will be tested by a number of companies within some selected product groups. It has not yet been established which product groups the system will start up with, but the intention is that more and more products and services will be covered by the system. Testing will last approximately one year ending in the fall of 2006. From the turn of the New Year 2006/2007, the system must be up and running and function without support from the EPA. Companies and organizations will then immediately be able to prepare environmental product declarations according to the product specific guidelines developed during testing and begin the development of product specific guidelines for other product groups.

[9] The parties to solve the task are Erik K. Jørgensen AS (EKJ) (Project management), Instituttet for produktudvikling (IPU) Dansk Standard (DS), AB Svenska Miljostyrningsrådet and Valør & Tinge A/S. In addition, a number of trade organizations and companies participate in the work; see www.mvd.dk

1.3 Relationships to other Environmental Product Information Schemes

The term eco-label covers many different interpretations in specific labels as well as programmes, schemes, etc., causing some confusion among consumers. The International Organization for Standardization (ISO) has developed standards for eco-labelling (ISO 14021:1999, ISO 14025:1999 and ISO14020:2000) to help structure and thereby reduce the confusion. The standardization was initiated in the flow of events linked to the Rio summit in 1992. The inspiration came from the success of the German Blue angel. The purpose of the standards was reduce the confusion and to make the communication on environmental product performance more efficient. An environmental label was generally defined as a claim with respect to the environmental aspects of a product or service. Three different types of eco-labelling are distinguished:

- Type I: Voluntary programs operated by private or public agencies. The programs award their label to products and services that meet a set of predetermined requirements. Hereby, the label identifies products and services that are environmentally preferable within a particular product category (ISO 14024:1999).
- Type II: Self-declared environmental claims
- Type III: Environmental declarations

Type I eco-labelling systems refer to positive, market-driven, voluntary schemes, where the criteria for awarding the label are based on considerations of the whole life-cycle of the products but not on a specific and detailed product group LCA. The life cycle perspective is important to avoid problem transformation from one stage in the product's life to another - or from one environmental media to another (air, water, waste etc).

Engelund et al. (2005) analyse the possible synergies between a series of schemes – in a broader context - which all include incentives or obligations to inform stakeholders, customers or the public regarding issues of relevance to health or environmental protection:

- The Integrated Pollution Prevention and Control Directive (Council Directive 96/91/EC) (IPPC)
- The Safety Data Sheet Directive (Directive 2001/58/EC) (SDS)
- The EU Eco-Management and Audit Scheme (Regulation 761/2001/EC) (EMAS)
- The Revised Community Eco-label Award Scheme (Regulation 1980/2000/EC) (EU Eco-label)
- Member states initiatives regarding Environmental Product Declarations (EPD) based on ISO 14025 (type III labelling)

There are other schemes applied on a global or regional scale, e.g. the EU energy label, the ISO environmental management standard (ISO 14001), and the ISO type II standard regarding environmental self-declarations (ISO 14024). The above 5 schemes have been selected by the study as they are identified as being among the most important voluntary tools in Commission Green Paper for Integrated Product Policy and Commission Announcement on IPP from 2003 (EMAS, Eco-label, EPD) or is obligatory for many European enterprises (IPPC, SDS).

The overall goals of the study were to:

- Identify barriers for achieving a better co-ordination of the 5 schemes.
- Identify benefits for the users of a further integration.
- Suggest measures for an improved synergy and co-ordination.

The analysis was organised as a "two-factor" comparison between

- IPPC and EMAS
- EMAS and Eco-label

- Eco-label and EPD
- Eco-label and SDS

The study also included a horizontal analysis of data and verification requirements for all systems, and how synergy may be improved.

Particularly on EPD, Engelund et al. (2005) list the following advantages and disadvantages:

Advantages:
- The presentation is impartial and neutral
- Impact categories selected by experts based on LCA assessment priority setting
- The quantifiable presentation format makes the manufacturer able to continuously measure the development of his products
- Products may be compared according to level of environmental loads within preset categories

Disadvantages:
- Environmental load information is difficult to interpret for non-experts
- It is costly to establish product specific requirements for new product areas
- The data collection process is very comprehensive
- It may be difficult to achieve quantitative data from suppliers (for eco-label criteria, compliance statements are sufficient)

Engelund et al. (2005) summarizes the following characteristics of Type I versus Type III labelling as in Table 1.

Table 1. List of characteristics of Type I and Type III ecolabelling (Engelund et al. 2005)

The EU Eco-label	**Swedish EPD programme (ISO Type III)**
Benchmark environmental performance criteria within a product group.	Quantitative aggregated environmental impacts categories within a product group.
Primary target group: The consumers and other end users	Primary target group: Professional down stream users
Based on life-cycle performance of a pre-defined and weighted set of core environmental attributes.	Based on the lifecycle performance of a pre-defined set of core environmental attributes.
Third party verified	Third party verified
Only products fulfilling preset criteria are to be assigned the label	All products within the preset product group and which fulfil the data requirements may apply the declaration
Rigid categorisation. Either the product/service is assigned the EU Eco-label or it is not.	Quantitative assessment based on well-defined system boundaries and data requirements. Comprehensive data providing environmental information on a product, similar to a nutritional declaration for food.
Signalise the product's environmental performance.	Need more products with an EPD within the same category to asses the environmental performance of the product.
Based on life cycle thinking – only criteria for selected parts of the life cycle represented	Based on life cycle assessment. Only selected parts of life-cycle loads represented in the EPD
Public authorities adopt criteria based on expert assessments.	A Competent body decides upon product specific requirements for each product category. Down stream users make their own judgement regarding environmental quality.
Relatively moderate data collection requirements. Supplier needs to provide guarantees that the criteria are fulfilled, not exact data.	Very time demanding. Supplier must provide the producer with specific data of the product performance. Can be problematic due to confidentiality concerns.
Chemical content a significant factor in the criteria for some product categories.	Tendency not to consider hazardous chemicals

Some of the main results from Engelund et al. (2005) aided in scoping the present study and the recommendations made:

> The results of the analysis clearly document the need for a stronger coordination of information systems with similar target groups and objectives. Highest priority should be given to a stronger coordination of Eco-labels, EMAS and EPD's, but also the IPPC data collection and the Safety Data Sheet have many aspects, which should be co-ordinated with the three other schemes. Most of the non-consistencies identified are presumably due to low or missing coordination between sectors responsible for the establishment and management of the schemes.
>
> Eco-label criteria are based on life cycle thinking – but the way of thinking may vary considerably between various product assessments partly due to the lack of appropriate requirements and guidelines. Some member countries are in the process of establishing (or have established) their own LCA-based national EPD programmes (e.g. Italy, Sweden and Denmark), which to some extend is co-ordinated informally. The LCA methodology used is based on an ISO standard (ISO/FDIS 14025), but the standard allows considerable degrees of freedom, which may lead to significant differences and thus difficulties of interpretation and comparison between the established systems. There is a need for a common EU defined LCA framework to be applied for LCA based assessments and information systems.
>
> An Environmental Product Declaration system may fulfil the need of communicating LCA-based data in the product chain. An EPD may deliver LCA-based data from the company to its suppliers and professional customers. EPD may therefore link together Eco-labels (target group: the consumers) and EMAS (target group: enterprises) and may be the system needed for EMAS to further develop into an environmental product management system (EMAS II). Especially EPD's and eco-labels should make use of the same LCA framework to facilitate the use of Product Category Rules (PCR) in the establishment of eco-label criteria and visa versa.
>
> By way of illustration it is the general impression, that much more companies use eco-label criteria as benchmarks for their environmental management compared to the number actually holding a license for the label. As the overall objective of the label is to increase the environmental performance of goods and services, the former use should be promoted in parallel to promoting the labelling of products.
>
> The extent and quality of the third party verification of the various systems is presently not coherent. The user of the system may not regard systems with a weak independent verification as credible. Presently, the SDS scheme is presumably the weakest verified system, as only a retrospective spot-check is performed. But also the third party verification system of Eco-labels is problematic as there has been established no common requirements and guidelines for the verification performed by the various national verification bodies. The basis for the establishment of a credible common third party verification system may be EMAS, as it contains all requirements and guidelines for certification and accreditation.
>
> The management of the various schemes is placed at different national agencies or sectors. Also at EU level each scheme has its own competent body forum. There are no established mechanisms for coordination at management level neither at national nor at EU-level. To achieve a coherent EMAS, Eco-label and EPD system one competent body at EU-level should be given the responsibility for the maintenance and promotion of the schemes.

Engelund et al. (2005) arrives at the following recommendations:

- An integrated environmental and health communication system should be developed and agreed upon in EU. As a first step, a strategy for how to develop, implement and manage an “Integrated product chain environmental and health communication system” should be elaborated.
- A common life cycle analysis (LCA) framework should be established at community level further detailing the ISO standard 14040. This “EU-standard” should be applied for elaboration of eco-label background documents for criteria settings, for Product Category Rules for EPDs and for the further development of the product focus in EMAS.
- The Commission should initiate working for the preparation of an EU regulation for environmental product declarations (EPDs) based on the eco-label and EMAS regulatory framework
- Mechanisms should be established to promote the formal coordination between the schemes at both national and Community level. The EU Competent bodies for EMAS and Eco-labels (and EPD) should merge into one single body to promote coherence between the schemes
- A common framework for verification of environmental and health information systems should be established covering the voluntary tools Eco-labels, EMAS and EPD (if established). The stringency of compliance control of the obligatory instruments IPPC and SDS should be similar to the stringency of the third party verification of voluntary tools.
- Guidelines and other background documents elaborated for the purpose of a single scheme should be made available for users of other relevant schemes.

2 Analysis and recommendations

2.1 Comprehensibility and comparability

2.1.1 The problems

The EPDs include environmental data for a number of environmental impact categories, typically in tabular form, as the example in Table 2. No information is provided on whether the scores are high or low compared to other products. For an experienced user it may be possible to compare two EPDs (for products within the same product group, i.e. with comparable functional units) by comparing the numbers for each impact category, but this is not adequate for a quick comparison by a lay user. Few consumers will be able to relate the numbers to any real environmental impact, and to judge the importance of the numbers. *Can a format of presentation be found that allows the consumer to judge the relative environmental merits of two products at a glance?*

Table 2. An example of tabular presentation of environmental impacts for an EPD, subdivided according to life cycle stages[10].

Impact category	Before our gate	Our production	Use	End-of-Life	Total
Nature occupation [m^2 eq arable land]	3.6	No data	16.5	-0.272	19.8
Global warming [kg eq CO_2]	61.4	8.8	311.1	-6.3	375.0
Acidification [m^2 unprotected ecosystem]	6.2	0.30	50.0	-0.532	55.9
Eutrophication [g eq NO_3 -]	0.28	0.04	1.42	-0.0240	1.71
Photochemical ozone formation [m^2*hr*ppm ozone]	952	202	3656	-105	4705
Human toxicity (into air, only carcinogenic effects) [kg chloroethylene-eq]	21.0	1.7	100.0	-1.7	121.0
Injuries [fatal injuries equivalents]	1.66E-07	1.64E-08	2.68E-07	-7.55E-09	4.43E-07

Present EPDs do not include any graphical presentation of the results, or any information that makes it possible to judge the relative importance of the numerical information. Showing the impacts for the specific product relative to a reference product (i.e. normalised to the impact from a reference product) would overcome this limitation, but the choice of reference product is not trivial, since it will influence the appearance and interpretation of the data. *Can a reference product be chosen that gives an unbiased comparison across products and product groups?*

The ISO 14025 give a large degree of freedom with respect to what environmental impact categories and information can be included under headings such as "life cycle inventory analysis", "life cycle impact assessment" and "additional environmental information". While this gives high flexibility in preparation of the Product Category Rules and good opportunities to adjust the presentation format to the specific product groups, it reduces the comparability of different products. *Can a layout template be specified that is applicable to*

[10] Named "phase" in the EPD, which is a term commonly used, although ISO 14040 prescribes the terminology of life cycle stages and LCA phases, i.e. phases is reserved for the assessment as such.

all product groups, using the same headings, order, nomenclature and graphical presentation, to optimise the comparability and comprehensibility of the environmental information? Can requirements be added to ensure that the list of environmental aspects and impacts of the EPD is aligned with similar lists of criteria parameters of e.g. Type I eco-labels?

2.1.2 The solutions

We recommend a graphical presentation in which the environmental impact of the product is compared (normalised) to the environmental impact of a reference product.

To allow comparisons of all products, also across product groups, and to make the normalised data additive, the reference product must be the same for all EPDs. Such a reference product could be “the average product”, which is of course an abstraction, i.e. the same as the environmental impact of the average consumer expenditure. Choosing this reference product would also highlight the environmental performance of the product group as such. However, small environmental improvements in a product will only be visible if the reference product is a very similar product, i.e. a product from the same product group.

To provide both kinds of information, we recommend using two graphs (see Figure 1 and 2 and/or the example EPDs in Annex 3):

- one where the impacts from the product are compared to the impacts from spending the same amount of money on an average product from the same product group, and
- one where the impacts from the product are compared to spending the same amount of money on an average consumer products.

The colours in Figures 1 and 2 indicate how far the impact is from the average by using green (better for the environment than average) and red (worse for the environment) – and yellow to indicate that the difference is smaller than 10%, which is the typical minimum difference that an LCA can determine with certainty.

Comparing the impacts of “the same amount of money spent” on different products makes it possible to compare products also when the physical characteristics are different and when the functional units are not expressed in comparable terms. Furthermore, it reduces the bias of price differences: When comparing two products, which have the same function but different prices, the consumer will save money by buying the cheaper product, and these saved money will be spent for other consumption. To reflect the full environmental impacts of the purchase decision, the impacts from this additional consumption should be included in the "product system" of the cheaper alternative. Normalising to the price is a way of taking this effect into account.

While the second graph (Figure 2) can always be produced, the first graph (Figure 1) cannot be produced if an average within the product group cannot be defined or data for such an average product is not available. In the example EPDs in the Annex 3, we were always able to find a reasonable average for the product group, but in other context we have encountered this obstacle, e.g. for highly specialized products, such as mobile water purification devices. In practice, it will be the responsibility of the PCR group to determine and provide the normalisation references, as part of their database work; see Chapter 2.2.

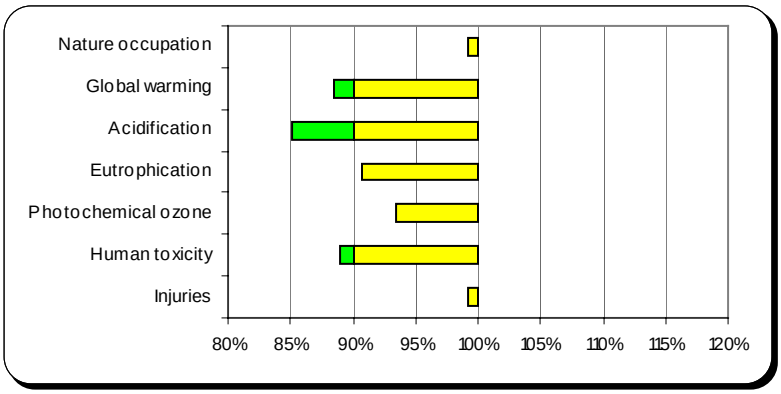

Figure 1. Impacts from Product A relative to the impacts of spending the same amount of money on an average product of this product group.

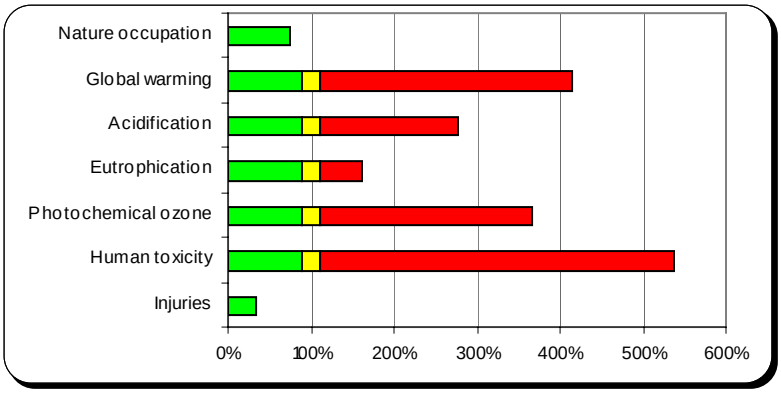

Figure 2. Impacts from Product A (same product as in Figure 1) relative to the impacts of spending the same amount of money on "average consumer goods".

Legend for Figure 1 and 2
Green: 10% lower than the reference
Yellow: Close to the reference
Red: 10% higher than the reference

Such normalised graphical information is additional, compared to existing EPD programmes. The main advantage is that perception of graphical information is quick, and allows the lay user to assess the relative severity of the environmental impacts from the product. It still does not allow assessing the absolute severity of the product, which would require a weighting *across* impact categories, i.e. the use of a generally recognized single-score impact assessment method. Weighting is not used in current EPD programmes, as there is no single weighting method that is generally recognized. However, we recommend that efforts be made towards a generally agreed method for expressing environmental impacts in a single-score, which would allow the graphical presentation to be simplified, comparable to the current energy labelling. Some promising developments in this direction are reported in Chapter 2.3.

Normalisation within each of the impact categories, to the average of a product group or to average consumer products in general, is not a comparative assertion in the meaning of the definition of ISO 14040[11] and consequently such normalisations are in compliance with both ISO 14040 and ISO 14025.

[11] **Comparative assertion** = Environmental claim regarding the superiority or equivalence of one product versus a competing product that performs the same function (ISO 14040:2006, 3.6)

ISO 14025 contains a list of required content, but does not specify the order of presentation, nor any specific layout. We recommend that the graphical information be placed on the front page of the EPD together with the product specification, including the functional unit, a small picture, and key performance characteristics. This is the reference information that the consumer will need to be able to quickly compare two products. Also the recommendations for use and disposal, which can be very important for the overall environmental impact, should be placed on the front page.

Technical detail may then follow on the subsequent pages. For easy reference between individual EPDs, we recommend following a specific order of the required content, as given below (see also the Example EPDs in Annex 3). We also provide some additional guidance for the content, which it may be useful to integrate as standard requirements:

- Product definition (including the functional unit and geographical boundaries for the market on which the EPD is valid. The latter - which is not required in ISO 14025 - is particularly important when the use and disposal stages are environmentally important, and modelled according to local electricity supply or waste disposal systems. If the lifetime is used to define the functional unit and some data are based on yearly consumptions or emissions, data shall be adjusted accordingly.
- Product specifications and recommendations for use and disposal (the latter points are part of "Additional environmental information" in ISO 14025, but placed here when important for the use of the product; more details can be placed under the heading "Additional environmental information" on page 3 of the EPD).
- Environmental Performance (graphical information)
- Product life cycle information, divided in the four stages:
    - “Before our gate” (all suppliers to “our production”, including electricity)
    - “Our production” (the producing plant only)
    - “Use” (use stage and all complementary products needed in the use stage)
    - “End-of-life” (waste disposal and recycling processes)

  This shall include information on the source of data for the overall life cycle (typically the standard database of the EPD programme; see Chapter 2.2) as well as for specific data that may have been used for each stage of the life cycle. This is not a clear requirement of ISO 14025.
- List of materials and chemical substances (above 0,1% of weight of the product, also indicating eventually content of substances eligible to labelling according to EU legislation on hazardous substances)
- Inventory (tabular information)
- Environmental impacts (tabular information supplementing the diagrams on page one with the absolute impact figures, differentiated on the four life cycle stages and in total. Hereby the user of the EPD can see, for each of the impact categories, which of the stages is most important for the product. Note that emissions from “Our production” shall only be the emissions from the production plant itself, not the emissions from the inputs, such as electricity, which belongs to “Before our gate”. Also note that emissions from production of complementary products - such as electricity use and detergents for a dishwasher - shall be included under “Use”.)
- Additional environmental information (ISO 14025 specifies a series of information bullets not based on LCA or LCI studies – or information modules. Some of these points are actually part of present LCA methodology and therefore included above; other points are important to the product definition and therefore also moved forward in the layout).
- The company
- Date of publication and period of validity
- Verification

- References (the references shall included bibliographic information on the LCA or LCI studies used as well as information modules and other sources of information; also relevant PCRs, Type I ecolabelling criteria and performance standards of environmental relevance shall be included).
- Reference to EDP Programme operator
- Statement that EPDs from different programmes may not be comparable. (In the example EPDs the statement has been extended with a disclaimer on the draft character of the EPD; in EPD programmes a statement shall be formulated as part of the PCR containing similar information on the programme and operator not elsewhere specified).

Synergy with other eco-labelling programmes shall be investigated when developing Type III Product Category Rules (PCRs) and applied, i.e. any applied label shall be mentioned in the EPD. It is recommended to align the list of environmental aspects and impacts of the EPD – the parameters – with the similar list of criteria parameters of e.g. Type I eco-labels.

2.1.3 Background

In the process of designing a universally applicable graphical presentation format, we have investigated different options, especially for the choice of reference products (benchmark products), but also for the graphical lay-out. The characteristics of the different options are described in the following sections.

2.1.3.1 Finnish benchmarking study

In 2003, four Finnish research institutes started a study to promote the use of LCA-based product information (Nissinen et al. 2005). The objectives were to:

- develop different benchmarks to which the LCA results of various products can be compared,
- study how consumers understand the different benchmarks and what proposals for improvement they have, and
- propose a few presentation formats and benchmarks.

The first type of benchmark chosen is environmental impacts per capita and day in Finland, which is also used to normalise results for specific products, services and activities. The relative impacts are placed on a scale from 0 to 100.

The second type of benchmark is based on a number of common products that could serve as a useful comparison points and allow consumer to “anchor” the novel information to a familiar context. Rye bread and cheese were the food products selected as reference products, largely due to the importance of food in everyday consumption and data availability considerations. Both make up only a small portion of the daily food intake, and thus also of a consumer’s total daily environmental load caused by food, but they provide an illustration of the environmental loads of commonly used products. Other reference products included in the study were a wash of laundry, a two-bedroom apartment and a car trip.

The I/O table of the year 1999 with 152 industry branches were used to supplement the results of the detailed review of a series of LCA studies.

The impact categories and contributing emissions applied were:

- Climate change (CO2, N2O, CH4),
- Acidification (SO2, NOx, NH3)
- Tropospheric ozone formation (NOx, VOC/HC, CH4)
- Terrestrial eutrophication (NOx, NH3)
- Aquatic eutrophication (NOx, NH3, N(w), P(w)).

Feedback on the first versions of benchmarks and presentation formats was obtained from potential users of the information, including both ordinary consumers (from a voluntary consumer panel maintained by the National Consumer Research Centre of 58 persons) and other stakeholders, such as professionals providing environmental advice and counselling (two seminars organized at the Finnish Environment Institute).

After this first round, the presentation formats were refined and the panel participants gave feedback on the revised presentation formats via a postal questionnaire.

The benchmark based on the “average daily per capita environmental impact of the whole Finnish economy” was received with a mixture of enthusiasm and confusion. It was considered an extremely informative benchmark, yet its validity in representing the average daily impacts of consumption was questioned.

Many potential users of the benchmarks preferred aggregated and weighted results, as they considered them most usable in actual decision situations.

Many alternative suggestions for presentation formats were received – ranging from colour coding to awarding points similar to those used by Weight Watchers. However, the most useful suggestion for general consumer education was found to be a “ruler” as a scale on which different products could be placed according to their environmental impacts.

Based on this feedback, Nissinen et al. (2005) recommends combining Figures 3 and 4 in environmental product information directed towards consumers. The graphics together with the benchmarks should provide an easily understandable presentation.

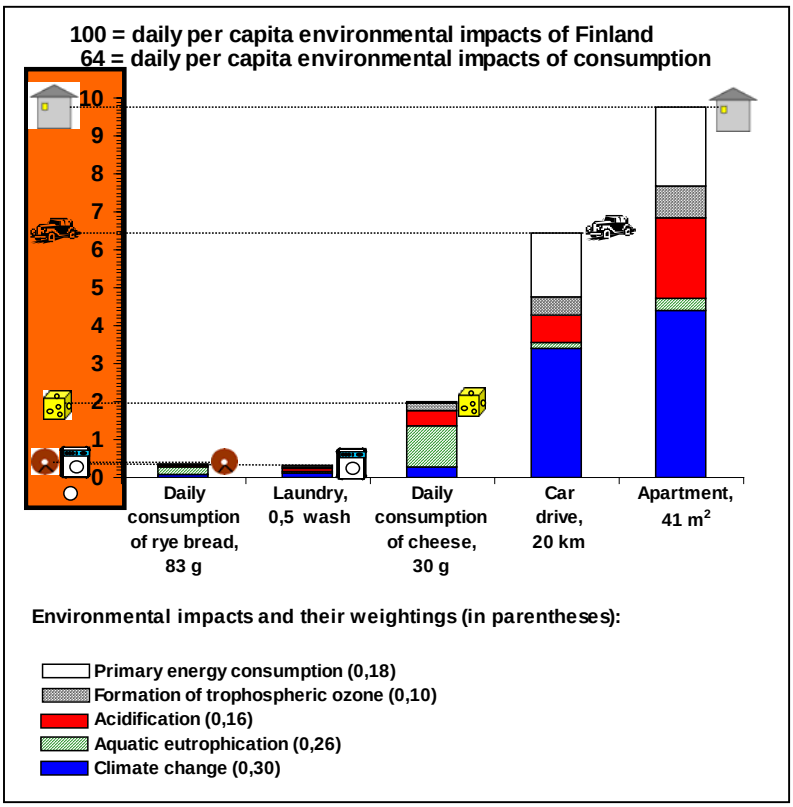

Figure 3. Benchmarking of environmental impacts per capita in Finland (Nissinen et al. 2005).

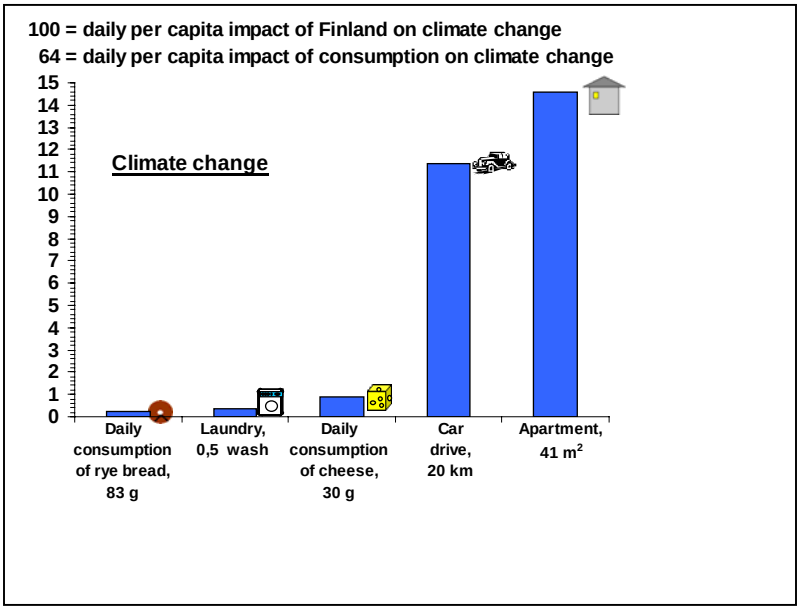

Figure 4. Climate change impacts of different types of consumption per capita in Finland (Nissinen et al. 2005).

One important problem in the choice of impact categories is the double counting by including both primary energy consumption and climate change. Referring to ISO 14025, this is a non-conformance, as inventory results should be clearly separated from impact assessment results. However, if a generally accepted method for aggregating environmental impacts could be found (e.g. based on the DALY and PDF*m^2*year concepts outlined in Chapter 2.3.3), the aggregated information is obviously simpler to communicate than information on 7 separate impact indicators. This would resemble the kind of information provided in the energy labels.

2.1.3.2 **Energy labelling**

Household appliances must be labelled according to EU directive 92/75/EEC indicating the energy consumption, the consumption of specific resources and other information. The mandatory energy labelling was introduced after some voluntary initiatives by industry, and experiences from this process might be valuable for the ongoing "voluntary" initiative with EPDs, e.g. for construction products. The directive is a framework directive and specific directives are developed for each product group included. The energy label indicates the energy consumption by a scale from A – More efficient – to G – Less efficient supplemented by quantitative information on e.g. for a washing machine

- energy consumption (kWh/cycle12)
- capacity (cotton) in kg
- waster consumption (l) and
- noise (dB(A)) during washing and spinning

Supplementing the overall scale with energy arrows, the performance during e.g. washing and spin-drying shall be indicated by using the same letters A to G.

The following product groups shall be energy labelled according to EU directives (reference to directive):

- Refrigerators and freezers (94/2/EC)
- Washing machines (95/12/EC)
- Tumble dryers (95/13/EC)
- Combined washer-dryers (96/60/EC)
- Dishwashers (97/17/EC and 99/9/EC)
- Lamps and light bulbs (98/11/EC)
- Air-conditioning appliances (2002/31/EC)
- Electric ovens (2002/40/EC)

Most of these directives are old and the slow update in the EU regulatory system is the major drawback, e.g. when agreement on new threshold values cannot be found (Rubik and Frankl, 2005). New energy classes for refrigerators and freezers were therefore developed in 2004 (2003/66/EC).

Energy labelling in this form is very user friendly and has also resulted in a reasonable turnover, which nevertheless can be much improved by economic instruments as seen recently in Denmark, where a 500 DKK premium on A++ and A+ appliances boomed the private consumption in the autumn of 2004; the campaign was therefore repeated in autumn 2005, now with a premium of 1.000 DKK, which made 14.000 household shift their refrigerators and freezers and the turnover of A++ and A+ to increase from 1% to 35% of the market (Jyllands-Posten 3.11.2005).

[12] Equivalent to wash of cotton at 60° C

Although the information in the energy label is too limited to fulfil the more comprehensive environmental information requirements of EPDs, the concepts of the label, including the scale, should be considered for improvement of the present format of EPDs. As mentioned in the previous section, this would require that a generally accepted method for aggregating environmental impacts be found.

2.1.3.3 Normalisation option A: Person equivalents

The following three sections, on normalisation options A, B and C, are based on Weidema and Nielsen (2002).

In classic LCA approaches, normalisation is often done in relation to the total annual per capita contributions to the environmental impacts in order to derive "person equivalents", i.e. the average environmental impact per person within a specific impact category.

> ***Example:***
> When using this normalization approach, the environmental impact from a dishwasher will be calculated as the contribution to the environmental impacts from one year's use of the dishwasher divided by the average environmental impact by an average European (which is equal to the total environmental impacts in Europe in e.g. 2003 divided by 431,000,000 Europeans). The factors have to be calculated separately for each environmental impact category. An example is given for Global warming:

$$\text{Factor for Global warming} = \frac{\text{The contribution to Global Warming from one year's use of a dishwasher}}{\text{The total contribution to Global Warming in Europe in 2003 / 431,000,000 Europeans}} \quad \frac{[CO_2\text{-equivalents per year}]}{[CO_2\text{-equivalents per year per person}]}$$

> The factor for Global warming will be in "person equivalents". The interpretation of this unit is rather straightforward: On average, all persons in Europe contribute 100% of the European contribution to global warming. If the factor is 0.05 person equivalents, it can be interpreted as "The use of this product contributes with 5% of my total contribution to the global warming" (Provided that the functional unit for the use of the product is based on one years use).

This approach is similar to the "per capita impacts from consumption in Finland" benchmark of Nissinen et al. (2005), presented in section 2.1.3.1, except that the period used by Nissinen et al. is one day, not one year.

The main advantage is that the approach is easy to understand as illustrated in Figure 5. Furthermore, this normalisation makes it possible to compare all types of products. Moreover, you can add contributions from different products (the contribution from the dishwasher can be added to the use of other kitchen apparatus).

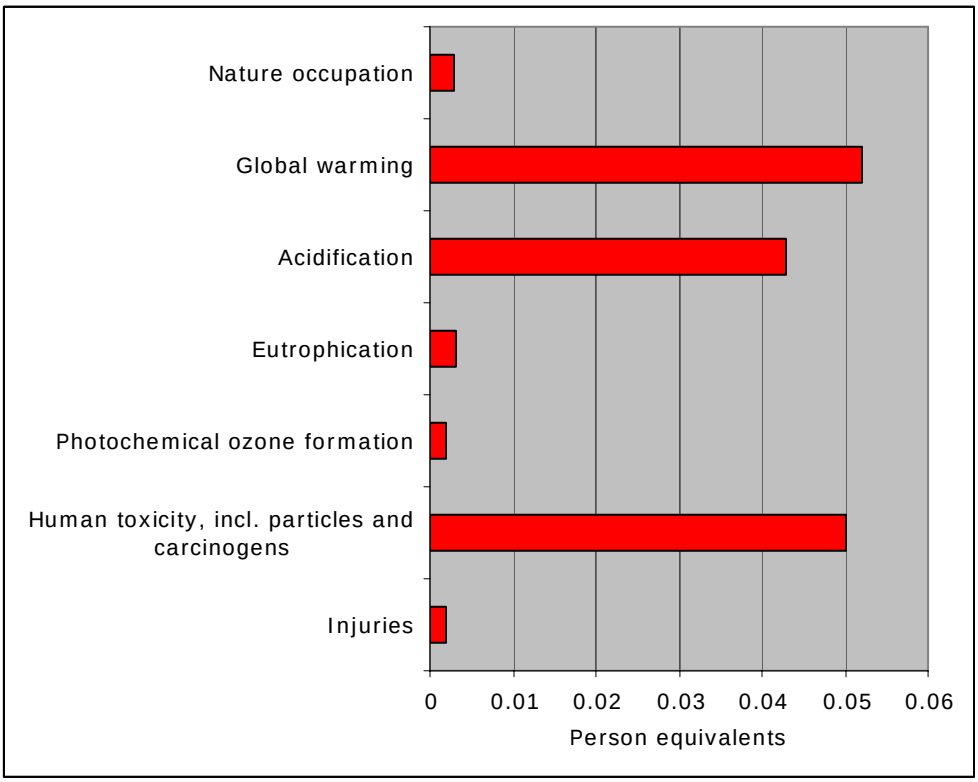

Figure 5. Normalising to person equivalents.

The two main drawbacks of using this normalisation reference are that when comparing two products within same product group (e.g. two cellular phones) the differences will often be so small that they will not be visible at this large scale. You can't distinguish the difference between cellular phone A and B. Moreover, you cannot see whether the specific product contributes more or less to the environmental impacts than average products.

2.1.3.4 Normalisation option B: "Environmental impacts per Euro spent relative to overall consumption"

This reference is based on option A, but extended by using the cost (price) of the product and the costs of the total consumption per person in one year (for an "average European").

The price of the product is included in order to avoid the bias that is introduced by price differences: When comparing two products, which have the same environmental impacts but a different price, the consumer will save money by buying the cheaper product. These saved money will be spent on another consumption that should be included in the "product system" of the cheaper alternative. By including the price i.e. getting the impacts pr. Euro, this bias is reduced.

The basis of this normalisation is "Environmental impact per Euro spent".

First, we calculate the environmental impacts related to buying product A: The total environmental impacts from product A, divided by the price of product A. The result answers the question: "What are the environmental consequences of using 1 Euro on this product".

This is then compared to "The environmental impacts of my average consumption per Euro". This is defined as the total environmental impacts per person from household consumption in Europe in 2003, divided by the total household expenditure per average European in

2003. For the Example EPDs in Annex 3, we have applied the Total environmental impact in Europe divided by the GDP, thus including also the public consumption.

The calculations are shown in the example below:

$$\text{Factor for Global warming} = \frac{\dfrac{\text{The contribution to Global Warming from one year's use of a dishwasher}}{\text{The price for using the dishwasher in one year}}}{\dfrac{\text{The total contribution to Global Warming in Europe in 2003 / 431,000,000 Europeans}}{\text{The total GDP in Europe in 2003 / 431,000,000 Europeans}}} \quad \frac{\dfrac{[CO_2\text{-equivalents per year}]}{[\text{Euro}]}}{\dfrac{[CO_2\text{-equivalents per year per person}]}{[\text{Euro per peson}]}}$$

Note, that 431,000,000 Europeans are in the formula twice, which means that the formula is equal to:

$$\text{Factor for Global warming} = \frac{\dfrac{\text{The contribution to Global Warming from one year's use of a dishwasher}}{\text{The price for using the dishwasher in one year}}}{\dfrac{\text{The total contribution to Global Warming in Europe in 2003}}{\text{The total GDP in Europe in 2003}}} \quad \frac{\dfrac{[CO_2\text{-equivalents per year}]}{[\text{Euro}]}}{\dfrac{[CO_2\text{-equivalents per year}]}{[\text{Euro}]}}$$

The total GDP in Europe in 2003 was $10E^{12}$ Euro for 431,000,000 Europeans, that is 23200 Euro per European on average.

The result is illustrated in the example in Figure 6. If the factor for global warming for dishwasher A is higher than 100%, it means that when you use 1 Euro for buying dishwasher A, it gives more contributions to global warming than when you use 1 Euro for your "average consumption". Maybe you should consider spending you money on other products? When the factor is lower than 100%, the product is not contributing to global warming as much as your "average consumption" – per used Euro.

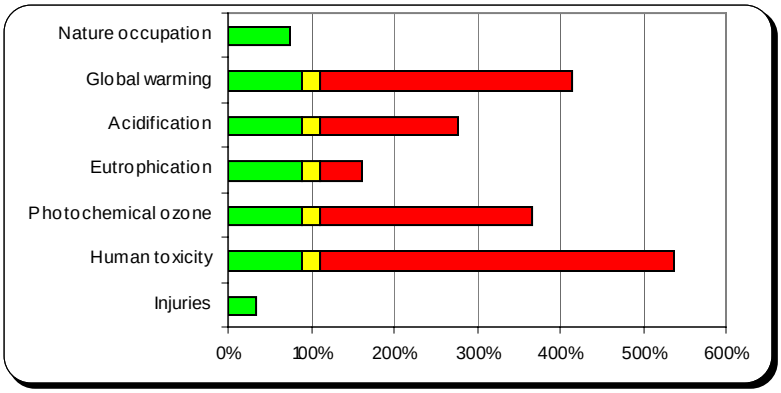

Figure 6. Impact from the total life cycle of dishwasher A compared to "average consumer goods".

The benefit of this normalisation reference is that it provides comparability with all other products and that products with different prices can be compared without bias. The comparison to the overall consumption can also help raise environmental awareness in a broader sense.

The drawback of using this normalisation reference is that when comparing two products within same product group (e.g. two cellular phones) the differences will often be so small that they will not be visible at this large scale. You can't distinguish the difference between cellular phone A and B. This drawback is not present in normalisation option C.

2.1.3.5 Normalisation option C: "Environmental impacts per Euro spent relative to average of the specific product group"

This approach is similar to option B; however the environmental impacts and price of product A is normalised in relation to the environmental impacts and average costs of the product group it belongs to. It means that dishwasher A is compared to "average dishwashers".

As for option B, the price of the product is included to avoid the bias of price differences. Again, the basis of this normalization is "Environmental impact per used Euro".

As for option B, we calculate the environmental impacts related to buying product A: The total environmental impacts from use of product A divided by the price for using product A. This answers the question: "What are the environmental consequences of using for 1 Euro of this product".

Then, the environmental impacts of average products within the product group are calculated. This is divided by the average price for products within the product group.

The calculations are shown in the example below:

$$\text{Factor for Global warming} = \frac{\dfrac{\text{The contribution to Global Warming from one year's use of dishwasher A}}{\text{The price for using dishwasher A in one year}}}{\dfrac{\text{The contribution to Global Warming from one year's use of an average dishwasher}}{\text{The price for using an average dishwasher in one year}}} = \frac{\dfrac{[CO_2\text{-equivalents per year}]}{[\text{Euro}]}}{\dfrac{[CO_2\text{-equivalents per year}]}{[\text{Euro}]}}$$

The result is illustrated in the example in Figure 7. If the factor dishwasher A for Global Warming is higher than 100%, it means that when you use 1 Euro on buying dishwasher A, it gives more contributions to Global Warming than when you use 1 Euro on "average dishwashers". Maybe you should consider using you money on another dishwasher? When the factor is lower than 100%, the dishwasher is not contributing to global warming as much as other "average dishwashers" – per used Euro.

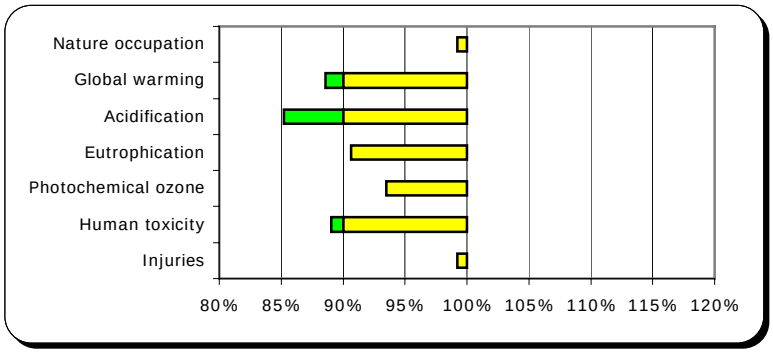

Figure 7. Impact from the total life cycle of dishwasher A compared to average dishwasher.

The benefit of this reference is that even small differences to other similar products can be seen. Products with different prices can be compared without bias, as in option B.

A drawback of using this normalisation reference is that it cannot be used to compare to product outside the specific product group. The bar diagram will show that buying "dishwasher A" is a more environmental friendly option than buying "an average dishwasher", and apparently, it is a good choice for spending the money. However, the bar diagram does not show that using a dishwasher contributes relatively much to the overall environmental impacts.

Also, Figure 7 does not show how good “dishwasher A” is compared to the best performing dishwasher, i.e. whether another dishwasher is an even better environmental choice. At the start of an EPD programme, such information is of course seldom available, but in a successful EPD programme, where a large part of the products within a product group have EPDs, this information will become available over time. At each 3 year revision of the PCR, the PCR group may define the best performing product in the product group, based on the EPD's produced within the product group the previous 3 years. These data may then be added to the graph in Figure 7, see the example in Figure 8. As this “best performance” will always be prior to the year in which a specific EPD is made, these data may be both higher and lower than the values for the actual product.

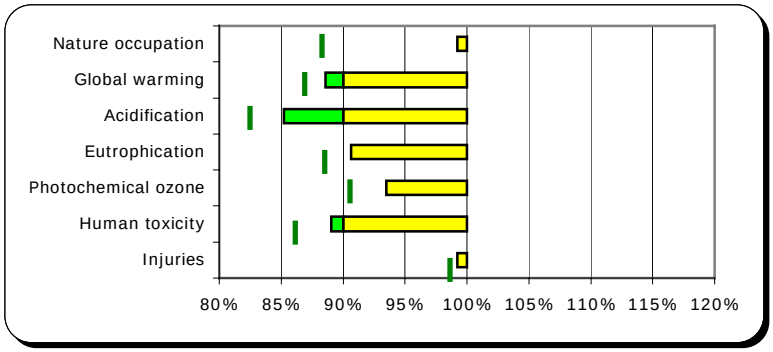

Figure 8. As Figure 7, but with deep green bars added to indicate the best performing product within the product group (for a specific year previous to the current).

2.1.3.6 Product specification and other general declaration content

Adding to the optional parts of data based on LCI-, LCA- and Information-modules, ISO 14025 prescribes a list of mandatory information items:

a) identification and description of the organization making the declaration
b) description of product
c) product identification (e.g. model number)
d) name of the programme and the programme operator’s address and, if relevant, logo and website
e) PCR identification
f) date of publication

Item b) and partly c) are often interpreted as a list of the materials used in the product. A detailed example can been found in e.g. the Norwegian EPD programme (for an office chair, www.epd-norge.no; NEPD nr. 38 E HÅG Capisco 8106).

Here the kg of materials and the overall percentage is listed for steel, aluminium, other metals, PUR, plastics, wood, textiles, corrugated cardboard and various. Also listed a the source of data (typically "Literature data" for material production and "Site-specific data" for processing and the overall percentages of materials included in the assessment, percentage of recycled materials, percentage of materials from suppliers with certified environmental management systems and percentage of components with environmental product declaration. The last four percentages are not specified.

From a user perspective, this kind of listing has several limitations:

- Some materials a reasonably well-defined – PUR – where others a very general – plastics. Also for the metals more important could be to know the content of recycled material for each. And the category "various" is not easy to understand – especially how to find "literature data"...
- Percentages of the materials are listed with 2-3 significant digits but not with any variation; although the allowed variation will vary with the product category, the very exact nature of the information can be misinterpreted as a quality mark of the declaration, which it is not. Adding to the confusion is the inclusion of "wood" – which is a very mixed category – with the content of 0%.
- Some of the "Literature data" are qualified by country or region, but it is not possible to see whether "corrugated cardboard" comes equally from Sweden and Switzerland.

Fortunately enough, on page two of the Norwegian EPD much more details can be found in tables of consumption of material resources, energy resources and waste and emissions all divided into the life cycle stages:

- Raw material production and processing
- Transport of components to the producer of the final product
- Processing and assembly with the producer of the final product
- Use stage and total

The end-of-life stage is not included in the tables but under separate heading ("Treatment of waste from the final product" as a scenario based on average Norwegian waste management of similar products (dismantling and material recycling and disposal).

Overall, this example confirms the difficulties in following the listing of data and information depicted by ISO 14025 using exact headings and order.

2.1.3.7 **Additional environmental information**

Some of the items of the list of Additional environmental information have already been discussed briefly above. In general, some confusion exists in the ISO 14025 on the division between the mandatory parts (7.2.1), the parts based on LCA-, LCI- and Information modules (7.2.2) and the Additional environmental information (7.2.3). During the development of the standard, several suggestions have been made to make this distinction more clear, but only partly achieved, although the inclusion of "Additional environmental information" on the same level of importance to the EPD and with similar requirements on data quality, verifications etc. (see 7.2.4 Requirements for additional environmental information) is a major improvement of the standard.

ANEC has previously conducted studies that use Type I eco-label information to develop baseline criteria for consumer products. These may also be applied to place requirements on the content of the "Additional environmental information" section of EPDs for specific product groups. One basic study "The Suitability of Eco-label Criteria to Derive Environmental Baseline Requirements Applicable to all Products on the Market" (Dolley et al. 2003) shows the approach in principle:

> (...) Eco-label schemes have generated a wealth of information that should be used to set minimum product performance standards (...) the Eco-label data should be recycled and applied to rating processes for consumer products. Specific eco-label requirements have been set to award products with the lowest adverse environmental impacts – usually falling in the top 5-25% of their group. Although the Eco-label system applies to the top range of products, ANEC's study shows that the information could be used at the other end of the scale, to set minimum standards to eliminate a similar percentage of products with the poorest environmental characteristics from

the market. (...) criteria used for five product groups: dishwashers, vacuum cleaners, dishwasher detergents, paints and varnishes, and textiles. (...) criteria for judging the environmental value of a product. These broadly relate to:

- Life cycle considerations, identifying environmental impacts
- Product 'classification', identifying performance spectrum across a given product group
- Sales data, identifying sales volumes by classification

The study found that for some products the background information available is good and provides a firm basis for developing reasoned proposals. Dishwashers are an example. For other product groups, like paints, the information available, at least in the public domain, is sparse. Indeed access to appropriate data was the most challenging aspect of the study. As a result, while performance criteria could be identified, setting a limit or level was difficult in many cases using available data. ANEC said, however, that information hurdles should not be seen as a barrier. They can be overcome in the same way that the EU Eco-label itself rises to the challenge, by:

- Using whatever limited data exists;
- Undertaking a limited round of testing to develop performance data;
- Relying on stakeholder consensus building to develop general agreement on key issues;
- Using a mixture of all the above.

There are over 240 different product groups under the National and European Eco-labelling schemes, providing a huge resource of information. The EU's Eco-label's environmental criteria cover everyday consumer goods and services, and the flower logo can be awarded to 21 product groups. The ecological criteria are the result of scientific studies and extensive consultation within the European Union Eco-labelling Board (EUEB), composed of different stakeholders: government authorities, representatives from environmental NGOs, from consumer and industry associations, from trade unions and from business. All these factors mean that the information already compiled is credible enough to be used for other measures.

There are 14 ecolabel schemes in Europe[13] covering some 340 product groups and around 10,000 products. These include the following product areas (Dolley et al. 2003; Rubik and Frankl 2005):

- Electrical/electronic (batteries, solar energy, energy
- Cleaning products
- Paper products
- Garden and household products (gardening and agriculture,
- Clothing and textiles
- Items used in offices (office equipment, office supplies (not paper)
- Packaging and containers
- Services and tourism
- Housing and appliances (burners and boilers, home appliances, home care products, lights, water-saving devices, furniture
- Personal care products
- Vehicles and fuel
- Food

Around 14 other schemes exist elsewhere in the world[14]. Type I ecolabelling schemes cooperate in a global network, Global Ecolabelling Network, www.gen.gr.jp

[13] Denmark, Norway, Sweden and Finland have a common scheme, the Swan; Sweden has another national scheme, the Falcon. The other member countries with national ISO Type I schemes are: Austria, Czech Republic, France, Germany, Hungary, Lithuania, Poland, Slovak Republic, Spain (+ regional scheme in Catalonia) and the Netherlands.

[14] Australia, Brazil, Canada, China, Croatia, Hong Kong, India, Israel, Japan, Korea, New Zealand, Taiwan, Thailand and USA

Ultimately ANEC's objective was for five product groups to be studied. As a result it was necessary to select product groups by:

- Preferentially opting for products covered by the EU ecolabel scheme the development of which involves a wide range of stakeholder consultation, which aims to incorporate specific requirements (environmental or political) from EU Member States. In other words, a degree of consensus exists across Europe.
- Selecting products where criteria have also been set by national ecolabel schemes and for which there have been a number of applicants. Again, the reasoning being that for such products one can surmise a degree of stakeholder consensus regarding the environmental impacts.
- Eliminating criteria in which production related requirements prevail. The issue here concerns potential trade barriers.
- Requiring that the criteria for a product should contain a sufficient number of specific environmental criteria so that even after elimination of some of those (e.g. production related) sufficient criteria covering a range of different issues remain for a minimum baseline to be developed.

The following five product groups were finally selected:

- Dishwashers
- Vacuum cleaners
- Detergents for dishwashers
- Paints and varnishes
- Textiles.

A detailed review of EU ecolabel requirements and background data on the current environmental performance for each of the five product groups are included in Dolley et al. (2003) and follow-up studies on dishwashers (CRA 2005) and textiles (Poulsen 2005) gives more recommendations for minimum requirements. The results of these studies have been applied in the Example EPDs in Annex 3. The PCR shall also specify what average use and disposal scenarios shall be used as reference scenarios for the graphical presentation

2.1.3.8 **Chemicals**

An area of specific interest is the content of hazardous chemicals or chemicals to be classified according to EU regulations and the use of information from Safe Data Sheets. Engelund et al. (2005) discusses the relation between SDS and other types of environmental product information and especially Type I and Type III eco-labelling using indoor paints and varnishes and all purpose cleaners as examples:

> (...) some of the information needed to apply for an eco-label may be obtained from the product's safety data sheet, but the safety data sheet cannot be used in its present form as the sole basis for an application for an eco-label.
>
> A common denominator for the two systems is that detailed composition information, i.e. the recipe of the product, is needed. The documentation for the eco-label may e.g. have to be supplemented by an analysis documenting the absence of heavy metals or that the content of free formaldehyde is less than 10 ppm.
>
> The eco-label criteria operate with 3 criteria levels: ban, limitation and/or declaration demand, while safety data sheets include demands for declaration of dangerous substances and safety advice for protection of health and environment.
>
> If the full recipe (chemical names and percentages) is available at a substance level, it is possible to prepare both a safety data sheet and to examine whether the product is in compliance with the criteria for absence of certain substances (e.g. substances that have been assigned certain R-phrases) and the criteria for the content being below a certain level.

However, the down-stream user/manufacture seldom have full information on the chemical composition of the product but in most cases only the summarised information in the safety data sheet. Based on the two examples above, it can be concluded that it is not possible to determine whether a product complies with the criteria for assignment of the eco-label on the basis of the information in the existing safety data sheet alone. However it will be possible for the supplier (on request from the customer) to add relevant information to the SDS. It may also be more operational/understandable for the producer to extend the information in the SDS instead of being requested to elaborate additional information in a format unknown to the producer.

A basic problem using the safety data sheet as a provider of information through the product chain is that the quality is often very poor, even though it is stated in the safety data sheet directive that "the safety data sheet should be prepared by a competent person ..". This problem has also been acknowledged by the Commission in the directive 2001/58/EC[15] : "It is known from recent enforcement activities and studies in the Member States that many safety data sheets are of poor quality and do not provide adequate information for the user ." It is furthermore stated that one way to improve the quality is to improve the guidance given to compilers and that the Commission and the Member states will consider other means by which the quality of safety data sheets can be improved in the future."

These conclusions are confirmed from experiences in the Stepwise EPD project[16] from working with two Danish SME's on development of EPD and among other sources using information from SDS. First its difficult to get the SDS' from many suppliers, secondly the information in the SDS' is not sufficient even for the health assessment, and thirdly the SME's typically don't have the competences internally to extract any relevant information for an EPD. Based on these observations, the following questions for a guide to the SME's on using SDS information in their work with EPD has been proposed:

- Who is responsible for having the SDS?
- What data can be found in an SDS?
- What data can be used for LCA and EPD?
- How can you persuade the supplier to fulfil the obligations?
- Interpretation by a consultant often needed.

2.2 Reliability of the data

2.2.1 The problems

The ISO 14025 requires that environmental information shall be based on LCAs according to ISO 14040 series of standards (ISO 14040 and 14044 after the ongoing revision) However, this still leaves a lot of freedom for the way that the LCA is performed, especially with respect to data quality and system boundaries.

The LCA practitioner will typically use a mixture of site-specific data and data from LCA databases. The choice of which processes to model with which kind of data as well as the choice between different LCA databases can significantly influence the result. If several LCA databases are used in combination, differences in system definitions may lead to inconsistencies in the LCA results.

[15] COMMISSION DIRECTIVE 2001/58/EC of 27 July 2001 amending for the second time the Directive 91/155/EEC

[16] The overall objective of this EU-funded CRAFT-project is to develop a method for stepwise environmental product declarations suitable for SMEs, so that also smaller companies can join emerging markets for "environmentally superior" products and services; http://extra.ivf.se/stepwise/Default.asp

LCA has traditionally been performed as a “bottom-up” analysis, based on linking the specific processes in a supply chain. A significant advantage of such a process-based inventory analysis is its capability for detail. However, a major problem in process-based LCA is the likelihood that important parts of the product systems are left out of the analysis, simply because it is a very difficult task to follow the entire supply chain in detail due mainly to lack of resources and time. Besides the more conscious decisions to apply cut-off rules to leave out flows that are considered insignificant, there is always a danger of missing important flows by simple ignorance. Based on our experience, bottom-up LCAs can have data gaps that add up to 50% of the total environmental exchanges. Even the most comprehensive process-based LCA databases have important data gaps due to the boundary settings.

An alternative to the "process-based" LCA is the so-called "Input/Output based" LCA, where data are collected from national input-output statistics, covering the entire economy and therefore obliterating the need for arbitrary cut-offs and the risk of incompleteness. Combining data from both approaches to data collection is called "Hybrid" LCA; see chapter 2.2.3 for more background information.

The most important aspect of LCA system modelling is the decision about what processes to include into the system and which not. Although specified in ISO 14049, unambiguous procedures to identify what processes to include have been lacking until recently. Therefore, many of the early LCAs were based on very simplified assumptions that ignored many important market aspects, such as market delimitations and production constraints. Recently, guidelines for so-called market-based or consequential LCA according to the ISO 14040 series of standards have been published (Weidema 2003, 2004). Consequential LCA is very relevant for EPDs, as it identifies the processes affected by a purchase of a declared product, and this is the approach being tested in the ongoing development of the Danish EPD programme (www.mvd.dk).

The following example (from Weidema 2003) on electricity shows the importance of market considerations:

> For example, it will make a large difference whether you regard the Nordic electricity market as one (relatively closed) market, so that Danish electricity consumption is calculated as an average of Danish, Finnish, Swedish and Norwegian electricity production, or whether it is assumed that Denmark is a market in itself (which is often seen in life cycle assessments). If we choose to look at the average for Denmark, which is not a closed market, it is decisive whether the average is calculated from the Danish production alone or whether you take into account the exchanges with the neighbouring markets, and how you take this into account, e.g. whether you calculate with Danish production plus import-mix (in periods with much available hydropower in Norway and Sweden), with Danish production plus import-mix minus export-mix (in periods with little hydropower available) or just Danish production plus net import/export (thus disregarding transit-trade).

When market considerations are *not* taken into account, Environmental Product Declarations or Eco-labels can be misleading, as demonstrated in the following example from Weidema (2003, page 64-65):

> …On the other hand, EPDs (i.e. Environmental Product Declarations) are seen as a means for the customer to influence the environmental impacts of the purchased products, which exactly places a requirement on the EPD that it reflects the expected environmental consequences of buying the declared product compared to not buying it...
>
> In Europe, some sources of electricity, notably hydropower and nuclear power, are subject to either physical or political constraints on their capacity. This implies that the production capacity cannot increase as a result of an increase in demand. An EPD based on current data

for these sources of electricity will therefore obviously be an attribution of past environmental impacts rather than a reflection of the consequences of an additional demand. Therefore, such an EPD should be issued with an appropriate warning that it should not be applied in a comparison with EPDs of other sources of electricity in the context of a purchase decision aiming at choosing the electricity source leading to the lowest environmental impact. In spite of this, there are examples of EPDs of hydropower presented to the public without such warnings, in a way that could lead the customer to think that they reflect the environmental consequences of buying the declared electricity.

The main problem of using average data for past environmental impacts, i.e. not based on consequential LCA, relates to production processes that are constrained, as in the example with hydropower and nuclear power. However, capacity constraints on specific raw materials or technologies are such a widespread feature in most supply chains, that in most cases where EPDs are based exclusively on data from the current supply chain, there is a risk that the declarations may be misleading.

The following example provides some suggestions for a solution to this problem:

In Europe, the market for ammonia is declining, mainly due to political constraints on the use of nitrogen fertiliser for environmental reasons. The variations in environmental impacts of ammonia production may be illustrated by the differences in energy consumption per ton of ammonia between a modern combined plant in Western Europe, at 29 GJ/ton, and an old plant in Eastern Europe producing at 48 GJ/ton. Considering an EPD on a nitrogen fertiliser produced on the basis of supplies from the modern plant, the inclusion of environmental data from this immediate supplier would not reflect the environmental consequences of buying the declared product. Since the market is declining, no new capacity is being installed, and the purchase of the declared product therefore does not lead to increase in production capacity for this environmentally preferable product, but rather to postponing the decommissioning of an old plant with poor environmental performance. In fact, the declining market may be seen as a special kind of constraint on increases in production capacity. Thus, to bring the declaration in accordance with reality, i.e. to reflect the consequences of the purchase of additional nitrogen fertiliser, the EPD would have to include the environmental data for the old Eastern European plants that would actually be affected by the purchase decision. To avoid this situation, there is another option for the producer of nitrogen fertiliser: To bring the reality in accordance with the declaration. This could be done by creating a separate market for “green” ammonia, i.e. ammonia from modern plants with low energy consumption, etc. If the producer of nitrogen fertiliser placed a requirement on the ammonia supplier(s) to increase the production capacity in proportion to the sale of declared ammonia, the consequences would be that decommissioning of old plants in Eastern Europe would be speeded up, and the declared ammonia would now really be produced on a modern plant, the data for which could then be safely used in the EPD.

From this example, we may discern three ways to avoid the problem of misleading EPDs due to system boundary choices:

a) Issue the declaration with a warning: The EPDs can be issued with a warning that they should not be used for comparisons with other equivalent products. However, this would then not provide any decision support to the customers.
b) Bring the declaration in accordance with reality: The EPDs can be produced under the application of system boundaries that reflect the consequences of the purchase decision, i.e. market-based, consequential modelling.
c) Bring reality in accordance with the declaration: The constraints on production capacity can be overcome, e.g. by creating a separate market for the environmentally preferable products, or by a promotional model where the producer invests in new production facilities in proportion to the sales of the declared products, so that the immediate supplier providing the data for the EPD also becomes the supplier affected by the purchase decision.

Solution a) does not appear desirable, while solution c) is the desirable outcome: An increase in production of environmentally preferable products. However, this outcome should also be the long-term result of solution b): When the declaration is in accordance with reality, the customer is expected to shift consumption to the environmentally preferable product.

Thus, recommending consequential, market-based modelling for EPDs will avoid the outlined problems, and will at the same time provide an incentive for producers to find more radical solutions, as in solution c) above.

2.2.2 Recommended solutions

We recommend that the standards should require the EPD programme operator to maintain a background database to be used for all processes in the LCAs for which the individual company or LCA practitioner does not supply specific data. In this way, it is avoided that the reliability and comparability of the EPDs is compromised arbitrarily by the choice of LCA data of different quality. At the same time, the individual companies and industry groups will be relieved of the costly task to provide and update LCA databases, resulting in cost savings and increased accessibility to the EPD system for small and medium sized companies.

The database shall:

- Cover all product groups at a generic level. This can be ensured by basing the database on a general Input/Output database covering the entire economy, supplemented by default use and disposal scenarios, which are currently missing in the cradle-to-gate declarations developed e.g. for construction products. The database may further be supplemented by product group specific data supplied by the stakeholders involved in developing the Product Category Rules. To complete an LCA for an EPD, the producer of the product simply adds his product specific data (typically factory gate-to-gate data or product specific use or disposal scenarios) to the generic background data from the database, thereby ensuring both completeness and the desired detail for those processes where product specific detail is indeed available.
- Be updated at regular intervals, e.g. every 3 years. It is important for comparability that the database is fixed for a certain time period, but technology development and improvements in data availability warrants that the period between two updates should not be longer than 3 years. More recent data may still be included in LCAs for specific EPDs, but will then have to be documented and verified separately.
- Be based on consequential modelling for those processes where the choice of modelling principle has significant implications for the LCA results.

We recommended that site-specific data be required for "gate-to-gate" activities, i.e. for "Our production", and also for other processes before and after "Our production" when the overall results are sensitive to the quality of these data. The PCR shall specify the extent to which specific (new) data are required for individual processes, stages or environmental parameters of the EPDs. The PCR shall also specify what average use and disposal scenarios shall be used as reference scenarios for the graphical presentation outlined in Chapter 2.1.2.

We recommend that the standard should furthermore require the use of consequential modelling for the site-specific part of the LCA (typically that where data are supplied by the individual company), thus ensuring that these processes describe the environmental consequences of purchase of the declared product.

It should be noted that the reliability of data is also improved through the verification procedure recommended in Chapter 2.4.

2.2.3 Background

2.2.3.1 Life cycle approach

Within the ISO 14000 series of standards for environmental management systems and tools, ecolabelling and LCA are addressed by the 14020- and 14040-series of standards respectively. ISO 14020:2001 states the general principles for environmental labels and declarations including the principle statement on life cycle considerations

> The development of environmental labels and declarations shall take into consideration all relevant aspects of the life cycle of the product. (Principle 5.3, 4.6.1)

This principle is clarified further in the text (4.6.2) - our accentuation:

> Consideration should be given to the life cycle of a product or service in order to help identify appropriate and relevant characteristics and criteria for environmental labels and declarations or to determine the significance of an environmental claim. The extent to which the life cycle is considered may vary depending on the type of environmental label or declaration, the nature of the claim and the product category.
>
> *This does not necessarily mean that a life cycle assessment should be undertaken.*

Based on as recent study of ecolabelling experiences in Canada, Lavallée and Plouffe (2004) states that

> ...ecolabels must take into account all the impacts of a product's life cycle and use a reliable and verifiable evaluation method.

ISO 14024:2000 is the standard addressing Type I environmental label and giving guidance on principles and procedures.

In ISO 14025, the above discussion has been emphasized by the principle of Life cycle basis (5.3)

> In the development of Type III environmental declarations all relevant environmental aspects of the product throughout its life cycle shall be taken into consideration and become part of the declaration. If the aspects considered to be relevant do not cover all stages of the life cycle then this shall be stated and justified. The data shall be generated using the principles, framework, methodologies and practices established by the ISO 14040 series of standards.
>
> Relevant environmental aspects that have not been covered by LCA shall be addressed using other appropriate methods.

Both for environmental aspects depicted in the EPD, coming from LCA as well as from other sources, ISO 14025 is quite clear on the principle of a life cycle approach (and a scientific basis). The ISO 14040-series of standards on life cycle assessment has recently been re-written i.e. the existing 4 standards have been merged into a new ISO 14040 stating the principles and framework and a new ISO 14044 stating requirements and guidelines. All the "shalls" of the existing standards are compiled in 14044 thereby representing a specification on how to conduct LCA whereas all the "should" and other guidance are compiled in 14040 thereby being a supplementary document. No new requirements on LCA have be introduced, so changes are mostly editorial in 14044 whereas more explanation on different issues have been added to 14040; this includes a new annex explaining different approaches to LCA (account of history versus consequences of possible (future) changes). Other annexes of the old standards have been incorporated partly in the new standard and

therefore deleted as annexes (Annexes A of 14040, 14041 and 14042, Bibliography, are moved into the bibliography, and Annex A of 14042, Relationship of life cycle impact assessment to the LCA framework, is deleted).

The technical report on EPDs, ISO 14025:1998 has been under revision for almost 4 years and will be published as an international standard in 2006. The standard depicts principles and procedures for programmes as well as the resulting EPDs, and present target audience are both business-to-business and business-to-consumer, although the later is not expected to gain much diffusion due to the market positioning of Type I environmental labels in many countries and regions. In the introduction, the connection between LCA and environmental declarations is stated

> Type III environmental declarations present quantified environmental life cycle product information to enable comparisons between products fulfilling the same function. Such declarations are:
> - provided by one or more organizations;
> - based on independently verified Life Cycle Assessment (LCA) data, Life Cycle Inventory analysis (LCI) data or information modules in accordance with the ISO 14040 series of standards and, where relevant, additional environmental information;
> - developed using predetermined parameters;
> - subject to the administration of a programme operator, such as a company or a group of companies, industrial sector or trade association, public authorities or agencies, or an independent scientific body or other organization.

2.2.3.2 **Databases**

Several authors have described the problems of lacking completeness of data (e.g. Norris 1995, Lenzen 2001, Yoshida et al. 2001) in process-based LCAs. It is only recently, with the arrival of extended Input/Output databases of environmental emissions, covering the entire economy at the level of industries, that it has become possible to quantify the degree of incompleteness in process-based LCAs. As the degree of incompleteness varies between industries, it means that process-based LCAs of different products – even when using the same rules for cut-offs and system boundaries - will have different degrees of completeness (Lenzen & Treloar 2003), which obviously creates an uneven ground for comparisons. If different LCAs furthermore use different databases, with different conventions for cut-offs and varying data quality, the comparability is further compromised. This provides the main argument for our recommendation that the programme operator should be responsible for supplying and updating one single background database to be used for all LCAs of each EPD programme.

Increased industry reporting requirements have led to more complete national environmental accounts (air and water emissions and hazardous and solid waste generation); for some countries supplemented with material flow analyses for important pollutants. In many countries, these environmental statistics are now being combined with the national Input/Output statistics on the trade between industries into so-called NAMEAs (National Accounting Matrices with Environmental Accounts), and further converted into the standard format of LCA databases. For example, the LCA software SimaPro now contains NAMEA-based data for the USA, divided on 480 industries (Suh 2003). A European version of this database has been developed by a recent EU project (Tukker et al. 2005). Similar databases for the Netherlands (Goedkoop 2004) and Denmark (Weidema et al. 2005) are available in SimaPro format. The Danish database is available in two versions, an average version and a market-adjusted version, the latter more appropriate for consequential LCA. As part of an on-going EU project, we have recently supplemented the NAMEA emissions data with data for injuries, an impact category that has not earlier been available in this format.

Input-output tables (or short: IO-tables) give an overview of the trade in national economies. The IO-tables are based on the reports on bought and sold products, which the national statistical bureau receives from the individual companies of the industry in question. IO-tables report the monetary value of the products traded between each sector of the economy. When the IO-tables are supplemented with environmental data for each sector (resource consumption and emissions per DKK produced by each industry), the total environmental exchanges can be calculated for the products from each sector, i.e. the data needed for EPDs.

As a “top-down” approach, IO-tables allow a complete allocation of all activities to all products. NAMEA databases have the advantage of being complete with regard to inclusion of all relevant activities related to a product. On the other hand, they cannot deal with very specific questions, since the approach relies on a grouping of activities in a limited number of industries. This makes it difficult to use for detailed studies, except for very homogenous industries.

The completeness of the NAMEA-based databases can be combined with the detail of the traditional process-based LCA databases, into what has become known as “hybrid LCA”. By embedding the more precise data of the process-database into the structure of the NAMEA-database, the advantages of both types of data become available to the users in one single, internally consistent database. Such hybrid LCA databases are not yet commercially available, but have been developed by consultants for internal use. It is possible to expand a NAMEA-database in this way, for one industry at a time, which means that the development of a hybrid LCA database can take place in small steps, as resources becomes available.

2.2.3.3 Consequential LCA

While consequential system modelling is now widely used in LCAs for product improvements and policy-making, the adoption of this modelling principle for eco-labelling and EPDs have been more hesitant. This may have to do with an inherent ambiguity in the way EPDs are viewed by the public and by experts in the field of labelling and declarations. On the one hand, EPDs are seen as declarations of the past environmental impact that the declared product has had up till the point of purchase, and sometimes including the expected use and disposal phases, but not specifically intended to indicate the expected environmental consequences of buying the declared product, in parallel to a declaration of contents, which does not indicate the expected composition of tomorrows product. On the other hand, EPDs are seen as a means for the customer to *influence* the environmental impacts of the purchased products, which exactly places a requirement on the EPD that it reflects the expected environmental consequences of buying the declared product compared to not buying it.

These two views on EPDs are not necessarily in conflict, since in some cases the environmental impacts from buying an additional unit of a product may be expected to be identical to the past environmental impacts caused by a unit of the same product. Intuitively, this expectation appears justified, since one would expect that buying an additional unit of the declared product would lead to an equivalent increase in production of this product by its immediate supplier, and in the long term an increase in the production capacity in the current supply chain. In many cases this may in fact be the case, and a declaration based on data from the current supply chain can then be regarded as both useful for the customer and beneficial for the environment.

However, two conditions must be fulfilled for the expectation to be true, namely:

a) that the production capacity in the supply chain is unconstrained, and
b) that the market is not declining.

In so far as these two conditions are *not* fulfilled, the inclusion of data from the current supply chain into the EPD may be seen as deceptive, as they may mislead the customer as to what are the actual consequences of the purchase. A few examples will illustrate the need for requiring the two conditions to be fulfilled before including data from the current supply chain into EPDs.

> The availability of recycled paper fibres are – like the availability of most other recycled materials – constrained by the amount collected, and this amount is typically not influenced by the demand for recycled fibres, i.e. by consumers buying paper with recycled content. This follows from the understanding that in the current growing market for fibre, the long-term price of paper fibre is determined by the marginal production cost of virgin fibre. This price will determine how profitable it is to collect recycled fibre, and thus how much recycled fibre will be collected and used, independent of any specific demand for recycled fibres. Collection of waste paper is (partly) regulated in many countries by recycling targets and public and private collection schemes. Similar to the production costs of virgin fibres, these regulations provide a constraint on the supply of recycled fibres, i.e. the supply is not controlled by demand for recycled fibres but by other factors. Thus, a credit for use of recycled fibres in an LCA or even the mention of recycled content in an EPD would be misleading, as it would imply that buying the product with recycled content would lead to more paper being recycled.

Besides physical and political constraints as in the above paper-recycling example, constraints may also be found in relation to co-products, and the use of allocation procedures may therefore lead to similar misleading results as the ones shown in the above case. In fact, capacity constraints on specific raw materials or technologies are such a widespread feature in most supply chains, that the two above conditions are seldom fulfilled for all parts of a product chain. This means that in most cases where EPDs are based exclusively on data from the current supply chain, there is a risk that the declarations may be misleading[17].

Our recent study on the use of LCA by Ecolabelling Denmark showed that consequential thinking is already applied when determining ecolabelling criteria, although not consistently (as e.g. shown by the current ecolabelling requirement for recycled paper). In the current pilot EPD programme in Denmark, the draft declarations are based on consequential LCAs, and discussions are on-going with the Swedish EPD programme, via the CRAFT project “Stepwise EPD”. Due to the difficult nature of the subject, it must be foreseen that it will take time before consensus on this subject is reached. An inter-rim or fallback position could be solution a) mentioned in Section 2.2.1, i.e. to issue the EPDs with a warning that they should not be used for comparisons with other equivalent products. However, we would not recommend this solution, since it goes counter to the entire purpose of the EPDs.

2.3 Completeness of environmental information

2.3.1 The problems

As already shown in Chapter 2.1, life cycle based environmental results are presented in terms of scores on a number of impact categories. The ISO 14025 provides a list of possible impact categories, but this list is not mandatory, which means that each programme operator may choose a different list of impact categories, thus limiting comparability between EPD programmes. The open choice of which environmental impacts to include for the specific product group in developing the PCR will add to this lack of common comparability, but will also add demands to the group developing the PCR to choose the most relevant

[17] While this section deals with environmental product declarations, the arguments and conclusions are equally valid for environmental labelling in general.

environmental parameters for the product group in question. With both Type I and Type III ecolabelling programmes running, this will complicate the search for environmental preferable products by both professional purchasers and consumers. *Should a list of mandatory impact categories be established and if so, what impact categories should it cover?*

Furthermore, to make the information clear and easy to grasp, it is necessary to limit the number of impact categories. It is often claimed that in a comparison it is not possible to consider more than 7 items at a time. But if we are to limit the number of impact categories, the ones that we select should be the most important ones. *How can we ensure that the most important environmental impact categories are covered? And should this be different for different product groups?*

In practice, the LCAs that are used as basis for the EPDs, may not contain information on the most important impact categories. Historically, LCA has often neglected more difficult environmental issues such as biodiversity impacts from land use, indoor air emissions, injuries, noise, toxicity, and socio-economic impacts. *Can a mandatory requirement ensure completeness of the environmental information provided, covering also issues such as content of hazardous substances and emissions from the product in the use stage?*

2.3.2 Recommended solution

We recommend that the standards should establish a generic minimum list of mandatory impact categories. While being open for future revisions, we recommend that the mandatory list for the time being be made up of the following 7 impact categories, which together represent more than 80% of the total environmental impact on humans and ecosystems, based on an analysis of the current burden of environmental impacts caused by European consumption:

- Nature occupation
- Global warming
- Acidification
- Nutrient enrichment
- Photochemical ozone formation
- Human toxicity, including particles and carcinogens[18]
- Injuries

For a specific product group, other impact categories than the 7 generic ones may be demonstrated to contribute significantly to the current burden of environmental impacts caused by European consumption, in which case the programme operator shall enforce that these impact categories are included under the heading of “Additional environmental information”, alongside other issues that are especially relevant for the customer of a product, such as content of hazardous substances, emissions during use, directions for proper and environmentally conscious use and disposal, which should be specifically declared.

[18] ANEC considers that the current methods for assessing and aggregating human (and eco-) toxicity are still too uncertain to include this impact category as mandatory for EPD programmes. If human toxicity is not included in a specific EPD programme, the programme operator shall ensure that the relevant toxicity related aspects are covered in the “Additional environmental information” sections of the EPDs.

2.3.3 Background

2.3.3.1 Selection of impact categories and other parameters

The ISO 14025 lists the following optional impact categories:

- Climate change;
- Destruction of the ozone layer;
- Acidification of land and water sources;
- Eutrophication;
- Formation of photochemical oxidants;
- Depletion of fossil energy resources;
- Depletion of mineral resources.

In the Swedish EPD system, the same 7 impact categories are mandatory, although the division of resource depletion is slightly different: The resources are classified in non-renewable and renewable, with and without energy content. Furthermore, three system-internal parameters are mandatory in the Swedish EPD system: electricity use, generation of hazardous waste and generation of other waste.

It is often claimed that in a comparison it is not possible to consider more than 7 ± 2 items at a time. This claim relates back to Miller (1956), who advanced this observation in relation to short-term memory of nonsense bits of information. Although it has been widely cited and applied in many different contexts, it has been superseded by later research (e.g. Cowan 1995), and certainly does not apply directly to decision-making situations. Nevertheless, it appears wise to limit the amount of information provided to the most important, although the criteria for inclusion should rather be one of completeness, e.g. that the impact categories should together cover more than 80% of the overall environmental impact.

In order to arrive at a judgement of the importance of an impact category, it is necessary to have a concept of what it implies that something is "environmentally important" and a method to make the concept operational. Until recently, it has been common for LCAs to express their results per impact category only, without any attempt at aggregating the results into single scores. However, the on-going development, e.g. in the SETAC/UNEP Life Cycle Initiative is to enable further modelling along the impact pathway from the impact categories to the final endpoints of value, also known as damage categories. Damage indicators are expressed in units relevant to the value of concern (e.g. damage to human health expressed in "Disability Adjusted Life Years"), which allows aggregation of various environmental issues that have the same ultimate effect (e.g. global warming and human toxicity both contribute to damage to human health).

The Disability Adjusted Life Year or DALY is a health gap measure that extends the concept of potential years of life lost due to premature death (YLL) to include equivalent years of ‘healthy’ life lost by virtue of being in states of poor health or disability (Murray et al. 2002). The DALY combines in one measure the time lived with disability and the time lost due to premature mortality. One DALY can be thought of as one lost year of ‘healthy’ life and the burden of disease as a measurement of the gap between current health status and an ideal situation where everyone lives into old age free of disease and disability. http://www.who.int/healthinfo/boddaly/en/

The reduction in physical capacity due to morbidity is measured using disability weights. The value of time lived at different ages has been calculated using an exponential function which reflects the dependence of the young and the elderly on the adults. The resulting values

may be discounted at a yearly rate of 3 percent or left undiscounted (our approach for Table 3).

There are four important components of disability-adjusted life years (DALYs):

1. Duration of time lost due to a death at each age – measured relative to the longevity of the longest living population on Earth, namely the Japanese at 82.5 years for women and 80 years for men.
2. Disability weights – the degree of incapacity associated with various health conditions. Values range from 0 (perfect health) to 1 (death).
3. Age-weighting function that indicates the relative importance of healthy life at different ages (optional).
4. Health is added across individuals – two people each losing 10 DALYs are treated as the same loss as one person losing 20 years.

The Life Cycle Impact Assessment method EcoIndicator99 (Goedkoop & Spriensma 2000) is a good example of the current state-of-the-art modelling from environmental impact categories to damage endpoints. Impacts on human health are aggregated in DALY and impacts on the biotic environment are aggregated in "Potentially Disappeared Fractions (PDF)" of species in area and time.

Applying the EcoIndicator99 method to the European normalisation reference (the sum of all production and consumption processes in Europe) provides a first rough assessment of what impact categories are important for human health and ecosystem quality. For some impact categories, other estimates have been used, to complete or update Tables 3 and 4.

Table 3. Relative importance of human health impact categories.

	DALY per E+6 capita	Assumed 95% confidence interval	Source of estimate
Traffic injuries	6500	6000 - 7000	Leigh et al. 1999
Toxic air emissions, excl. particles	6000	750 - 48000	Hofstetter 1998
Particles in air	2700	150 - 50000	Hofstetter 1998
Global warming	2400	1000 - 6000	Goedkoop & Spriensma 2000
Carcinogenic substances	2000	250 - 16000	Goedkoop & Spriensma 2000
Traffic noise	2000	700 -6000	de Hollander et al. 1999
Photochemical ozone formation	560	100 - 280	Hauschild et al. 2005
Diseases related to product hygiene	280	80 - 1100	de Hollander et al. 1999
Stratospheric ozone depletion	220	110 - 440	Goedkoop & Spriensma 2000
Total impact	23000		

Table 4. Relative importance of ecosystem impact categories.

	PDF*m^2*years per capita	Assumed 95% confidence interval	Source of estimate
Global warming	6200	1800 - 21000	Thomas et al. 2004
Nature occupation	4000	3000 - 5300	Goedkoop & Spriensma 2000
Invasive species dispersal	2600	1300 - 5200	Own estimate based on Wilcove et al. 1998
Acidification / Eutrophication	500	250 - 1000	Goedkoop & Spriensma 2000
Ecotoxicity	260	70 - 1000	Humbert et al. 2004
Photochemical ozone formation	100	60 - 160	Hauschild et al. 2005
Total impact	13760		

Besides human health and ecosystems, the Ecoindicator99 operates with natural resources as a damage category. However, Müller-Wenk (1999) has calculated the future increase in environmental impacts as a result of the current consumption of 12 metals with a relatively short supply horizon (including lead, copper, tin and zinc) and found that the additional future environmental impact was insignificant compared to the current impact. Furthermore, current LCA data do not include information on the quality of the resources in waste outputs, which is necessary to make a meaningful assessment of the quality deterioration of resources in the current production systems. On this background it is recommended not to include resource depletion as an impact category in EPDs.

From the above discussion, we conclude that the following 8 impact categories cover more than 80% of the environmental impact on human health and ecosystems:

- Nature occupation
- Global warming
- Invasive species dispersal
- Acidification
- Nutrient enrichment
- Photochemical ozone formation
- Human toxicity, including particles and carcinogens
- Injuries

It could be argued that ecotoxicity and traffic noise are as important as some of the other impact categories included. However, traffic noise is not well covered by current LCA data and will largely co-vary with traffic injuries. The methods for quantifying ecotoxicological impacts in LCA are similarly in their infancy, resulting in very large uncertainties for this impact category. This, taken together with their relatively low importance, warrants the exclusion of these two impacts from the above list.

Operational indicators and data exist for all of the 8 above-listed impact categories, except for invasive species dispersal. Dispersal of invasive alien species is generally regarded as the second most important cause of biodiversity loss next to nature occupation, but as yet operational life cycle indicators have not been developed. At the current time, we are

therefore forced to omit this impact category, but as soon as operational indicators are available, we do recommend that this impact category is included in EPDs.

A comparison of the above 7 operational impact categories (the 8 listed less invasive species dispersal) with the lists in the ISO 14025 shows that 4 impact categories can be found on both lists:

- Global warming (climate change)
- Acidification
- Nutrient enrichment (eutrophication)
- Photochemical ozone formation

while the following impact categories are not covered by the ISO 14025 list of data based on LCA-, LCI- or information-modules[19]:

- Nature occupation
- Human toxicity, including particles and carcinogens
- Injuries

Nature occupation is partly covered by the Additional environmental information list point "a) 1) impact(s) and potential impacts(s) on biodiversity", and Human toxicity by the next point "a) 2) toxicity related to human health and/or the environment" whereas Injuries could be covered by point "h) Hazard and risk assessment on human health and the environment" although not in the "statistical" interpretations used in the above category.

The following impact categories from the ISO 14025 list are omitted from our recommended list, for reasons of insignificance, as argued above:

- Destruction of the ozone layer (stratospheric ozone depletion)
- Depletion of fossil energy resources
- Depletion of mineral resources.

It should be noted that the current trend in LCA, as exemplified by the on-going work of the SETAC/UNEP Life Cycle Initiative, is to expand the coverage to impacts on social aspects (such as child labour) as well as economic aspects (such as impacts on crops and buildings), so that one may speak of “sustainability LCAs”. This will obviously have consequences for the kind of impact categories that may be relevant for EPDs in the future, which implies that the standards should remain open for revisions in the list of mandatory impact categories.

In parallel to this development, there is a trend towards modelling the impact categories further towards endpoints, as the above DALYs and PDF*m^2*years, the general acceptance of which would actually allow the EPDs to be limited to these two impact categories. Further attempts are being made to convert PDF*m^2*years to DALYs, which would then become a single-score unit for environmental impacts. Although a general agreement on such modelling is likely to take time, it is a trend that would significantly increase the ease of environmental communication, as already pointed out in Chapter 2.1.2.

The above 7 recommended impact categories might not be equally relevant for all product groups. Using the comprehensive databases described in Chapter 2.2 it can easily be shown what impact categories are relevant and significant for each product group, and product category rules could therefore allow EPDs for specific product groups to be limited to the impact categories that are relevant and significant. An example of this is pork

[19] **Information module** = compilation of data to be used as a basis for a Type III environmental declaration, covering a unit process or a combination of unit processes that are part of the life cycle of a product [ISO/FDIS 14025]

products, where only two environmental aspects (ammonia emissions and nature occupation) dominate the variation between different pig producers worldwide, and the environmental communication could therefore in principle be limited to these.

However, since the 7 impact categories where chosen for their overall relevance, they will always be relevant for comparing the product to the reference of average consumption, as in second graph of our recommended lay-out (Figure 2 in Chapter 2.1.2).

For specific product groups, there may be other important environmental impact categories than the 7 recommended above, for example it would be reasonable to add traffic noise for the product group cars. If operational impact assessment methods exist, such additional impact categories could be added as mandatory for specific product groups. However, in practice, it may be more sensible to add such issues under the heading of “Additional Environmental Information”, to maintain the graphical presentation of the 7 mandatory impact categories uniform across all product groups.

2.3.3.2 Inventory parameters

In all existing EPD programmes, data from life cycle inventory analysis are included. ISO 14025 also list these as optional and in a very merged form as:

7.2.2) a) Data from life cycle inventory analysis (LCI), according to the PCR:
• consumption of resources, including energy, water and renewable resources;
• emissions to air, water, and soil.

We have left room for this in our EPD template used for the Example EPDs, but in general, we do not recommend that data be provided at this level, since the typical user will not have the tools to assess these data. The result could therefore add more to confusion than to clarity. For business-to-business communication these data may be of interest, but out of the large number of possible data (all individual substance flows of an LCI) the limited selection of data that can fit into an EPD is bound to be incomplete and therefore not fulfilling for this purpose, where an electronic communication of the complete LCA information in a standard format may be more suitable.

2.4 Adequate stakeholder involvement

2.4.1 The problems

Even when consumer representatives are formally invited to participate in the procedures used to determine the requirements relating to the above-mentioned items, consumer representatives have limited resources to participate in such work.

Therefore, it is in the interest of consumer organisations that *the need* for stakeholder involvement is minimized by the application of objective, science-based procedures for determining Product Category Rules and the content of specific EPDs. *Can standardised procedures be designed that limits the demands on stakeholder involvement, while maintaining a high degree of transparency and validity of the PCRs and resulting EPDs?*

2.4.2 Recommended solutions

When developing an EPD programme, the organisational and procedural model shall satisfy the ISO 14040 requirement for third part review by a panel of interested parties of any LCA "intended to be used in comparative assertions intended to be disclosed to the public". This is already a requirement of ISO 14025 for business-to-consumer EPDs, but should also be required for business-to-business EPDs, since these can be seen as modules that may eventually be used for a business-to-consumer EPD.

While minimizing the administration, costs and demands on detailed consumer involvement, this requirement can be fulfilled by letting the board of the programme operator function as the third party review panel for PCRs as well as commissioner for the verification of data and EPDs, using spot-checks and delegation to qualified and professional verifiers as appropriate, also taking advantage of the possible synergy with other verification elements of environmental management schemes, cf. Chapter 1.3.

2.4.3 Background

2.4.3.1 Comparative assertion

Strict requirements in reporting and a critical review by a panel of interested parties[20] has been partly included in ISO 14025, i.e. fulfilling the requirements of ISO 14044 (according to our own internal review at the end of 2004 of the ongoing discussion on the status of EPDs in relation to the demands in ISO 14040 with respect to "comparative assertions"). Representatives of both ISO working groups involved in the development of the standards have declared that the difference is not significant for the practical application of the standards (reference: minutes of Madrid meeting, 2005.09.14-15).

When conducting an LCA according to ISO 14044, a series of requirements have to be fulfilled for the LCA as such. But also for the use of the results, there are further requirements – primarily for third party reporting and for comparative assertions. It is still discussed if EPDs are "comparative assertions" as defined in ISO 14044, which implies strict requirements in reporting, critical reviewing by panel of interested parties and excluding weighting in the impact assessment. ISO 14044 states the following requirements:

[20] **Interested party** = person or body interested in or affected by the development and use of a Type III environmental declaration

> An LCI study alone shall not be used for comparisons intended to be used in comparative assertions intended to be disclosed to the public. (4.1)
>
> A life cycle impact assessment shall be performed for studies intended to be used in comparative assertions intended to be disclosed to the public. (4.2.3.7)[21]

If the EPD is regarded as a comparative assertion, using LCI data alone without a LCIA for an EPD will be a non-conformance.

> Where the study is intended to be used in comparative assertions intended to be disclosed to the public, the final sensitivity analysis of the inputs and outputs data shall include the mass, energy and environmental significance criteria so that all inputs that cumulatively contribute more than a defined amount (e.g. percentage) to the total are included in the study. (4.2.3.3.2)
>
> When an LCA is intended to be used in comparative assertions intended to be disclosed to the public, the evaluation element shall include interpretative statements based on detailed sensitivity analyses. (4.5.3.2)

If the EPD is regarded as a comparative assertion, the documentation behind the EPD, e.g. the PCR and the LCA report, shall include the results of a sensitivity analysis including of the application of cut-off criteria often used in EPD. This is not a requirement in 14025.

> Where a study is intended to be used in comparative assertions intended to be disclosed to the public, the above-mentioned data quality requirements shall be addressed. (4.2.3.6.1)

This requirement is fulfilled by the requirements for the independent verification of data in 14025 (8.1.3):

- that data evaluation includes coverage, precision, completeness, representativeness, consistency, reproducibility, sources and uncertainty;

ISO 14044 further requires:

> In a comparative study, the equivalence of the systems being compared shall be evaluated before interpreting the results. Consequently, the scope of the study shall be defined in such a way that the systems can be compared. Systems shall be compared using the same functional unit and equivalent methodological considerations, such as performance, system boundary, data quality, allocation procedures, decision rules on evaluating inputs and outputs and impact assessment. Any differences between systems regarding these parameters shall be identified and reported. If the study is intended to be used for a comparative assertion intended to be disclosed to the public, interested parties shall conduct this evaluation as a critical review.

EPDs are intended to be comparable as stated several places in 14025, but the comparison as such is not included in the individual EPD. The first part of the requirement for comparative studies can therefore be stated as not being relevant for EPDs. But the intention of comparison cannot be questioned i.e. the last requirement on the critical review should be part of ISO 14025 – but is not.

Finally, ISO 14044 stipulates further requirements for reporting of studies including comparative assertions where the results are intended to be disclosed to the public (5.3.1), which are a summary and detailing of the already listed requirements.

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[21] 4.4.5 of 14044 includes a series of detailed requirements on the LCIA intended to be used in comparative assertions intended to be disclosed to the public: Comprehensive set of category indicators, not the sole basis for comparison, scientifically and technically valid and environmentally relevant category indicators, no weighting, and sensitivity and uncertainty analysis. These requirements are general requirements on an LCA indented to be used for a comparative assertion intended to be disclosed to the public.

In our view, an EPD *is* intended to be used in e.g. product comparisons, although this is not a comparative assertion according to the present version of 14025:

> 4. Objectives
> (...)
> - assist purchasers and users to make informed comparisons between products. These declarations are not comparative assertions;
>
> (...)

This disclaimer is also used later in the standard on the issue of Additional environmental information (7.2.4 f):

> Additional environmental information shall (...) not make a comparative assertion, but shall be comparable within the product category; (...)

In our understanding, "intended to be used to support a comparative assertion" does not differ from "enable comparisons between products fulfilling the same function" in practical terms, and to keep the credibility of the present programmes on ecolabelling, it is therefore recommended to address the requirements of ISO 14044 in Type III environmental declarations - as well as in Type I and II environmental labelling.

2.4.3.2 Verification

The ISO/FDIS 14025 proposal for verification encompasses 3 separate verification activities, i.e. verification of the Product Category Rules (PCR review[22]), of the LCA and other data used for the EPD ("Independent verification of data") and of the declarations as such ("Independent verification of the Type III environmental declaration"). The rules of verification are to be established by the programme operator in accordance with the ISO standards. A third party panel shall conduct the "PCR review", whereas verification of the data and the declaration can be conducted by an independent verifier (i.e. one person) internal or external to the organization developing the declaration. Requirements for business-to-consumer declarations, although, implies a third party verification of all three issues (PCR, data and declaration).

Verification shall examine (interpretation of ISO 14025 and ISO 14044):

- that the choice of methods used in the LCA study is within the framework of the requirements;
- that the calculations of one or more impact category indicators have been made in a correct way based on the inventory analysis results and characterisation factors;
- that all relevant information is documented for each unit process, i.e. a comprehensive documentation to enable an independent evaluation of the relevance of the data in relation to the goal of the LCA study;
- that data is documented in a reliable way;
- that data validity is reliable;
- data´s conformance to the original data source;
- that the presentation of environmental performance are in accordance with the requirements;
- that the product is in compliance with legislation; and
- the accuracy, credibility and neutrality of the additional environmental information.

Guidelines or instructions for verification of EPDs have been developed for the Swedish EPD programme in 1999; they will be revised and updated in 2006. Also in 2006, the Danish EPD programme will have developed more detailed instructions. Both programmes are

[22] **PCR review** = process whereby a third party panel verifies the product category rules

based on a combination of PCR review and verification of data and EPD similar to the outline in ISO 14025. In the Danish programme guidance on critical review of LCA studies developed some year ago for the Danish EPA are expected to form the backbone of the guideline. Especially for the panel review of the PCR new instruction have to be developed though.

3 Example EPDs

Example EPDs that are in accordance with our recommendations in the previous chapter are included in Annex 3, for the following product groups, chosen in cooperation with ANEC from a list of existing PCRs and priority product groups from two earlier projects prioritising product groups for labelling (Bogeskär et al. 2002, Weidema et al. 2005):

Construction products:

- Insulation
- Paint
- Cement

Energy using products:

- Dishwasher
- PC
- Cellular phone

Others:

- Textile
- Food
- Personal hygiene product
- Transport by car

All examples with products and names are fictitious and do not refer to, or portray, in name or substance, any actual products, names, organisations or entities. Any resemblance to any real product, person, organisation or entity is purely coincidental.

The content and layout of the example EPDs fulfil the requirements of ISO 14025. However, using normalisation is not in accordance with existing EPD programmes, i.e. the example EPDs are not eligible to registration with e.g. the Swedish EPD system.

In the process of producing the Example EPDs, a number of general experiences are worth reporting:

- For products where the use (or disposal) stage is dominating the impacts, and the use (or disposal) is modelled as being identical for the product and the average reference product of the product group, it will not be possible to see the difference made by the (production of) the declared product. In this situation, we have therefore not included the use stage in the calculations for the top graph on the front page. Examples of this can be seen in the EPDs for insulation, mobile phone and shampoo. Note that for the second graph (comparison to average consumer goods) this problem does not appear, and all life cycle stages are included for these products. Thereby, it is still possible to see the advantages of the specific product (in the upper graph), while maintaining a correct picture of the overall life cycle impacts (in the lower graph).
- The layout of EPDs prescribed by ISO 14025 has been modified by keeping all requested or recommended information; however changing the order. Information *not* required or recommended by ISO 14025 has been added, e.g. market information in the top box at page 1, and data sources in the "Product life cycle information" on page 2.

- Information derived from other labelling schemes e.g. Type I labelling has been used in the preparation of the PCR for each product group i.e. for the choice of information

points (parameters) in the EPD. We do recommend including information about the labelling (if achieved) and the requirements (if relevant) but not to include the actual labels in the EPD; for some product groups this could expand the "Additional environmental information" with several pages. However, as an illustration, we have included a graphical label in the example EPD on transport by car (but not in the dishwasher example).

ANEC has forwarded a series of comments and suggestions for each of the 10 product examples. Most of the suggestions have been included in the draft EPDs; one major deviation is the use of benchmarks from e.g. Type I eco-labelling, which we have not included presently in the examples. However, the suggestion is included in more general terms in chapter 2.1.3.5. The following is a review of how we have treated the comments and suggestions from ANEC:

1. Insulation

The example is based on a stone wool insulation bat. We do not find it possible to develop an EPD for insulation as such i.e. they should be specific for the different insulation materials. The use of blowing agents for insulation is not relevant for stone wool and therefore not addressed. Stone wool is based on renewable material as such including some recycled material (around 10%), which is declared in the material list. A requirement for this depends on the product group and should be addressed by the PCR group. Product performance is addressed in "Product specifications and recommendations for use and disposal" on page 1.

2. Paint

The example includes text on all information requirements suggested by ANEC but not detailed for the example. Including data on test chamber concentrations in an EPD might be too detailed for the common user, and could be directed to background technical information. The PCR for paints shall include requirements for inclusion of information of the performance of the product on all parameters in relevant Type 1 labelling schemes. Benchmarks for specific products are not included in the drafts for this project.

3. Cement

Cement is used in too many applications to give a general life cycle profile. Thus, according to ISO 14025 requirements for business-to-consumer information, different scenarios should be shown for the use and end-of-life stages of the cement. Due to project budget and time restrictions it has not been possible to construct the relevant scenarios. This limits the value both for professional readers and for consumers in general. ***WARNING****: The EPD for cement excludes the use and end-of-life stages and is therefore not in compliance with ISO 14025 requirements for business-to-consumer information.* Our recommendation is actually not to use such cradle-to-gate for *any* product information.

4. Dishwasher

Performance parameters from Type 1 labelleling are included in the product specifications, but not as performance criteria as such. The PCR for dishwashers shall include requirements for inclusion of information on the performance of the product on all parameters in relevant Type 1 labelling schemes. For a real EPD, the data would be based on data for "Average Dishwashers" in the PCR for Dishwashers. The table developed by Evans (2005) has been used as a checklist.

5. PC

Energy consumption during the different activity levels of the PC system is included in product specifications. Also information on guarantee period is included. The PCR for PC systems shall include requirements for inclusion of information of the performance of the product on all parameters in relevant Type 1 labelling schemes including energy labelling.

6. Cellular phone
Criteria from Blue Angel are included as information parameters including SAR. Benchmarks for specific products are not included in the drafts for this project.

7. Textile
Technical specifications e.g. fitness for use from Type I ecolabelling have been included as information points. Especially content of chemicals, intentionally and unintentionally, are in focus of Type 1 ecolabels but also other label schemes like Ökotex 100 which includes a series of limit values for different chemicals from a health perspective only; further details have not been included in the present study (more information can be found on http://www.oeko-tex.com/en/start/start.html and in Olsen 2004).

8. Food
No comments from ANEC.

9. Personal hygiene product (shampoo)
The example is based on a real product with Nordic Swan label; all ingredients are included but not quantified. Information on degradability is included as "Additional environmental information".

10. Transport by car
Graphical display of fuel economy similar to energy labelling is included as "Additional environmental information".

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Annexes

Annex 1 Content of EPDs (ISO/DIS 14025 Madrid; 2005-.09.14-15.)

a) Identification and description of the organization making the declaration
b) Description of product
c) Product identification (e.g. model number)
d) Name of the programme and the programme operator's address and, if relevant, logo and website
e) PCR identification
f) Date of publication and period of validity[23]
g) Data from LCA, LCI or information modules (see 7.2.2); - "may include but are not limited to"
7.2.2) a) Data from life cycle inventory analysis (LCI), according to the PCR:
• consumption of resources, including energy, water and renewable resources; and
• emissions to air, water, and soil.
b) Indicator results of life cycle impact assessment (LCIA), if applied:
• climate change;
• depletion of the stratospheric ozone layer;
• acidification of land and water sources;
• eutrophication;
• formation of photochemical oxidants;
• depletion of fossil energy resources; and
• depletion of mineral resources.
c) Other data such as quantities and types of waste produced (hazardous and non-hazardous waste).

[23] Period of validity was included in the PCR list and has been added in the final editing of the FDIS.

h) Additional environmental information (see 7.2.3); "shall, where relevant", Identification of the significant environmental aspects should as a minimum take into consideration the following
7.2.3 a) Information on environmental issues such as:
1) impact(s) and potential impact(s) on biodiversity
2) toxicity related to human health and/or the environment
3) geographical aspects relating to any stages of the life cycle (e.g. a discussion on the relation between the potential environmental impact(s) and the location of the product system)
b) Data on product performance, if environmentally significant
c) The organization's adherence to any environmental management system, with a statement on where an interested party may find details of the system
d) Any other environmental certification programme applied to the product and a statement on where an interested party may find details of the certification programme
e) Other environmental activities of the organization, such as participation in recycling or recovery programmes, provided details of these programmes are readily available to the purchaser or user and contact information is provided
f) Information that is derived from LCA but not communicated in the typical LCI or LCIA based formats
g) Instructions and limits for efficient use
h) Hazard and risk assessment on human health and the environment
i) Information on absence or level of presence of a material in the product that is considered of environmental significance in certain areas [see ISO 14021, 5.4 and 5.7 (r)]
j) Preferred waste management option for used products
k) Potential for incidents that can have impact(s) on the environment
i) Content declaration covering materials and substances to be declared (e.g. information about product content, including specification of materials and substances that can adversely affect human health and the environment, in all stages of the life cycle). With appropriate justification this requirement does not apply to proprietary information relating to materials and substances covered by intellectual property rights or similar legal restrictions. It may also not be appropriate for declarations concerning intangible products
j) Information on which stages are not considered, if the declaration is not based on an LCA covering all life cycle stages
k) Statement that environmental declarations from different programmes may not be comparable

l) Information on where explanatory material may be obtained
PCR[a] review , was conducted by: < name and organization of the chair, and information on how to contact the chair through the programme operator >
Independent verification of the declaration and data, according to ISO 14025: ☐ internal ☐ external
(Where appropriate [b]) Third party verifier: <name of the third party verifier>

Annex 2 Cross reference table of product groups

GEDNET list of PSRs (2005.11.01) Shaded entries = under preparation		Bogeskär et al 2002	Weidema et al. 2005 Product groups for Type I (Otherwise prioritized)
Air conditioners			
Aluminum beverage cans made from UBC cans			
Analog Camera (with silver film)(AE)			
Automobile air filter			
Bays, high voltage type			
Bearing steel balls			
Beds and Mattresses			
Bevarage Container (paper) (BD)			
Bidet Toilet Seat(AM)			
Biological treatment of municipal solid waste (MSW): Composting			
Building products		Construction	(Maintenance and repair of dwelling)
Bus traffic			
CCD sensors, one-dimensional			
Cement			
Ceramic tiles			
Chemical products		Chemicals	(Detergents prepared for use)
Circuit breakers, high voltage type			
Circuit breakers, low voltage type			
Circuit breakers, medium- and high voltage type			
Clay construction products			
Collecting and Treatment Service of Municipal Wastewater (MWW)			
Communication Cable (AL)			
Concrete			
Contactors			
Contrast media, x-ray Iodinated			
Cork stopper			
Corrosion protection of fabricated steel products			
CRT glass substrates			
Dairy transports			
Data Projector (AG)			
Digital camera			
Digital Camera (AP)			
Digital mobile printer (BA)			
Digital Printer-Duplicator (AF)			
Disconnectors, medium/high voltage type			
Dissassembly and pre-treatment of illuminated advertisement signs			
Distribution of messages, letters and parcels			
Drain Ditch Cover (AU)			
Dye-Sublimation Thermal Transfer Media			
Electric Blackboard (AZ)			
Electric wire and cables			
Electrical manipulation industrial robot			

Electricity and district heating generation			Electricity Energy for temparature regulation
Electricity generation through Solid Oxide Cells (SOFC) systems			
Electronic devices based on printed circuit boards		Electrical and electronic equipment	
Electrophotographic Dry Process Photocopier (AA)			
Electrophotographic Printer and Ink Jet Printer (AD)			
EP rubbers			
Expanded clay LWA			
Facsimile (AH)			
Facsimile machines			
Filling materials for transport use			
Fixed Telephone (AY)			
Flooring materials			
Forest cranes			
Fuels			
Gasoline			
Grid Electricity (AT)			
Hand dishwashing detergents			
Hook and loop fastener (velcro strap)(BK)			
Household water purifier			
Insulation materials			
Intercom (AX)			
IT-services			
Large format printer (BN)			
Laser printer			
Laundry detergents			
Leather (Finished bovine)			
Liquefied natural gas			
Logistic service applied to meal delivering in public catering			
Low voltage electrical switchgear and controlgear assembly			
Low-pressure Motor Control Center (BG)			
Lubricants			
Media Gateway			
Metal Can for Beverage and Foods (BC)			
Microcomputers			
Microwave ovens			
Mobile phones			
Network Camera (BH)			
Notebook Computer (AS)			
OA label			
Office Desk (AR)			
Optical Disc Drive (BB)			
Outside flowerpot			
Packaging		Packaging	
Packaging machines for liquid food			
Packaging Material (Polystyrene foam type)(AB)			
Passenger vehicles			

PC built-in optical disk drives			
PDP TVs			
Personal computer with display (BJ)			
Polystyrene Sheet			
Porcelain Products (AQ)			
Power Saving Device for Facsimile (AW)			
Powered hand held saw			
Private Branch Exchange (PBX) system			
Products in glass yarn for reinforcement use			
Pumps and mixers, submersible types			
Raised Floor (Free Access to the Internet) (BE)			
Refrigerator for household appliances			
Refrigerators			
Remanufactured toner cartridges			
Roof boxes			
Rotating electrical machines			
Sanitation goods			
Sawn timber			
Scanner (AV)			
Seasoning			
Seating			
Single-use Camera (AC)			
Softstarter			
Speed electric drives, variable type			
Steel products			
Structual Aggregate (AN)			
Table			
Textiles		Textiles	(Household textiles) (Garments and clothing materials etc.)
TFT-LCD glass substrates			
TFT-LCD Module unit			
TFT-LCD modules			
TFT-LCD monitors			
Thermal Transfer Card Printer (AJ)			
Thermal Transfer Media			
Thermal treatment of municipal solid waste (MSW): Incineration			
Thermoplastic materials in the form of granule, powder or equivalent			
Tile carpet (BQ)			
Tires for passenger cars			
Tissue paper manufactured from recovered paper		Paper and pulp	
Tissue paper manufactured from virgin fibres			
Toilet papers			
Transformers			
Transit TDM switch			
Washing machines - drum type			
Washing machines and dishwashers for household use			
Waste handling, municipal solid type			
Water Meter Box (AK)			

Water Meter Unit			
Wholesale Electricity (BF)			
Video media players/recorders			
Wood particleboards			
Wooden packaging		Packaging	
Wooden pallet			
		Food	(Meat)
			(Food products n.e.c.)
			(Potatoes)
			(Fruit and vegetables except potatoes)
			(Petfood)
			(Bread and cereals)
			(Eggs)
			(Fish)
			(Ice cream, chocolate and confectionery)
			(Butter, oils and fats)
			(Mineral waters, soft drinks and juices)
			(Coffee, tea and cocoa)
		Energy and transport	(Transport services)
		Automotive	(Car purchase and driving in Denmark)
		Tourism	(Car driving for holiday abroad)
			(Fireworks)
			(Non-durable household goods)
			(Personal hygiene)
			(Toys)
			Tents and outdoor equipment
			(Major durables for recreation and culture n.e.c.)
			(Plants and flowers)
			Candles
			(Christmas trees)

Annex 3 Ten Example EPDs

Environmental product Declaration

for

FELIX Flexi Insulation Batts

Environmental Product Declaration

Photo of the product

for **FELIX Flexi Insulation Batts** (a fictive product).

This environmental declaration applies for a functional unit of:
Thermal resistance of 1m ^{2} K/W for a use of 50 years
which is equal to 1 m ^{2} of 37 mm stone wool batts weighing 1.18 kg [(1)]

Important: This EPD is valid **only** for insulation purposes where there is **unlimited** room for the insulation material (i.e. that the **thickness** of the insulation material does not matter.)

If the available room for the insulation material is limited (e.g. if the thickness of the insulation can not exceed 20 cm due to the circumstances/limitations set by the construction), an EPD is not needed. In this case, the most important factor is the insulation properties for the given thickness. The reason is that insulation materials can save more than 100 times the energy used for its manufacture. Hence, in case of limited space, the only important factor is to obtain the highest insulation capacity as possible within the available space (to save as much energy during the life time) as the production of the insulation is relatively unimportant in relation to the energy saved.
The functional unit is further described in the underlying LCA, see Schmidt et al. (2003) and Schmidt (2004)
*[(1)] in accordance with PCR 2006 for "Insulation materials" (**Fictive PCR** for this **example**).*

Product specifications and recommendations for use and disposal

FELIX Flexi Insulation Batts are flexible high quality stone wool insulation batts, designed for thermal, acoustic and fire insulation. They are manufactured in a variety of thicknesses and the flexibility makes them suitable for many insulation applications including floors, walls and roofs. Stone wool is stable to moisture and resistant to biological attack. Stone wool can not burn and resists temperatures higher than 1,000°C. It can act as a fire barrier and provides valuable extra minutes to save people and property.

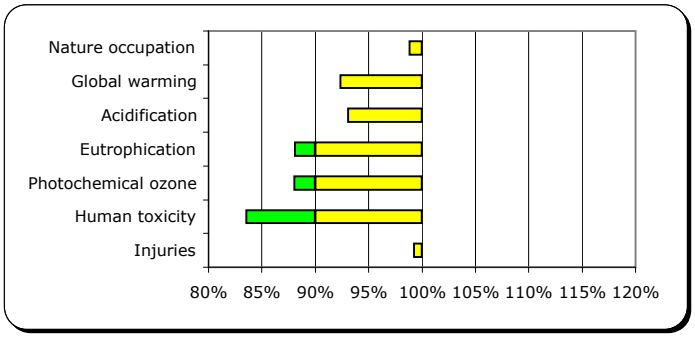
Technical performance
Thermal conductivity (λ value): 0.039 W/mK (at a mean temperature of 10°C).
Fire Performance: Non-combustible (class A1).
Moisture Sorption: less than 0.3 kg/m² (0.03%)
Water Vapor Transmission: 0.14 kg/m·s·GPa

Quality and standards
The insulation performance is measured according to ISO 6946.

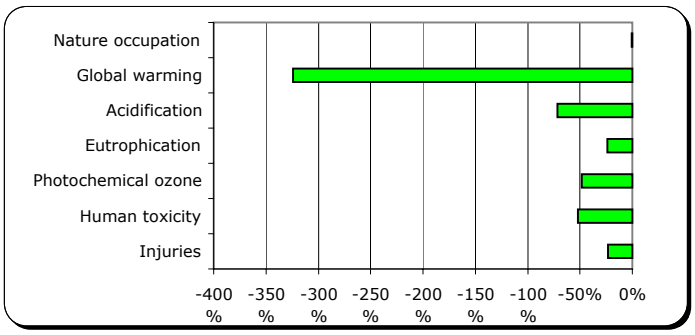
Recommendations for use
Handling of coarse fibres can cause a transient mechanical effect. Coarse fibres may annoy your skin until you wash or otherwise remove them. Due to this well-known effect, the EU classified mineral wool products as irritating to the skin in 1997. Further recommendations for use, see "Additional environmental information" (page 3).

Recommendations for disposal
It is recommended to dispose of residues of stone wool batts (and disposed stone wool batts) according to the instructions from your local authorities, which will normally be at your local recycling centre.

Environmental Performance



Life cycle impacts from FELIX Flexi Insulation Batts relative to the life cycle impacts of spending the same amount of money on "average mineral wool".
Note: The "use stage" is not included in this figure as it is the same for both FELIX Flexi Insulation Batts and "average mineral wool."



Life cycle impacts from FELIX Flexi Insulation Batts relative to the life cycle impacts of spending the same amount of money on "average consumer goods".
Note: The "use stage" is included in this figure.

Explanation (applies for both figures)
100% indicates same level.
Impacts cannot be added across impact categories.

Legend
Green/medium grey: More than 10% less than the reference
Yellow/light grey: Close to the reference
Red/dark grey: More than 10% higher than the reference

Product life cycle information

The Environmental declaration relates to 50 years use of a 1 m ^{2} of 37 mm stone wool batts weighing 1.18 kg which corresponds to a thermal resistance of 1m ^{2}K/W.

Before our gate
"Before our gate" includes raw material extraction and suppliers. Emissions from electricity production are included here.
For "Average Mineral Wool" (figure 1) data is based on the upstream processes to "Mineral wool" from the EIPRO input/output database [(2)].
For FELIX Flexi Insulation Batts data is based on the upstream processes to "Mineral wool" from the EIPRO input/output database with the following exceptions based on information from our green account (2004) and purchase information from 2004 from the plant in Rockchester:
- The electricity consumption is 5% lower than for "Average Mineral wool".
- The consumption of natural gas and coal are 8.7% lower than for "Average Mineral wool".
- The use of raw materials and chemicals are 7% lower than for "Average Mineral wool".

Our Production
Data is site specific production data from the production of the FELIX Flexi Insulation Batts at the plant in Rockchester including emissions at the plant, but not emissions from electricity production (they are included under "before our gate").
For "Average Mineral Wool" (figure 1) data is based on the direct emissions from "Mineral wool" from the EIPRO input/output database [(2)].

Use
"Use" includes saved energy due to the insulation properties. It is assumed that the energy saved is oil-based in a household. Due to the choice of functional unit, the energy saved is the same for FELIX Flexi Insulation Batts and for "Average Mineral wool" (i.e. 17953 MJ energy over the time period of 50 years) [(2)].

End-of-Life
"Disposal" includes landfilling.

*[(2)] in accordance with PCR 2006 for "Insulation materials" (**Fictive PCR** for this **example**).*

List of materials and chemical substances (above 0,1% of weight of the product)

	kg	Weight %
Materials, substances and preparations		
Basalt	0.56	47.6%
Limestone, milled	0.28	23.8%
Portland cement	0.11	9.4%
Recycled materials (from other industries)	0.12	10.2%
Urea	0.014	1.2%
Ammonium bicarbonate	0.0012	0.1%
Substances classified according to EU legislation		
Formaldehyd	0.061	5.1%
Phenol	0.022	1.8%
Ammonia, liquid	0.0083	0.7%
Lime, hydrated	0.0012	0.1%
Total	1.18	100.8%

Inventory

Inventory parameter	Before our gate	Our production	Use	End-of-Life	Total
Non-renewable energy [MJ primary]	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Mineral extraction [MJ]	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Carbon dioxide	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Nitrogen dioxide	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Sulphur dioxide	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
…. The list of inventory parameters can be continued as long as wanted. It has not been done as this an EXAMPLE.					

Environmental impacts

Impact category	Before our gate	Our production	Use	End-of-Life	Total
Nature occupation [m^2 eq arable land]	0.18	No data	-2.4	0.001	-2.2
Global warming [kg eq CO_2]	2.1	1.3	-1599	-0.025	-1596
Acidification [m^2 unprotected ecosystem]	0.26	0.045	-54.3	0.0017	-54.0
Eutrophication [g eq NO_3 -]	0.011	0.0064	-1.42	0.000075	-1.40
Photochemical ozone formation [m^2*hr*ppm ozone]	32	20	-3832	0.16	-3779
Human toxicity (into air, only carcino-genic effects) [kg chloroethylene-eq]	0.75	2.3	-133	0.0050	-130
Injuries [fatal injuries equivalents]	6.09E-09	1.17E-09	-7.62E-07	1.90E-10	-7.54E-07

Additional environmental information

Toxicological information

Stone wool is with proper precautions a safe material to work with. The World Health Organisation's International Agency for Research on Cancer (IARC) has exempted stone wool from its list of "possibly cancer causing agents". This conclusion was based on epidemiological studies showing no evidence of an increased risk of lung cancer from occupational exposure to stone wool fibres, and that there has been no excess of tumours in long-term inhalation studies.

Carcinogenic, mutagenic and reproductive toxic effects: None. Human epidemiological studies show no link between exposure to mineral wool fibres and lung disease or any other chronic effects. Owing to their high bio-solubility, the fibre types of stone wool insulation materials are assessed as free from suspicion of possible carcinogenic effects in accordance with EU Directive 97/69/EC (Note Q). This Directive is incorporated into UK health and safety legislation through The Chemicals (Hazard Information and Packaging for Supply) (Amendment) Regulations.

In October 2001, the International Agency for Research on Cancer ("IARC", part of the World Health Organisation) reviewed its 1987 classification of mineral wool fibres and removed them from its list of possible carcinogens, reflecting the increase in scientific knowledge and the established safety of mineral wool for workers and building occupiers. IARC scientists gave mineral wool insulation, formerly classified as a precautionary principle as Group 2B (possibly carcinogenic to humans), a Group 3 classification (unclassifiable as to its carcinogenicity in humans).

Recommendations for use

Recommended work practices (How to reduce dust):

1. Store the material to protect against damage, including humidity.
2. Do not unpack the material until at the application site.
3. Cut the insulation on a flat surface. Use a sharp knife with serrated edge. Don’t use a saw.
4. Open a door or open a window to ensure good ventilation.
5. Organise your workplace in a manner that makes mounting and fixing easy.
6. In confined spaces with poor ventilation use protective goggles and a dust mask. Gloves and loose fitting, long-sleeved, long-legged work clothes advised.
7. Keep your workplace clean. Prevent whirling dust. Use a vacuum cleaner, not a broom.
8. Don’t rub. Wash in cold water. Change clothes and wash on completing work.
9. Read our material safety data sheets (MSDS) how to work safely and efficiently with stone wool.

The company

FELIX Insulation Ltd is situated in Rockchester in UK. In 2004 we produced more than 2,000,000 m2 of insulation batts mainly for our domestic marked.

Contact info:
FELIX Insulation Ltd, 334 Golden Road, RO15 9UB Rockchester, UK. Tel: 0 44 345 368 881. Web: www.FELIXinsulation.com

Date of publication and period of validity

2006.03.01
The EPD is valid for 3 years.

Verification

PCR[a] review[b], was conducted by:
< name and organization of the chair, and information on how to contact the chair through the programme operator >
Independent verification of the declaration and data, according to ISO 14025:
☐ internal ☐ external
(Where appropriate [c]) Third party verifier:
<name of the third party verifier>

References

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Nordic Ecolabelling (2005): Swan labelling of Panels for the building, decorating and furniture industry. Version 4.1 19 March 2003 – 19 March 2007 http://www.svanen.nu/DocEng/010e.pdf

PCR (2006): Product Category Rules for "Insulation materials". A **fictive, non-existing** PCR as this an **example** EPD.

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Rockwool (2003): Miljøredegørelse 2003 for fabrikkerne i Hedehusene, Vamdrup og Øster Doense. http://www.rockwool.dk/graphics/RW_DK/om_rockwool/firma_information/rockwool_miljoeredegoerelse_2003.pdf

Schmidt A, A U Clausen, AA Jensen, O Kamstrup (2003): Comparative Life Cycle Assessment of Three Insulation Materials: Stone Wool, Flax and Paper Wool. Final Report, August 2003. LCA Documents. Ecomed publishes Vol 8 2003. Eco-Informa Press. Edited by Walter Klöpffer and otto Hutzinger.

Schmidt A, A Jensen, A Clausen, O Kamstrup og D Postlethwaite (2004): A Comparative Life Cycle Assessment of Building Insulation Products made of Stone Wool, Paper Wool and Flax. Int J LCA 9 (1) 53-66 (2004).

Österreichisches Umweltzeichen (2003): Richtlinie UZ 45 Wärmedämmstoffe aus mineralischen Rohstoffen Ausgabe vom 1. Jänner 2003. http://www.umweltzeichen.at

www.rockwool.com, www.rockwool.co.uk and www.rockwool.dk

This is an example of an Type III Environmental Declaration for a fictive product. Data are based on literature. It has been prepared by 2.-0 LCA consultants Aps for ANEC (the European Association for Consumer Participation in Standardisation) as a part of the project "Consumer demands on type III environmental declarations" Environmental Product Declarations from different programmes may not be comparable.

Environmental product Declaration

for

EASY PAINT©

Environmental Product Declaration

for a **EASY PAINT©** (a fictive product).

This environmental declaration applies for a functional unit of:
m² of dry film (98 % opacity) [1].

This EPD is valid for EASY PAINT© used on the European Market.

[1] *in accordance with PCR 2006 for "Paint" (**Fictive PCR** for this **example**).*

Photo of the product

Product specifications and recommendations for use and disposal

EASY PAINT© is a indoor decorative paint for walls for use by do-it-yourself and professional users.
EASY PAINT© is washable.

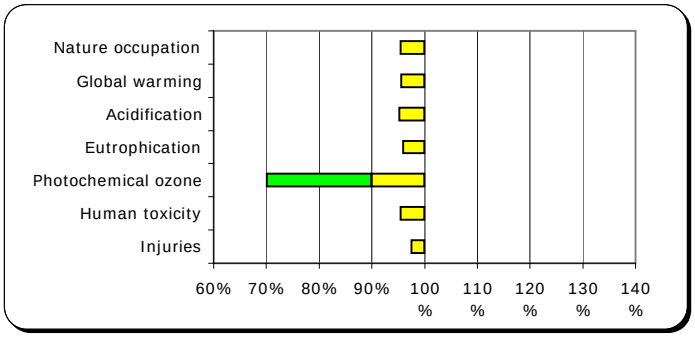
Properties, quality and standards
Spreading rate: EASY Paints have a spreading rate of 10 m ^{2} per liter of product (with 98 % opacity) [1].
Wet scrub resistance: class 3 [2]
Drying time: 24 hours (at 20°C)

Recommendations for use
Recommendations for use are written on the label of all EASY PAINT packagings. They include advice on ventilation, drying time, time before the second layer of paint can be added and disposal of residues.

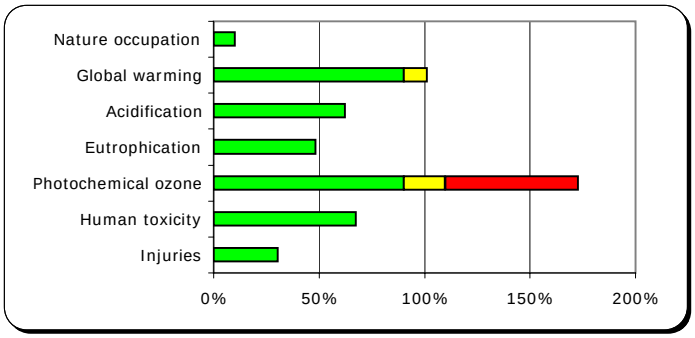
Recommendations for disposal
Deliver the used packaging and residues of paint at your local municipal recycling centre.

[1] *According to ISO 6504/1 (Paints and varnishes, Part 1: Kubelka-Munk method for white and light-coloured paints) or ISO 6504/3*
[2] *According to EN 13300 and EN ISO 11998.*

Environmental Performance



Life cycle impacts from EASY PAINT© relative to the life cycle impacts of spending the same amount of money on "average paints and laquers".



Life cycle impacts from EASY PAINT© relative to the life cycle impacts of spending the same amount of money on "average consumer goods".

Explanation (applies for both figures)
100% indicates same level.
Impacts cannot be added across impact categories.

Legend
Green/medium grey: More than 10% less than the reference
Yellow/light grey: Close to the reference
Red/dark grey: More than 10% higher than the reference

Product life cycle information

The calculations are related to m² of dry film (98 % opacity).

Before our gate
"Before our gate" includes extraction of raw materials, production of energy and production of all items used in the production at the plant (including auxiliary materials). Data is based on the upstream processes to the category: "Paints and allied products" from the EIPRO input/output database [(2)]. However, the overall consumption of organic chemicals are 12% lower for EASY PAINT© than for "average paints".

Our Production
Data is site specific data from the production of EASY PAINT© at the factory in France.
For "Average Computers" (figure 1) data is based on the direct emissions from "Paints and allied products" from the EIPRO input/output database [(2)].

Use
"Use" covers the painting, i.e. the emissions during and after painting. For this **example** EPD, it has been assumed that 100% of the VOC content evaporate during and after painting (estimate: 30 gram pr litre for EASY PAINT and 100 g/litre for "average paints"). For a real EPD, more details of evaporating chemicals should be included. For "average paint", levels would be given in the PCR for painting.

End-of-Life
"End-of-life" covers disposal of painting residues and packaging. It has been assumed that all is disposed of to incineration [(2)]. Final disposal of the paint on the walls is not included [(2)].

*[(2)] in accordance with PCR 2006 for "Paint" (**Fictive PCR** for this **example**).*

List of materials and chemical substances (above 0,1% of weight of the product)

	kg	Weight %
Materials, substances and preparations		
Solvent a *(no data has been available for this EXAMPLE EPD)*	no data	
Binder a *(no data has been available for this EXAMPLE EPD)*	no data	
Pigment a *(no data have been available for this EXAMPLE EPD)*	no data	
Additive a *(no data have been available for this EXAMPLE EPD)*	no data	
Additive b *(no data have been available for this EXAMPLE EPD)*	no data	
Additive c *(no data have been available for this EXAMPLE EPD)*	no data	
Substances classified according to EU legislation		
Solvent b *(no data has been available for this EXAMPLE EPD)*	no data	
Binder b *(no data has been available for this EXAMPLE EPD)*	no data	
Pigment b *(no data have been available for this EXAMPLE EPD)*	no data	
Additive d *(no data have been available for this EXAMPLE EPD)*	no data	
Additive e *(no data have been available for this EXAMPLE EPD)*	no data	
Total		

Inventory

Inventory parameter	Before our gate	Our production	Use	End-of-Life	Total
Non-renewable energy [MJ primary]	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Mineral extraction [MJ]	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Carbon dioxide	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Nitrogen dioxide	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Sulphur dioxide	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
.... The list of inventory parameters can be continued as long as wanted. It has not been done as this an EXAMPLE.					

Environmental impacts

Impact category	Before our gate	Our production	Use	End-of-Life	Total
Nature occupation [m^2 eq arable land]	0.039	No data	No data	0.00008	0.039
Global warming [kg eq CO_2]	0.41	0.058	No data	-0.0028	0.47
Acidification [m^2 unprotected ecosystem]	0.041	0.0029	No data	0.00019	0.044
Eutrophication [g eq NO_3 -]	0.0022	0.00040	No data	0.0000085	0.0027
Photochemical ozone formation [m^2*hr*ppm ozone]	7.4	3.4	1.8	0.0	12.6
Human toxicity (into air, only carcino-genic effects) [kg chloroethylene-eq]	0.14	0.016	0.00021	0.00057	0.16
Injuries [fatal injuries equivalents]	8.27E-10	7.69E-11	No data	2.13E-11	9.26E-10

Additional environmental information

Hazardous substances

All EASY PAINTs have been developed with focus on the environment. Hence, the content of hazardous substances are as low as possible. The actual content varies with the colour, but for all colours the following apply:

- The content of titanium dioxide (TiO_2) is lower than 38 g per m² of dry film (with 98 % opacity)
- The content of volatile organic compounds (VOC) does not exceed 30 g/l (minus water).
- The content of volatile aromatic hydrocarbons is less than 0,15 % of the product.
- Heavy metals (i.e. cadmium, lead, chromium VI, mercury, arsenic) have not been used. However, the paints may contain traces of these metals deriving from impurities in the raw materials.
- Alkylphenolethoxylates (APEOs) and glycol ethers have not been used.
- The content of isothiazolinone compounds is lower than 500 ppm.
- The content of free formaldehyde present in EASY PAINT is lower than 10 mg/kg.

The levels above apply with the levels set in the EU ecolabel for paint (The European Commission, 2002)
The levels are below present limit values for labelling af hazardous substances.

Neither EASY PAINT nor the ingredients in EASY PAINT is classified as very toxic, toxic, dangerous to the environment, carcinogenic, toxic for reproduction or mutagenic in accordance with Directive 1999/45/EC.

Consumer information

Consumer information is attached to the packaging (e.g. information on the use, substrate and conditions of use). Furthermore, the consumer information contains information on recommendations for cleaning tools and appropriate waste management (in order to limit water pollution).

The company

SP Paints Ltd. produce paint and varnish. The plant is situated in France.

Contact info:
SP Paints Ltd., 70 rue d'Hautpoul, Salle B369, 74419 Aix-en-Provence, France, Tél: 01 44 37 74 00, Fax: 01 44 37 74 01
www.sp-paints.fr

Date of publication and period of validity

2006.03.01
The EPD is valid for 3 years.

Verification

PCR[a] review[b], was conducted by:
< name and organization of the chair, and information on how to contact the chair through the programme operator >
Independent verification of the declaration and data, according to ISO 14025:
☐ internal ☐ external
(Where appropriate [c]) Third party verifier:
<name of the third party verifier>

References

BIO INTELLIGENCE SERVICE (2002): Revision of Commission Decision 99/10/EC establishing the ecological criteria for the award of the Community eco-label to indoor paints and varnishes. AFNOR CERTIFICATION.
(This is the background document for the European Ecolabel for indoor paint and varnishes.)
http://europa.eu.int/comm/environment/ecolabel/pdf/paints_varnishes/finalreport_0902.pdf

Der Blaue Engel (2003): BASIC CRITERIA FOR THE AWARD OF THE ENVIRONMENTAL LABEL. Low-Emission Wall Paints RAL-UZ 102. Ausgabe: September 2003 Preisgruppe: 1a. © 2003 RAL, Sankt Augustin
http://www.blauer-engel.de/englisch/navigation/body_blauer_engel.htm

EIPRO input/output database in SimaPro: Data for ""Paints and allied products", 2.-0 LCA consultants, Copenhagen.

PCR (2006): Product Category Rules for "Paint". A **fictive, non-existing** PCR as this an **example** EPD.

The European Commission (2002): COMMISSION DECISION of 3 September 2002 establishing revised ecological criteria for the award of the community eco-label to **indoor paints and varnishes** and amending Decision 1999/10/EC (notified under document number C(2002) 3202). The criteria document valid until 31, August 2007
http://europa.eu.int/eur-lex/pri/en/oj/dat/2002/l_236/l_23620020904en00040009.pdf

Österreichische Umweltszeichen (2003): Richtlinie UZ 17 Wandfarben. Ausgabe vom 1. Jänner 2003
http://www.umweltzeichen.at/

This is an example of an Type III Environmental Declaration for a fictive product. Data are based on literature.
It has been prepared by 2.-0 LCA consultants Aps for ANEC (the European Association for Consumer Participation in Standardisation) as a part of the project "Consumer demands on type III environmental declarations"
Environmental Product Declarations from different programmes may not be comparable.

Environmental product Declaration

for

BB Basis Cement ©

Environmental Product Declaration

for **BB Basis Cement ©** (a fictive product).

This environmental declaration applies for a functional unit of:
1000 kg of basis cement on the European Market

According to the draft PCR for cement from the Swedish Environmental management Council (2005) the declaration for cement cannot include the use phase and the end of life phase because cement is used as a building material in many different applications.
WARNING: *This EPD is therefore not in compliance with ISO 14025 requirements for business-to-consumer information.*

Photo of the product

Product specifications and recommendations for use and disposal

BB Basis Cement © is a Portland Cement (CEM II/A-LL 52,5 R (IS/LA/≤2) [1)]

Properties

28 days strength [2)]	67 Mpa	Sulphate content SO_3	3.1%
Initial setting time	145 min	Chloride	0.05%
Expansion	1 mm	Water soluble chromate	≤ 2 mg/kg
		Absolute density	3100 kg/m3

Quality and standards
All cements produced by BB Ltd. are product certified following EN 197-1.
The cements are evaluated and monitored in relation to the demands in EN 197-2:2000.

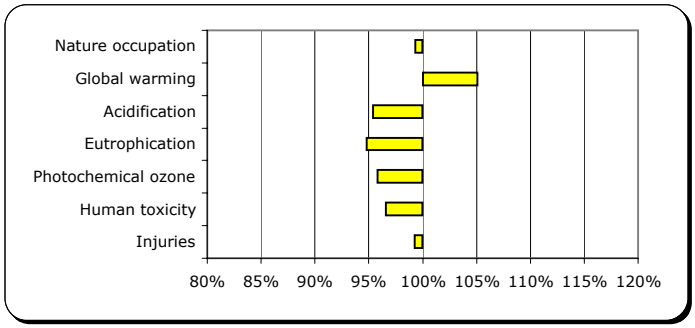
Important safety issues
Very important before use: **Follow the safety instructions in our Safety Data Sheet** which is written on the cement bags and can be downloaded from our web page: www.bb-cement.co.uk

Hazardous Ingredients
When the lime, calcium silicates and alkalis within the cement are mixed with water it will give rise to a potentially hazardous alkaline solution. Hexavalent chromium salts in the cement are soluble and when mixed with water, can give rise to a allergic contact dermatitis.

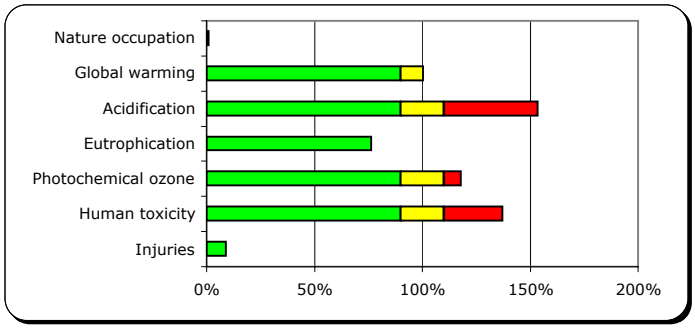
Hazards Identification
When cement is mixed with water such as when making concrete or mortar, or when the cement becomes damp from contact with sweat or tears, a strong alkaline solution is produced. If this comes into contact with the eyes or skin it may cause serious burns and ulceration. The eyes are particularly vulnerable and damage will increase with contact time. Strong alkaline solutions in contact with the skin tend to damage the nerve endings first before damaging the skin, therefore chemical burns can develop without pain being felt at the time. Cement mortar and concrete mixes may until set cause both irritant and allergic contact dermatitis. Once developed, an allergy to cement is permanent.

1) according to standard EN 197-1 *2) according to standard EN 196-1*

Environmental Performance



Life cycle impacts from BB Basis Cement © relative to the life cycle impacts of spending the same amount of money on "average cement".



Life cycle impacts from BB Basis Cement © relative to the life cycle impacts of spending the same amount of money on "average consumer goods".

Explanation (applies for both figures)
100% indicates same level.
Impacts cannot be added across impact categories.

Legend
Green/medium grey: More than 10% less than the reference
Yellow/light grey: Close to the reference
Red/dark grey: More than 10% higher than the reference

Product life cycle information

Before our gate
"Before our gate" includes extraction of raw materials, production of energy and production of all items used in the production at the cement plant (including auxiliary materials) [(2)].
Data is based on the upstream processes to the category: "Cement, hydraulic" from the EIPRO input/output database.
Based on information from our green account and purchase information from 2005 we have adjusted the following values:
- The electricity consumption is 12.4% lower than for "Cement, hydraulic" in the EIPRO database.
- The consumption of natural gas is 12% higher than for "Cement, hydraulic" in the EIPRO database.
- The consumption of coal is 15.8% lower than for "Cement, hydraulic" in the EIPRO database.
- The consumption of gypsum products is 4.5% lower than for "Cement, hydraulic" in the EIPRO database.

For "Average cement" (in figure 1) upstream processes to the category: "Cement, hydraulic" from the EIPRO input/output database has been used without changes [(2)].

Our Production
The processes at the plant includes:
- pre-homogenisation of raw materials, grinding of raw material and production of the "meal"
- homogenisation and storage of "meal"
- pyroprocessin, production of clinker and storage of clinker
- grinding of clinker-additive mix and production of cement
- storage and bagging of cement

Data is site specific production data from the production of the BB Basis Cement © at the plant in England.
For "Average Cement" (figure 1) data is based on the direct emissions from "Cement, hydraulic" from the EIPRO input/output database [(2)].

Use
The use stage is not included in this EPD.

End-of-Life
The final disposal is not included in this EPD.

*[(2)] in accordance with PCR 2006 for "Cement" (**Fictive PCR** for this **example**).*

List of materials and chemical substances (above 0,1% of weight of the product)

	kg	Weight %
Materials, substances and preparations		
Limestone, milled, loose	841	51%
Calcareous marl	466	28%
Clay	331	20%
Sand	9.3	0.56%
Lime, hydrated, loose	3.9	0.24%
Secondary materials	1.4	0.08%
Substances classified according to EU legislation		
Ammonia	0.91	0.06%
Ethylene glycol (Ecoinvent)	0.35	0.02%
Total	1653.9	100%

Inventory

Inventory parameter	Before our gate	Our production	Use	End-of-Life	Total
Non-renewable energy [MJ primary]	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Mineral extraction [MJ]	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Carbon dioxide	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Nitrogen dioxide	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Sulphur dioxide	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Water consumption (litres)	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
…. The list of inventory parameters can be continued as long as wanted. It has not been done as this an EXAMPLE.					

Environmental impacts

Impact category	Before our gate	Our production	Use	End-of-Life	Total
Nature occupation [m^2 eq arable land]	4.1	No data	*not included*	*not included*	4.1
Global warming [kg eq CO_2]	129.2	363.3	*not included*	*not included*	492.5
Acidification [m^2 unprotected ecosystem]	20.8	94.69	*not included*	*not included*	115.5
Eutrophication [g eq NO_3 -]	0.81	3.67	*not included*	*not included*	4.48
Photochemical ozone formation [m^2*hr*ppm ozone]	1890	7294	*not included*	*not included*	9183
Human toxicity (into air, only carcino-genic effects) [kg chloroethylene-eq]	54.1	288.2	*not included*	*not included*	342.2
Injuries [fatal injuries equivalents]	2.71E-07	1.61E-08	*not included*	*not included*	2.87E-07

Additional environmental information

Toxicological information
Chemical analysis give evidence of the presence of trace of heavy metals (details have not been available for this example EPD).

The company

BB Ltd. has been producer of cement and concrete since 1972. The plant is situated in UK, West Sussex.

Contact info:
BB Ltd., BB Limited, Grey Castle, GC12 9AC, Tel: 01788 992 927, website: www.bb-cement.co.uk info@bb-cement.co.uk

Date of publication and period of validity

2006.03.01
The EPD is valid for 3 years.

Verification

PCR[a] review[b], was conducted by:
< name and organization of the chair, and information on how to contact the chair through the programme operator >
Independent verification of the declaration and data, according to ISO 14025:
☐ internal ☐ external
(Where appropriate [c]) Third party verifier:
<name of the third party verifier>

References

Aalborg Portland A/S (2004): Livscyklusopgørelse for 1 ton Basis Cement (CEM II/A - L 52,5 R) fra Aalborg Portland A/S, Rørdal, Danmark. In Danish.

Aalborg-Portland (2005): Information on composition of cement and safety issues from the website: http://www.aalborg-portland.dk

Buzzi Unicem (2004): Environmental Product Declaration (EPD) for "Average Cement". http://www.environdec.com/epd.asp?id=99

Ecoinvent database in SimaPro: Data for Portland cement, strength class Z 42.5, at plant/CH U

EIPRO input/output database in SimaPro: Data for "Cement, hydraulic", 2.-0 LCA consultants, Copenhagen.

European Standard EN 197-1:2000: Cement. Composition, specifications and conformity criteria for common cements. Document Number: BS EN 197-1:2000 British Standard / European Standard 15-Sep-2000. ISBN: 0 580 36456 9. 52 pages. *Note: We did NOT have access to this standard during the work with the example EPDs, as there was no budget for buying standards. It would, of course, have been included in an EDP, therefore, it is added to the reference list for the example.*

European Standard EN 196-1:2005: Methods of testing cement. Determination of strength British Standard / European Standard. 15-Mar-1995. ISBN: 0 580 21485 0. 28 pages *Note: We did NOT have access to this standard during the work with the example EPDs, as there was no budget for buying standards. It would, of course, have been included in an EDP, therefore, it is added to the reference list for the example.*

European Standard EN 197-2:2000: Cement. Conformity evaluation. British Standard / European Standard. 15-Sep-2000. ISBN: 0 580 36455 0. 30 pages pages Note: We did NOT have access to this standard during the work with the example EPDs, as there was no budget for buying standards. It would, of course, have been included in an EDP, therefore, it is added to the reference list for the example.

PCR (2006): Product Category Rules for "Cement". A **fictive, non-existing** PCR as this an **example** EPD.

Rugby Cement (2005): Health and Safety. http://www.cemex.co.uk/file/HSCem.pdf

SIAM CEMENT LIMITED (2005): Information on safety. http://www.ferncement.co.nz/safetydata.htm

The Swedish Environmental management Council (2004): PSR 2004:1. Product-specific requirements (PSR) for preparing an environmental product declaration (EPD) for Product Group Cement. The PSR document has been prepared within the framework of the EU funded project Intend, coordinated by Macroscopio, Italy. More information at www.intendproject.com Approval date 2004-01-10. Latest revision 2005-08-09 (revision 2.1) Expire date 2007-01-10 http://www.environdec.com/psr/e_psr0401.pdf

The Swedish Environmental management Council (2005): PCR 2005:X. Product Category Rules (PCR) for preparing an environmental product declaration (EPD) for Product Group "Cement". PCR 2005:1. The PCR document has been prepared within the framework of the EU funded project Intend, coordinated by Macroscopio, Italy. More information at www.intendproject.com and http://www.environdec.com/psr/pcr_draft05-09v1_e.pdf

Environmental product Declaration

for a

POSH W453 Dishwasher

Environmental Product Declaration

for a **POSH W453 Dishwasher** (a fictive product).

This environmental declaration applies for a functional unit of:
one years use of a 12 place setting dishwasher (here defined as 365 cycles pr year) [1]
The EPD is only valid for Dishwashers sold and used in EU.

*[1] in accordance with PCR 2006 for "Dishwashers" (**Fictive PCR** for this **example**).*

Photo of the product

Product specifications and recommendations for use and disposal

POSH W453 is a free-standing dishwasher with a capacity of 12 place settings.

The POSH W453 has been designed to reduce impacts on the environment. It saves energy and water and have a special dosing system which gives correct doses of rinse-aid, salt and detergent. It has an expected lifetime of 11 years compared to 8.4 years for average dishwashers due to our broad range of spare parts (ref: Market Transformation Programme (MTP) (2005)).
POSH W453 Dishwasher is produced in Freiburg in Germany.

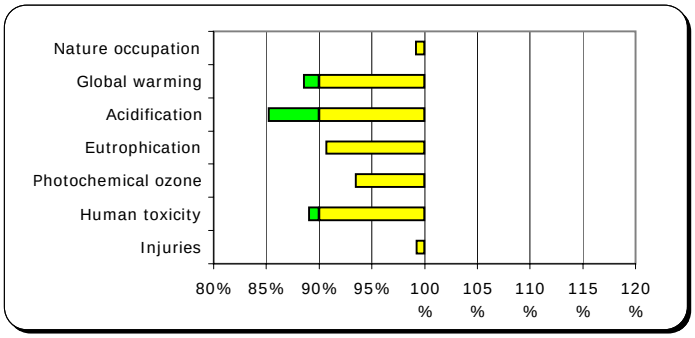
Properties, quality and standards
Energy efficiency: Energy efficiency class: A. Energy consumption: 1.05 kWh per wash [1].
The energy consumption in stand-by is 0.8 watts.
Water consumption: 14 litres of water per wash [1].
Cleaning performance: class A [2].
Drying performance: class A [2].
Noise emission: <49dB [1].
It has temperature selection at 50°C or 60°C. Dimensions: H850 x W600 x D600 mm. Weight: 20 kg.
POSH W453 meets the requirements in the EU Ecolabel and carries the EU Ecolabel ("The Flower").
POSH Appliances Ltd. gives a guarantee of 2 years from the day of purchase.

Recommendations for use
The POSH W453 Dishwasher is designed to reduce impacts on the environment as much as possible.
However, the consumer behaviour is significant for the overall environmental impacts of using a dishwasher.
Recommendations for optimal use of energy, water and additives (detergent, salt, etc.) are given in the instructions manual for the POSH W453. A few energy saving tips are given under "Additional environmental information" in this EPD.

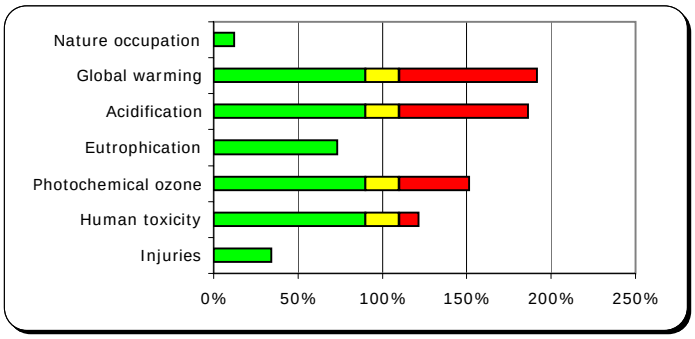
Recommendations for disposal
POSH W453 Dishwasher is designed for disassembly and recycling. Furthermore, all plastic parts heavier than 50 grams have a permanent marking identifying the material in conformity with EN ISO 11469.
POSH appliances Ltd. has a free take-back programme in order to reduce environmental impacts at the end of life.
Please contact us when needed.

[1] According to EN 50242/EN 60704-2-3/EN 60704-3, using the same test method and programme cycle as for Directive 97/17/EC. [2] According to Directive 97/17/EC.

Environmental Performance



Life cycle impacts from the POSH W453 Dishwasher relative to the life cycle impacts of spending the same amount of money on "average dishwashers".



Life cycle impacts from the POSH W453 Dishwasher relative to the life cycle impacts of spending the same amount of money on "average consumer goods".

Explanation (applies for both figures)
100% indicates same level.
Impacts cannot be added across impact categories.

Legend
Green/medium grey: More than 10% less than the reference
Yellow/light grey: Close to the reference
Red/dark grey: More than 10% higher than the reference

Product life cycle information

The Environmental declaration relates to one years use of a 12 place setting dishwasher (365 cycles pr year) [(2)].

Before our gate
"Before our gate" includes raw material extraction, production by our suppliers and energy production [(2)].
For "average dishwashers", data is based on the upstream processes to the category: "Household appliances, n.e.c." from the EIPRO input/output database [(2)].
Data for the POSH W453 Dishwasher is based on a combination of purchase information for 2005 and the upstream processes to "Household appliances, n.e.c." from EIPRO input/output database (For this **example EPD**, data for the POSH W453 Dishwasher is identical to the EIPRO data).

Our Production
Data is site specific production data from the production of the POSH W453 Dishwasher at the factory in Freiburg, Germany.
Emissions from the electricity used for the production is included under "Before our gate".
For "Average Dishwashers" (figure 1) data is based on the direct emissions from "Household appliances, n.e.c." from the EIPRO input/output database [(2)].
(For this **example EPD**, data for the POSH W453 Dishwasher is identical to the EIPRO data).

Use
"Use" includes production of electricity, water and detergents for 365 cycles [(2)].
Data for "Average Dishwasher" is based on Market Transformation Programme (MTP) (2005)) and Evans (2005).

Differences between a POSH W453 Dishwasher and an average dishwasher:

	POSH W453 Dishwasher	**Average Dishwasher**
Use - energy consumption	1.05 kWh per cycle	1.426 kWh per cycle [(2)]
Use - water consumption	14 litres per cycle	18.2 litres per cycle [(2)]
Use - detergent consumption	10.8 grams per cycle	14 grams per cycle [(2)]

End-of-Life
"Disposal" includes recycling, avoided production of recycled products and land filling of non-recycled items [(2)].

Differences between a POSH W453 Dishwasher and an average dishwasher:

	POSH W453 Dishwasher	**Average Dishwasher**
Disposal	POSH take-back Recycling of steel, aluminium, copper and plastic parts	Municipal recycling centre [(2)] Recycling of steel [(2)]

Life Time Extension Programme
POSH W453 has an extended lifetime due to a broad range of spare parts in our "extended lifetime programme" at our repair clinic. We guarantee that spare parts are available at least 12 years from the time that production ceases.

Differences between a POSH W453 Dishwasher and an average dishwasher:

	POSH W453 Dishwasher	**Average Dishwasher**
Lifetime	11 years	8.4 years [(2)]

*[(2)] in accordance with PCR 2006 for "Dishwashers" (**Fictive PCR** for this **example**).*

List of materials and chemical substances (above 0,1% of weight of the product)

	kg	Weight %
Materials, substances and preparations		
Stainless steel	12.4 kg	62%
Aluminium	1.0 kg	5%
Plastic	4.8 kg	24%
Copper	0.2 kg	1%
Wood	0.6 kg	3%
Concrete	0.4 kg	2%
Electronic components	0.2 kg	1%
Other	0.4 kg	2%
Substances classified according to EU legislation		
None		
Total	20 kg	100%

Inventory

Inventory parameter	Before our gate	Our production	Use	End-of-Life	Total
Non-renewable energy [MJ primary]	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Mineral extraction [MJ]	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Carbon dioxide	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Nitrogen dioxide	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Sulphur dioxide	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
.... The list of inventory parameters can be continued as long as wanted. It has not been done as this an EXAMPLE.					

Environmental impacts

Impact category	Before our gate	Our production	Use	End-of-Life	Total
Nature occupation [m^2 eq arable land]	3.6	No data	16.5	-0.272	19.8
Global warming [kg eq CO_2]	61.4	8.8	311.1	-6.3	375.0
Acidification [m^2 unprotected ecosystem]	6.2	0.30	50.0	-0.532	55.9
Eutrophication [g eq NO_3 -]	0.28	0.04	1.42	-0.0240	1.71
Photochemical ozone formation [m^2*hr*ppm ozone]	952	202	3656	-105	4705
Human toxicity (into air, only carcino-genic effects) [kg chloroethylene-eq]	21.0	1.7	100.0	-1.7	121.0
Injuries [fatal injuries equivalents]	1.66E-07	1.64E-08	2.68E-07	-7.55E-09	4.43E-07

Additional environmental information

Recommendations for use

A few energy saving tips are given below:

1. Use the "Daily programme" whenever possible (it is the energy saving programme). It takes longer time but saves energy.
2. Don't pre-rinse dishes before putting them in the dishwasher. The dishwashers do a superb job of cleaning even heavily soiled dishes. Scrape off food and empty liquids--the dishwasher will do the rest. If you must rinse dishes first, at least use cold water.
3. Wash only full loads. The dishwasher uses the same amount of water whether it's half-full or completely full. Putting dishes in the dishwasher throughout the day and running it once in the evening will use less water and energy than washing the dishes by hand throughout the day. Load dishes according to the instructions manual. Completely fill the racks to optimize water and energy use, but allow proper water circulation for adequate cleaning.
4. Please read the instructions manual carefully. It contains:
   Advice on correct use of salt and rinsing-aid (adjusting the salt dosing to the local water hardness)
   Advice on how to install the machine so as to minimise the noise emitted
   Advice that the use of the hot-fill can save primary energy and related emissions if the water is heated by solar energy, community heating, modern natural gas or oil heating systems or natural gas continuous flow heater.
   Advice to use a full load whenever possible.
   Advice to avoid rinsing items before placing them in the dishwasher and only using the pre-wash programme when needed
   Advice on the best use of the rinse and hold option, if available, and, otherwise, the proper use of programmes
   Advice on the availability of detergents that work best at temperatures lower than 65 °C and have the potential to save energy
   Advice on varying the detergent dose according to the type and amount of the load and its degree of soil (for example: a half load requires less detergent). Reference shall be made to the markings in the detergent dispenser.
   Information about the levels of energy and water consumption of the dishwasher for the different programmes
   Advice on appropriate maintenance of the dishwasher, including the regular cleaning of filters, and information on the availability of replacement parts
   Advice on how the consumer can take advantage of the POSH take-back procedure.

The company

POSH Appliances GmbH is situated in Freiburg in Germany. We produce dishwashers, washing machines and tumble dryers.

Contact info:
POSH Appliances GmbH, Werner Von Loacker Strasse 23, 96476 Freiburg, Germany. Tel: +49/ 95 64 / 92 96 34 56
www.poshappliances.com

Date of publication and period of validity

2006.03.01
The EPD is valid for 3 years.

Verification

PCR[a] review[b], was conducted by:
< name and organization of the chair, and information on how to contact the chair through the programme operator >
Independent verification of the declaration and data, according to ISO 14025:
☐ internal ☐ external
(Where appropriate [c]) Third party verifier:
<name of the third party verifier>

References

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This is an example of an Type III Environmental Declaration for a fictive product. Data are based on literature. It has been prepared by 2.-0 LCA consultants Aps for ANEC (the European Association for Consumer Participation in Standardisation) as a part of the project "Consumer demands on type III environmental declarations" Environmental Product Declarations from different programmes may not be comparable.

Environmental product Declaration

for a

MASTER LR13© Personal Computer System

Environmental Product Declaration

for a **MASTER LR13© Personal Computer System** (a fictive product).

This environmental declaration applies for a functional unit of:
one years use of a MASTER LR13© Personal Computer System in EU [1]

[1] *in accordance with PCR 2006 for "Personal computers" (**Fictive PCR** for this **example**).*

Photo of the product

Product specifications and recommendations for use and disposal

MASTER LR13© is a Personal Computer system, designed for use on a desktop. The system consist of a personal computer, a monitor, a keyboard and a mouse.

Properties
Intel® Pentium 4-processor 630 w HT-technology (3GHz, 2MB L2 Cache, 800MHz FSB), 1024MB DDR2 RAM 400 MHz
160GB Hard disc (7200 rpm, 8MB Cache), Integrated 7.1 Sound Card, 16X DVD±RW DL, 8 USB 2.0 Ports
19" Flat Panel Monitor
Energy consumption: On (idle): 98.3 watt, sleep: 1.2 watt, standby: 0.4 watt
MASTER Ltd gives a Guarantee period of 2 years from the day of purchase.

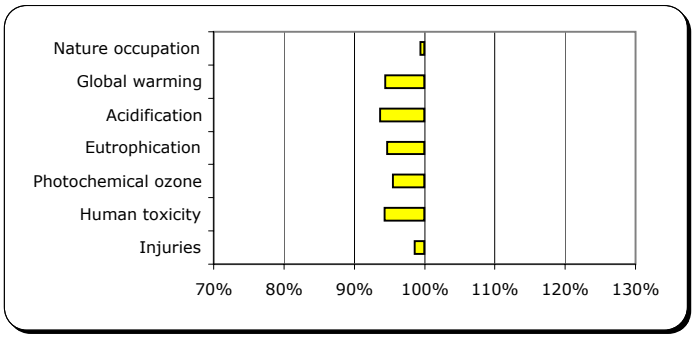
Quality and standards
The MASTER LR13© PC system meets the Energy Star [1] configuration requirements for energy consumption.
Tests have been performed by laboratories that meet the general requirements expressed in standard EN ISO 17025.
The Plat Panel Monitor meets the requirements of DIN ISO 13406-2 (2001).

Recommendations for use
MASTER LR13© PC System has a range of power management features. Disabling these features can lead to a higher energy consumption. The energy consumption can be reduced to zero if the computer is unplugged or if the wall socket is switched off. Find more recommendations for use in the leaflet for the MASTER LR13© PC System.

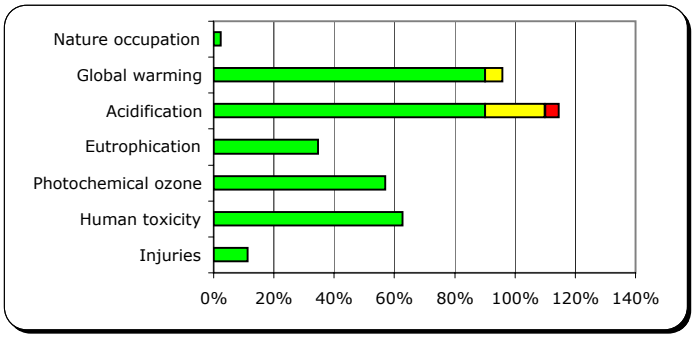
Recommendations for disposal
The MASTER LR13© PC system is designed to facilitate recycling. A range of issues has been taken into consideration, e.g. easy dismantling and that the background lighting lamps of LCD monitors are easily separable.
It is recommended to make use of the MASTER PC Ltd. take back and recycling facilities, which is free of charge.
All electronic equipment produced by MASTER PC Ltd. should be recycled by our recycling system.
More than 90 % (by weight) of the plastic and metal materials in the housing and chassis is technically recyclable.
Find more information at our web page.
The MASTER LR13© PC System should not be disposed of without recycling.

[1] *As defined by the United States Environmental Protection Agency and are in operation as at September 2004.*

Environmental Performance



Life cycle impacts from the MASTER LR13© PC System relative to the life cycle impacts of spending the same amount of money on "average computers".



Life cycle impacts from the MASTER LR13© PC System relative to the life cycle impacts of spending the same amount of money on "average consumer goods".

Explanation (applies for both figures)
100% indicates same level.
Impacts cannot be added across impact categories.

Legend
Green/medium grey: More than 10% less than the reference
Yellow/light grey: Close to the reference
Red/dark grey: More than 10% higher than the reference

Product life cycle information

Before our gate
"Before our gate" includes raw material extraction and suppliers. Emissions from electricity production and other energy production are included here.
Data for "Average computers" (figure 1) is based on the upstream processes to "Electronic computers" from the EIPRO input/output database [(2)].
Data for the MASTER LR13© PD System is based on a combination of purchase information for 2005 and the upstream processes to "Electronic computers" from EIPRO input/output database (For this **example EPD**, data for the MASTER LR13© PD System is identical to the EIPRO data).

Our Production
Data is site specific production data from the production of the MASTER LR13© PD System at the factory in Portugal.
For "Average Computers" (figure 1) data is based on the direct emissions from "Electronic computers" from the EIPRO input/output database [(2)].
(For this **example EPD**, data for the MASTER LR13© PD System is identical to the EIPRO data).

Use
The calculations are based on one years use, i.e. the energy consumption when the computer system is switched on (assumed 20 hours a week), stand by (20 hours a week) and when it is switched off (the rest of the time) [(2)].
These assumptions are used for both the MASTER LR13© PC system and "Average Computers" (figure 1).
In the use stage, the energy consumption of the MASTER LR13© PC system is 8.7% lower than "Average Computers" due to the energy saving design of the MASTER LR13© PC system.

End-of-Life
The MASTER LR13© PC system is designed for easy disassembly, optimizing the possibilities for recycling of plastic, steel, aluminium, copper, silver, gold and platinum.
For "Average Computers", it has been assumed that PC's are returned via the municipal recycling centre, dismantled and recycled as materials (nonferrous metals, ferrous metals) or disposed of for incineration with heat recovery (plastic) [(2)]. Recycling rates of the metals are higher for the specific take back system of MASTER PC, and also most of the plastic parts are recycled.

Life Time Extension Programme
The MASTER LR13© PC system has been designed for an optimal life time. The computer is designed so that:
- the RAM memory is readily accessible and can be changed.
- the hard disk, and if available the DVD drive, can be changed.
- graphic cards are easily accessible and can be changed.
- MASTER PC Ltd. guarantee that spare parts for upgrading or exchanging will be available at least 5 years from the publication of the EPD.
- Spare parts and accessories can be ordered at our web page: www.master-PC.com

Information on how to change spare parts / accessories can also be found at our web page.

It is assumed that the MASTER LR13© PC system has an average life time of 5 years due to the Life Time Extension Programme, which is one year more than the estimated life time for "Average Computers" (estimated Life time: 4 years.)

*[(2)] in accordance with PCR 2006 for "Personal computers" (**Fictive PCR** for this **example**).*

List of materials and chemical substances (above 0,1% of weight of the product)

	kg	Weight %
Materials, substances and preparations		
Plastic	3.7	75%
Iron and steel	0.7	14%
Copper	0.42	9%
Aluminium	0.11	2%
Substances classified according to EU legislation		
Mercury (mainly for the background lighting of the LCD monitor)	less than 1 g	
Total	4.9	100%

Inventory

Inventory parameter	Before our gate	Our production	Use	End-of-Life	Total
Non-renewable energy [MJ primary]	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Mineral extraction [MJ]	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Carbon dioxide	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Nitrogen dioxide	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Sulphur dioxide	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
…. The list of inventory parameters can be continued as long as wanted. It has not been done as this an EXAMPLE.					

Environmental impacts

Impact category	Before our gate	Our production	Use	End-of-Life	Total
Nature occupation [m^2 eq arable land]	5.4	No data	1.2	-0.010	6.6
Global warming [kg eq CO_2]	64.8	6.3	251.6	-0.4	322.3
Acidification [m^2 unprotected ecosystem]	7.6	0.17	51.3	-0.039	59.1
Eutrophication [g eq NO_3 -]	0.33	0.03	1.03	-0.0012	1.39
Photochemical ozone formation [m^2*hr*ppm ozone]	987	116	1935	-5	3033
Human toxicity (into air, only carcino-genic effects) [kg chloroethylene-eq]	22.4	1.0	83.6	-0.1	106.9
Injuries [fatal injuries equivalents]	1.82E-07	3.80E-09	6.53E-08	-5.28E-10	2.51E-07

Additional environmental information

Noise reduction
The MASTER LR13© PC system is designed with focus on noise reduction. In the idle operating mode, noise is reduced to less than 40 dB(A)). When accessing a hard-disk drive noise is reduced to less than 45 dB(A)).
The levels of noise emissions has been measured by an independent test laboratory accredited to ISO 17025 in accordance with ISO 7779 and declared in accordance with ISO 9296.

Energy consumption
The MASTER LR13© PC system meet the Energy Star (1) configuration requirements.
The MASTER LR13© PC system has the following energy saving features:
- the computer has an easily accessible on-off switch.
- the computer has a power consumption of 98.3 watts during use (idle).
- the computer has a sleep state that allows minimum energy consumptions of 1.2 watts.
- the computer has a off-mode power consumption of 0.4 watts.
- the monitor has an easily accessible on-off switch.
- the monitor has a power consumption of 22 watts during use.
- the monitor has a sleep mode with a power consumption of 2 watts.
- the monitor has an off-mode with a power consumption of 1 watt.

Detailed information on the energy-saving modes and recommendations for setting and use of these modes can be found in the leaflet enclosed with the computer and at our web page.

The Monitor - Mercury level
The background lighting of the LCD monitor contains less than 3 mg of mercury on average per lamp.

The Monitor - Electromagnetic emissions
The monitor meets the requirements set out in EN50279, Category A.

Hazardous substances
The MASTER LR13© PC system is designed to minimize the use of hazardous substances and follows the guidelines as given by The European Ecolabel criteria for personal computers of 11. April 2005.
For example, plastic parts does not contain poly-brominated biphenyl (PBB) or poly-brominated diphenyl ether (PBDE) flame retardants as listed in Article 4 to Directive 2002/95/EC of the European Parliament and of the Council.

[1)] As defined by the United States Environmental Protection Agency and are in operation as at September 2004.

The company

MASTER PC Ltd. has been producer of PCs and other electronic equipment since 2001. The plant is situated in Portugal.

Contact info:
MASTER PC Ltd., Casa Bianca, GC12 9AC, Tel: 01788 992 927. www.master-PC.com. E-mail: info@master-PC.com

Date of publication and period of validity

2006.03.01
The EPD is valid for 3 years.

Verification

PCR[a] review[b], was conducted by:
< name and organization of the chair, and information on how to contact the chair through the programme operator >
Independent verification of the declaration and data, according to ISO 14025:
☐ internal ☐ external
(Where appropriate [c]) Third party verifier:
<name of the third party verifier>

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Choi Byung-Chul, Hang-Sik Shin, Su-Yol Lee and Tak Hur (2005): Life Cycle Assessment of a Personal Computer and its Effective Recycling Rate. The International Journal of Life Cycle Assessment, LCA 2004 (OnlineFirst): 1 – 7. Online Edition. http://www.scientificjournals.com/sj/lca/abstract/doi/lca2004.12.196

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and basic criteria for this at: http://www.blauer-engel.de/englisch/vergabe/download_uz_e/e-UZ-078.pdf

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This is an example of an Type III Environmental Declaration for a fictive product. Data are based on literature. It has been prepared by 2.-0 LCA consultants Aps for ANEC (the European Association for Consumer Participation in Standardisation) as a part of the project "Consumer demands on type III environmental declarations" Environmental Product Declarations from different programmes may not be comparable.

Environmental product Declaration

for a

Fox© F5 Mobile Phone

Environmental Product Declaration

for a **Fox© F5 Mobile Phone** (a fictive product).

This environmental declaration applies for a functional unit of:
one years use of a Fox© F5 Mobile Phone in EU [(1)].

*[(1)] in accordance with PCR 2006 for "Mobile phones" (**Fictive PCR** for this **example**).*

Photo of the product

Product specifications and recommendations for use and disposal

The Fox© F5 is a mobile phone designed for optimal ease of use.

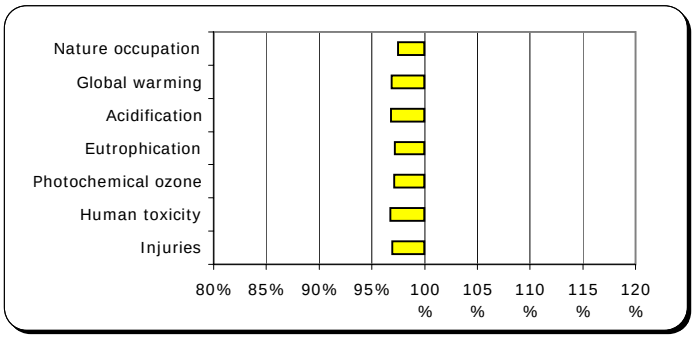
Properties, quality and standards
The Fox© F5 phone has a feature set that will appeal to most mobile phone users:
- Easy calling and easy messaging. Send text messages in seconds with one-press-per-letter messaging.
- Personal ringtones. Choose your own! Alarm clock and calendar.
- Digital music player. Enough memory for up to 20 full-length audio CDs. A stereo headset for quality listening.
- Light: Only 99 grams
- Battery performance: Up to 8 hours talk time or up to 540 hours standby time (may vary depending on network and phone usage).
- Low SAR Value. The Fox© F5 has a Specific Absorption Rate (SAR value) of 0.58 watts per kilogram [1)] .
- Energy consumption during talk time and standby time: *No data available for this example EPD.*

Recommendations for use
- Do not switch the phone on when wireless phone use is prohibited or when it may cause interference or danger.
- Road safety: Don't use a hand-held phone while driving.
- Switch off in hospitals. Follow any regulations or rules. Switch the phone off near medical equipment.
- Switch off in aircraft. Wireless devices can cause interference in aircraft.
- Switch off when refuelling. Don't use the phone at a refuelling point. Don't use near fuel or chemicals.
- Use only approved accessories and batteries. The mobile phone can explode if connecting incompatible batteries.
- Optimize the battery lifetime: Don't leave the battery in hot or cold places, such as in a closed car in summer or winter conditions. It will reduce the capacity and lifetime of the battery.
- Save energy: Unplug the charger when not in use. Charge the batteries only when needed. Do not leave the adapter and phone longer in the socket than needed as it will use more energy than necessary.

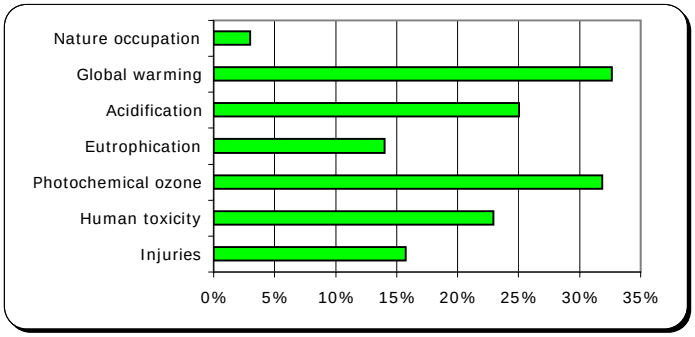
Recommendations for disposal
The battery can be charged and discharged hundreds of times but it will eventually wear out. Dispose of batteries according to local regulations (e.g. recycling at your local municipal recycling centre). Do not dispose as household waste. Mobile phones should not be disposed with other household wastes at the end of its working life.
It is recommended to make use of the Fox Ltd. take back facilities, which is free of charge. Find details at our homepage. Alternatively, deliver old mobile phones at your local municipal recycling centre.

[1)] Measured in accordance with DIN EN 50361. The SAR value is measured at maximum output power of the mobile phone and the user's exposure is usually lower as the phone does usually not operate at full power during telephoning.

Environmental Performance



Life cycle impacts from the Fox© F5 Mobile Phone relative to the life cycle impacts of spending the same amount of money on "average mobile phones".
Note: The "use stage" is not included in this figure as it is the same for both the Fox© Phone and "average mobile phones."



Life cycle impacts from the Fox© F5 Mobile Phone relative to the life cycle impacts of spending the same amount of money on "average consumer goods".
Note: The "use stage" is included in this figure.

Explanation (applies for both figures)
100% indicates same level.
Impacts cannot be added across impact categories.

Legend
Green/medium grey: More than 10% less than the reference
Yellow/light grey: Close to the reference
Red/dark grey: More than 10% higher than the reference

Product life cycle information

Before our gate
"Before our gate" includes raw material extraction and suppliers. Emissions from electricity production and other energy production are included here.
Data for "Average mobile phones" (figure 1) is based on the upstream processes to "Communication equipment" from the EIPRO input/output database [(2)].
Data for Fox© F5 mobile phone is based on a combination of purchase information for 2005 and the upstream processes to "Communication equipment" from EIPRO input/output database (For this **example EPD**, data for the Fox© F5 mobile phone is identical to the EIPRO data).

Our Production
Data is site specific production data from the production of the Fox© F5 at the factory in Belgium.
For "Average mobile phone" (figure 1) data is based on the direct emissions from "Communication equipment" from the EIPRO input/output database [(2)].
(For this **example EPD**, data for the Fox© F5 mobile phone is identical to the EIPRO data).

Use
The calculations are based on one years use [(2)]. The following assumptions have been used: 30 minutes of talk time per day, 30 minutes of sms-use per day and 23 hours of standby per day [(2)]. The average life time for a mobile phone has been assumed to be 2 years [(2)]. It has been assumed that the battery lasts 2 years (i.e. the life time of the mobile phone) [(2)].
These assumptions have been used both for a Fox© F5 phone and for "average mobile phones" (figure 1).
It has been assumed that Fox© F5 has the same energy consumtion in the use stage as "average mobile phones" (figure 1).
Furthermore, use of the communications equipment that is precondition for the use of mobile phones (antennas, transmitters, transceivers, receivers etc.) has been included by assuming that the consumer pays 25 Euro per month for talk-time, SMS's etc., i.e. 300 Euro per one years use of a mobile phone [(2)]. The use of communications equipment has been assumed to be the same for the Fox© Phone and "Average mobile phones".
Data for the communications equipment is based on "Telephone, telegraph communications, and communications services n.e.c." from the EIPRO input/output database [(2)].

End-of-Life
The Fox© F5 is designed for easy disassembly, optimizing the possibilities for recycling of metals and plastic.
For "Average mobile phones", it has been assumed that the mobile phones are returned via the municipal recycling centre, dismantled and recycled as materials (nonferrous metals, ferrous metals) or disposed of for incineration with heat recovery (plastic) [(2)]. Recycling rates of the metals are higher for the specific take back system of Fox Ltd., and also most of the plastic parts are recycled. For recycling of electronics within the FOX recycling scheme the following recycling rates have been assumed: copper 99%, gold 98%, silver and palladium 90%, lead, nickel and zinc 85%.
For "Average mobile phones", it has been assumed that the overall recycling rate for metals are 80% [(2)].

*[(2)] in accordance with PCR 2006 for "Mobile phones" (**Fictive PCR** for this **example**).*

List of materials and chemical substances (above 0,1% of weight of the product)

	grams	Weight %
Materials, substances and preparations		
Polycarbonate (PC)	20.2	20%
ABS	12.6	13%
Epoxy	18.5	19%
Other plastics	20.4	21%
Copper (Cu)	12.5	13%
Iron and steel (Fe)	9.0	9%
Aluminium (al)	5.8	6%
Gold (Au)	0.03	0.03%
Silver (Ag)	No data	
Palladium (Pd)	No data	
Nickel (Ni)	No data	
Zinc (Zn)	No data	
Cobalt (Co)	No data	
Lithium (Li)	No data	
Antimony (Sb)	No data	
Pewter (Sn)	No data	
Substances classified according to EU legislation		
Total	99.0	100%

Inventory

Inventory parameter	Before our gate	Our production	Use	End-of-Life	Total
Non-renewable energy [MJ primary]	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Mineral extraction [MJ]	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Carbon dioxide	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Nitrogen dioxide	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Sulphur dioxide	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
.... The list of inventory parameters can be continued as long as wanted. It has not been done as this an EXAMPLE.					

Environmental impacts

Impact category	Before our gate	Our production	Use	End-of-Life	Total
Nature occupation [m^2 eq arable land]	1.1	No data	7.8	-0.213	8.8
Global warming [kg eq CO_2]	14.8	2.1	101.5	-3.8	114.6
Acidification [m^2 unprotected ecosystem]	1.7	0.07	12.1	-0.417	13.5
Eutrophication [g eq NO_3 -]	0.07	0.01	0.52	-0.0169	0.59
Photochemical ozone formation [m^2*hr*ppm ozone]	220	43	1566	-55	1775
Human toxicity (into air, only carcinogenic effects) [kg chloroethylene-eq]	5.1	0.4	36.7	-1.3	40.9
Injuries [fatal injuries equivalents]	4.05E-08	6.22E-09	3.31E-07	-1.03E-08	3.67E-07

Additional environmental information

Mobile phones and pacemakers
Pacemaker manufacturers recommend that a minimum separation of 20 cm (6 inches) be maintained between a handheld wireless phone and a pacemaker to avoid potential interference with the pacemaker.

Health aspects
Numerous studies have been and are still being conducted worldwide into the influences of the effect of electromagnetic fields (non-ionizing radiation) on man's well-being and health. The German Strahlenschutzkommission (SSK) (Commission on Radiological Protection) has comprehensively assessed the scientific evidence for health effects of electromagnetic fields and has come to the conclusion that, according to present knowledge, the current limiting values provide sufficient protection from established health risks (Der Blaue Engel, 2004). An important indicator of health effects of radio waves of mobile phones is the specific absorption rate (SAR). It is expressed in watts per kilogram of biological tissue and principally taken at the mobile phone's maximum output power pursuant to a standardized procedure.
The Fox © F5 meets the EU requirements for exposure to radio waves. The SAR limit for mobile phones recommended by Der Blaue Engel is 0.6 watts/kilogram (W/kg) averaged over ten grams of tissue. The limit incorporates a substantial margin of safety to give additional protection and to account for any variations in measurements.
The guidelines were developed by independent scientific organisations thorough evaluation of scientific studies.
SAR values may vary depending on national reporting requirements and the network band. For SAR information in your region please look at our homepage.
The Fox © F5 meets the EU exposure guidelines when used either in the normal use position against the ear or when positioned at least 1.5 cm away from the body. When a carry case, belt clip or holder is used for body-worn operation, it should not contain metal and should position the product at least 1.5 cm away from your body.

Guidelines for a precautionary use of mobile phones in order to minimize radio wave exposure is enclosed with the phone. The use of a headset helps to reduce the radio wave exposure around the user's head.

Environmental aspects
- The Fox © F5 phone is designed so it can be easily dismantled for recycling purposes.
- Chlorinated or brominated polymers and additions of chlororganic or bromoorganic compounds (as flame retardants) have not been used for the plastic parts.
- Lead and cadmium as well as their compounds have not been used in plastics and coatings.
- Plastic case parts (equal or exceeding 10 grams) has been marked [(2)].
- The carrier material of printed circuit boards do not contain any PBB (polybrominated biphenyls), PBDE (polybrominated diphenyl ethers) or chlorinated paraffins.
- Cadmium, mercury as well as beryllium and their compounds have not been used in the electronic components.
- The batteries does not contain any lead, cadmium or mercury.

[(2)] according to DIN ISO 11 469.

The company

Fox Ltd. produce mobile phones and other electronic equipment. The plant is situated in Belgium.

Contact info:
Fox Ltd., Rue de l'Industrie, 122 – B-1040 Brussels. Tel: + 32 (0) 2 288 55 55. www.foxmobile.com.

Date of publication and period of validity

2006.03.01
The EPD is valid for 3 years.

Verification

PCR[a] review[b], was conducted by:
< name and organization of the chair, and information on how to contact the chair through the programme operator >
Independent verification of the declaration and data, according to ISO 14025:
☐ internal ☐ external
(Where appropriate [c]) Third party verifier:
<name of the third party verifier>

References

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PCR (2006): Product Category Rules for "Mobile phones". A **fictive, non-existing** PCR as this an **example** EPD.

www.nokia.com

www.samsung.com

This is an example of an Type III Environmental Declaration for a fictive product. Data are based on literature. It has been prepared by 2.-0 LCA consultants Aps for ANEC (the European Association for Consumer Participation in Standardisation) as a part of the project "Consumer demands on type III environmental declarations" Environmental Product Declarations from different programmes may not be comparable.

Environmental product Declaration

for a

Lovely Little Laura Cardigan

Environmental Product Declaration

for a **Lovely Little Laura Cardigan** (100% organic cotton) **(a fictive product).**

This environmental declaration applies for a functional unit of:
One Lovely Little Laura Cardigan used one year (i.e. washed 25 times) [(1) (2)].

This EPD is valid for cardigans sold and used within the European Market.

*[(1)] in accordance with PCR 2006 for "Textiles" (**Fictive PCR** for this **example**).*
[(2)] washing conditions as specified in ISO 139 Textiles

Photo of the product

Product specifications and recommendations for use and disposal

The Lovely Little Laura Cardigan combines the classic dark blue look with the most romantic small pink and white roses.
The Lovely Little Laura Cardigan is made of 100% organic cotton [(2)] and has been awarded the EU ecolabel (the Flower).

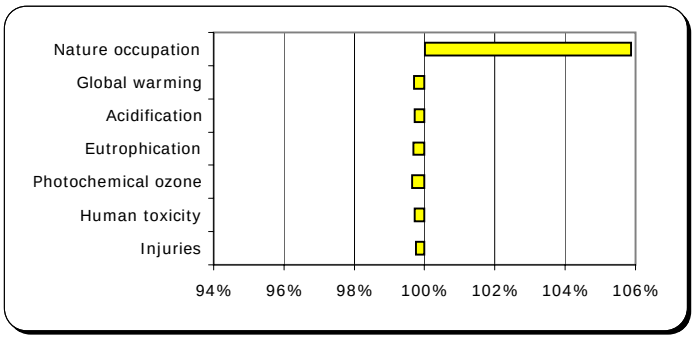
Properties, qualities and standards
The Lovely Little Laura Cardigan is available in size 86-92, 98-104, 110-116, 122-128, 134-140 and 146-152.
The weight of the cardigan is 100 grams to 250 grams, depending on the size.
Dimensional changes during washing and drying: Less than 7% (length and width) [(3)].
The colour fastness to washing: Level 4 colour change and level 4 for staining [(4)].
Colour fastness to perspiration (acid, alkaline): Level 4 (colour change and staining) [(5)].
Colour fastness to wet rubbing: Level 3 [(6)].
Colour fastness to dry rubbing: Level 4 [(7)].
Colour fastness to light: Level 4 [(8)].

Recommendations for use
The Lovely Little Laura Cardigan can be washed at 40 °C.
Do not tumble dry.

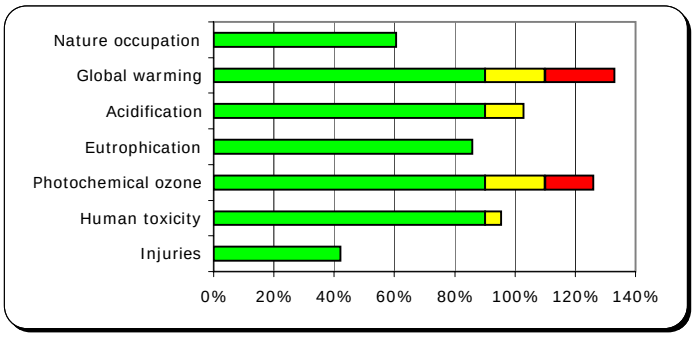
Recommendations for disposal
The cardigan can be disposed of as municipal waste.

[(2)] Certified to have been produced in conformity with the production and inspection requirements laid down in Regulation (EEC) No 2092/91.
[(3)] Acccording to the test method in ISO 5077 modified as follows: 3 washes at temperatures as indicated on the product, with tumble drying after each washing cycle unless other drying procedures are indicated on the product, at temperatures as marked on the product, wash load (2 or 4 kg) depending on the wash symbol.
[(4)] following test method in ISO 105 C06 (single wash, at temperature as marked on the product, with perborate powder).
[(5)] following test method in ISO 105 E04 (acid and alkaline, comparison with multi-fibre fabric).
[(6) and (7)] following test method in ISO 105 X12. [(8)] following test method in ISO 105 B02.

Environmental Performance



Life cycle impacts from a Lovely Little Laura Cardigan relative to the life cycle impacts of spending the same amount of money on "average knit fabrics".



Life cycle impacts from a Lovely Little Laura Cardigan relative to the life cycle impacts of spending the same amount of money on "average consumer goods".

Explanation (applies for both figures)
100% indicates same level.
Impacts cannot be added across impact categories.

Legend
Green/medium grey: More than 10% less than the reference
Yellow/light grey: Close to the reference
Red/dark grey: More than 10% higher than the reference

Product life cycle information

Before our gate
Data is based on the upstream processes to the category: "Knit fabric mills" from the EIPRO input/output database [(3)].
As the Lovely Little Laura Cardigan is made of 100% organic cotton, it has been necessary to change data for the cotton production in the EIPRO database.
The process "Cotton" has been changed into "Organic cotton" making the following assumptions:
- All use pesticides has been set to zero.
- The emission of dicofol to soil has been set to zero.
- The emission of hydrazine to air has been set to zero.
- Land use has been increased by 15% as it has been assumed that the yield per hektar is lower for organic crops, hence a larger area is needed.

For "Average knit fabrics" (in figure 1) the EIPRO data has not been changed [(3)].

Our Production
Data is site specific production data from the production of the Lovely Little Laura Cardigan at the factory in Denmark.
For "Average knit fabrics" (figure 1) data is based on the direct emissions from "Knit fabric mills" from the EIPRO input/output database [(3)].
When comparing our production with the production of "Average knit fabrics" (from the EIPRO database) the following differences could be mentioned:
- For our production there is no emissions of cabaryl.
- The emissions of formaldehyd is 60% lower for our production.

Use
The calculations are based on the assumptions that Lovely Little Laura Cardigan is worn 100 days and washed 25 times. Assuming that the washing mashine contains 12-13 pieces of clothes (same size as the cardigan) per wash, the calculations for washing are based on 2 fully loaded washing mashines during the life time of the cardigan (25/12.5=2) The wash includes consumption of electricity, water, soap (detergents) and use of the washing mashine. It has been assumed that the life time of the washing machine is 8 years and that it used 300 times per year (i.e. that the washing machine washes 8*300=2400 fully loaded washes in it's entire life time).
These assumptions has been used both for the Lovely Little Laura Cardigan and for "average knit fabrics" (figure 1) [(3)].

End-of-Life
It has been assumed that the cardigan is disposed off as municipal waste and incinerated with heat recovery [(3)].

*[(3)] in accordance with PCR 2006 for "Textiles" (**Fictive PCR** for this **example**).*

List of materials and chemical substances (above 0,1% of weight of the product)

	kg	Weight %
Materials, substances and preparations		
Organic cotton	0.95	95%
Buttons (plast)	0.05	5%
Substances classified according to EU legislation		
None		
Total	1.0	100%

Inventory

Inventory parameter	Before our gate	Our production	Use	End-of-Life	Total
Non-renewable energy [MJ primary]	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Mineral extraction [MJ]	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Carbon dioxide	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Nitrogen dioxide	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Sulphur dioxide	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
.... The list of inventory parameters can be continued as long as wanted. It has not been done as this an EXAMPLE.					

Environmental impacts

Impact category	Before our gate	Our production	Use	End-of-Life	Total
Nature occupation [m^2 eq arable land]	23.4	No data	0.1	0.00017	23.5
Global warming [kg eq CO_2]	44.7	12.8	4.2	-0.006	61.8
Acidification [m^2 unprotected ecosystem]	6.4	0.24	0.7	0.00042	7.3
Eutrophication [g eq NO_3 -]	0.42	0.04	0.02	0.000019	0.48
Photochemical ozone formation [m^2*hr*ppm ozone]	714	170	45	0.040	929
Human toxicity (into air, only carcino-genic effects) [kg chloroethylene-eq]	19.7	1.5	1.3	0.0013	22.5
Injuries [fatal injuries equivalents]	1.21E-07	4.98E-09	3.82E-09	4.74E-11	1.30E-07

Additional environmental information

Environmental aspects

The Lovely Little Laura Cardigan has been awarded the EU ecolabel and fulfills all the requirements in the European Commission Decision of 15 May 2002 for textile products. That means that the amount of chemicals used for the production of the cardigan has been minimized and that the content of chemical residues in the cardigan is reduced to a minimum. Some of the requirements that the Lovely Little Laura Cardigan fullfills is mentioned below. Further information can be found in the European Commission Decision of 15 May 2002 for textile products.

- At least 95 % (by dry weight) of the component substances of any sizeing preparation applied to yarns are biodegradable in wastewater treatment plants
- At least 90 % (by dry weight) of the component substances for spinning solution additives, spinning additives and preparation agents for primary spinning are biodegradable in waste water treatment plants.
- Chlorophenols (their salts and esters), PCB and organotin compounds have not been used during transportation or storage of products and semi-manufactured products.
- Heavy metal salts or formaldehyde have not be used for stripping or depigmentation.
- Compounds of cerium have not been used in the weighting of yarn or fabrics.
- The following auxiliary chemicals have not been used: Alkylphenolethoxylates (APEOs), linear alkylbenzene sulfonates (LAS), bis(hydrogenated tallow alkyl) dimethyl, ammonium chloride (DTDMAC), distearyl dimethyl ammonium chloride (DSDMAC), di(hardened tallow) dimethyl, ammonium chloride (DHTDMAC), ethylene diamine tetra acetate (EDTA), and diethylene triamine penta acetate, (DTPA).
- At least 95 % by weight of the detergents, fabric softeners and weight complexing agents used at the wet-processing sites are degradable in wastewater treatment plants.
- The levels of ionic impurities in the dyes used does not exceed the following: Ag 100 ppm; As 50 ppm; Ba 100 ppm; Cd 20 ppm; Co 500 ppm; Cr 100 ppm; Cu 250 ppm; Fe 2 500 ppm; Hg 4 ppm; Mn 1 000 ppm; Ni 200 ppm; Pb 100 ppm; Se 20 ppm; Sb 50 ppm; Sn 250 ppm; Zn 1 500 ppm.
- The levels of ionic impurities for pigments used does not exceed the following: As 50 ppm; Ba 100 ppm, Cd 50 ppm; Cr 100 ppm; Hg 25 ppm; Pb 100 ppm; Se 100 ppm Sb 250 ppm; Zn 1 000 ppm.
- Metal complex dyes based on copper, chromium or nickel have not been used.
- Chemicals, dyes, flame retardents and finishes that are restricted according to the European Ecolabel have not been used.
- The amount of free and partly hydrolysable formaldehyde in the final fabric does not exceed 30 ppm.

The company

Lovely Little Laura A/S in Herning in Denmark produces childrens clothes.

Contact info:
Lovely Little Laura A/S, Industriparken 145, 7400 Herning, tel: 9712 4555. www.Lovelylittlelaura.com.

Date of publication and period of validity

2006.03.01
The EPD is valid for 3 years.

Verification

PCR[a] review[b], was conducted by:
< name and organization of the chair, and information on how to contact the chair through the programme operator >
Independent verification of the declaration and data, according to ISO 14025:
☐ internal ☐ external
(Where appropriate [c]) Third party verifier:
<name of the third party verifier>

References

EIPRO input/output database in SimaPro: Data for "Knit fabric mills", 2.-0 LCA consultants, Copenhagen.

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Nordic Ecolabelling (2004): Background Memo on the Swan-labelling of textiles, skins and leather. Background Memo to criteria document version 3.0. 18 March 2004.
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Skaar C (2005): Draft Proposal: Product Category Rules (PCR) for preparing an Environmental Product Declaration (EPD) for Product Group Upholstery textiles Last revised: 14th November 2005
http://www.environdec.com/psr/int/NPCR06Textiles.pdf

This is an example of an Type III Environmental Declaration for a fictive product. Data are based on literature.
It has been prepared by 2.-0 LCA consultants Aps for ANEC (the European Association for Consumer Participation in Standardisation) as a part of the project "Consumer demands on type III environmental declarations"
Environmental Product Declarations from different programmes may not be comparable.

Environmental product Declaration

for

GG Breakfast Buns

Environmental Product Declaration

for **GG Breakfast Buns (a fictive product).**

This environmental declaration applies for a functional unit of:
1 kg of GG Breakfast Buns.

(1) *in accordance with PCR 2006 for "Bread" (**Fictive PCR** for this **example**).*

Photo of the product

Product specifications and recommendations for use and disposal

GG Breakfast Buns are available in packs of 8 pcs.

Properties, qualities and standards
Shelf-life: 8 days after "production date".
Weight per bun: 58.8 grams.

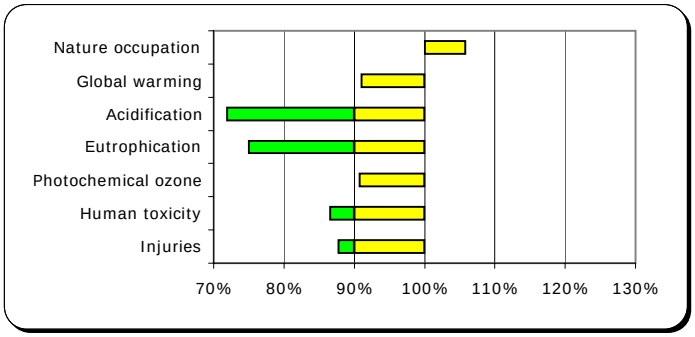
	Per 100 grams	Per bun
Energy	1090 kJ	640 kJ
	260 kcal	150 kcal
Protein	8.5 g	5 g
Carbohydrates (starch)	48 g	28 g
- of which sugars	10 g	6 g
Fat	3.5 g	2 g
- of which saturated fatty acids	0.3 g	0.2 g
- of which mono saturated fatty acids	1.5 g	0.9 g
- of which poly unsaturated fatty acids	0.9 g	0.5 g
Dietary fibres	3.5 g	2 g
Sodium	0.36 g	0.21 g

The Breakfast Buns are based on wheat.

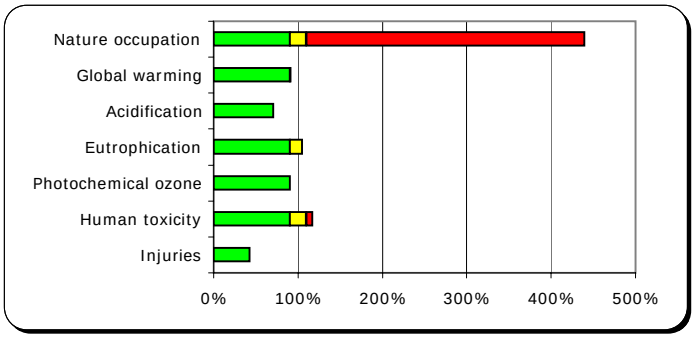
Recommendations for use
The Breakfast Buns can be eaten as they are, right out of the packaging.
Alternatively you can sprinkle a little water on top of the Breakfast Buns and heat them in the oven or at your toaster.

Recommendations for disposal
Dispose of mouldy bread in the rubbish bin. Do not give it to the birds as some moulds may produce toxins.

Environmental Performance



Life cycle impacts from the GG Breakfast Buns relative to the life cycle impacts of spending the same amount of money on "average bread products".



Life cycle impacts from the GG Breakfast Buns relative to the life cycle impacts of spending the same amount of money on "average consumer goods".

Explanation (applies for both figures)
100% indicates same level.
Impacts cannot be added across impact categories.

Legend
Green/medium grey: More than 10% less than the reference
Yellow/light grey: Close to the reference
Red/dark grey: More than 10% higher than the reference

Product life cycle information

Before our gate

"Before our gate" includes suppliers and production of ingredients. Emissions from electricity production are included here.
For "Average bread products" (figure 1) data is based on the upstream processes to "Bread, cake and related products" from the EIPRO input/output database [(2)].
For GG Breakfast Buns data is based on the upstream processes to "Bread, cake and related products" from the EIPRO input/output database with the following changes based on information from our green account (2005) and purchase information from the production of GG Breakfast Buns at the factory in Amsterdam:

- The electricity consumption for the production of Breakfast Buns is 7.7% lower than the energy consumption for "Bread, cake and related products" from EIPRO.
- The amount of wheat flour is 40% higher in GG Breakfast Buns than in "Bread, cake and related products" from EIPRO.
- Ingredients that is not used in the recipe for GG Breakfast Buns has been deleted (eggs, nuts, fruit, vegetables butter, cheese, milk, chocolate, candy and other confectionery products, meat from animals and rice).
- The amount of sugar is 82% lower in Breakfast Buns than in "Bread, cake and related products" from EIPRO.
- The fat content in Breakfast Buns is based on rape oil. Hence the use of "animal and marine fats and oils", "cottonseed oil" and "soybean oil" has been deleted.

Our Production

Data is site specific production data from the production of the Breakfast Buns at our factory in the Netherlands.
For "Average bread products" (figure 1) data is based on the direct emissions from "Bread, cake and related products" from the EIPRO input/output database [(2)].
(For this **example EPD**, data for the Breakfast Buns is identical to the EIPRO data).

Use

The use stage is not included for the buns [(2)]. Some users might heat the buns in the oven or at the toaster, which will increase the total energy consumpion. However, this is not included.

End-of-Life

"End-of-Life" is not included for the buns [(2)].

*[(2)] in accordance with PCR 2006 for "Bread" (**Fictive PCR** for this **example**).*

List of materials and chemical substances (above 0,1% of weight of the product)

	kg	Weight %
Materials, substances and preparations		
Wheat flour	0.677	67.7%
Yeast	0.027	2.7%
Salt	0.012	1.2%
Sugar	0.011	1.1%
Rape oil	0.017	1.7%
Poppy seeds	0.045	4.5%
Water included in the sold buns (0.374 kg water is added but part of it evaporates)	0.211	21.1%
Food Preservative (E 282) (Calcium propionate)		Less 1%
Emulsifier (E 471) (Mono and diglycerides of fatty acids)		Less 1%
Emulsifier (E 470a) (Sodium, potassium and calcium salts of fatty acids)		Less 1%
Emulsifier (E472e) (Mono and diacetyl tartaric acid esters of mono and diglycerides of fatty acids)		Less 1%
E 300 (Ascorbic acid)		Less 1%
Substances classified according to EU legislation		
None		
Total	1.000	100%

Inventory

Inventory parameter	Before our gate	Our production	Use	End-of-Life	Total
Non-renewable energy [MJ primary]	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Mineral extraction [MJ]	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Carbon dioxide	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Nitrogen dioxide	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Sulphur dioxide	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
.... The list of inventory parameters can be continued as long as wanted. It has not been done as this an EXAMPLE.					

Environmental impacts

Impact category	Before our gate	Our production	Use	End-of-Life	Total
Nature occupation [m^2 eq arable land]	9.6	No data	Not included	Not included	9.6
Global warming [kg eq CO_2]	2.0	0.4	Not included	Not included	2.4
Acidification [m^2 unprotected ecosystem]	0.3	0.01	Not included	Not included	0.3
Eutrophication [g eq NO_3 -]	0.03	0.00	Not included	Not included	0.03
Photochemical ozone formation [m^2*hr*ppm ozone]	33	4	Not included	Not included	37
Human toxicity (into air, only carcino-genic effects) [kg chloroethylene-eq]	1.5	0.0	Not included	Not included	1.5
Injuries [fatal injuries equivalents]	5.48E-09	1.79E-09	Not included	Not included	7.27E-09

Additional environmental information

Environmental aspects

Straw shortening chemicals have not been used.

The company

GG Baker BV is your traditional home style bakery selling a wide range of products. We sell traditional the fabulous Breakfast Buns, rye bread, sandwich loaves, bread rolls, bread sticks, foccicia, savory rolls, tea cakes, cinnamon buns, danishes, croissants, scones and much more. The factory is situated in Amsterdam, The Netherlands.

Contact info:
GG Bakers main office: GG Bakers BV, PO Box 76623, Koelaan23, 1070 HE Amsterdam, tel: +31204633421
www.GGbakers.nl

Date of publication and period of validity

2006.03.01
The EPD is valid for 3 years.

Verification

PCR[a] review[b], was conducted by:
< name and organization of the chair, and information on how to contact the chair through the programme operator >
Independent verification of the declaration and data, according to ISO 14025:
☐ internal ☐ external
(Where appropriate [c]) Third party verifier:
<name of the third party verifier>

References

Braschkat, J, A Patyk, M Quirin, G.A. Reinhardt (2003): Life cycle assessment of bread production - a comparison of eight different scenarios. From the 4th International Conference on: Life Cycle Assessment in the Agri-food sector. http://www.lcafood.dk/lca_conf/DJFrapport_paper_2_poster.pdf

EIPRO input/output database in SimaPro: Data for "Bread, cake and related products", 2.-0 LCA consultants, Copenhagen.

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Rosing L, Feldvoss C, Kann M, Leth K D, Mundt P, Pedersen H, Skovsby K, Christensen L M. (2001). LCA of a roll (in Danish). Working report in the project LCAfood. Available at www.lcafood.dk

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Environmental product Declaration

for

Rosamunde© Shampoo

Environmental Product Declaration

for **Rosamunde© Shampoo** (a fictive product).

This environmental declaration applies for a functional unit of:
1 litre of Rosamunde© Shampoo.

This EPD is valid for Rosamunde© Shampoo sold and used within the European Market.

*(1) in accordance with PCR 2006 for "Shampoo" (**Fictive PCR** for this **example**).*

Photo of the product

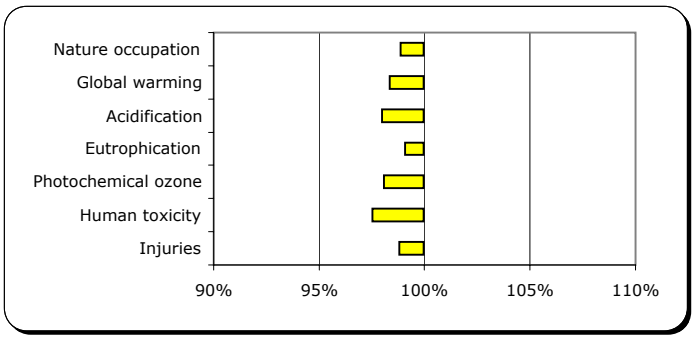
Product specifications and recommendations for use and disposal

Properties
Rosamunde© Shampoo has the dreamy smell of red roses in a sunny garden.
It is a shampoo for normal and dry hair.
pH: Approximately 5
The bottle contains 400 ml of shampoo.
The bottle is made of polyethylene (PE) and the lid of polypropylene (PP)

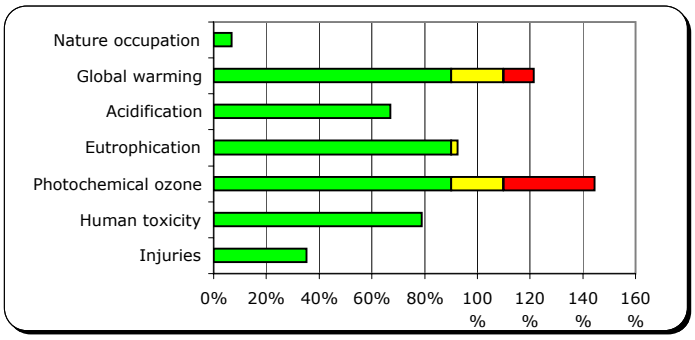
Recommendations for use
Rosamunde© Shampoo is suitable for daily use.
If you get shampoo in the eyes, rinse with running water.

Recommendations for disposal
The empty bottle and residues of shampoo can be disposed of in the rubbish bin with the normal municipal solid waste.

Environmental Performance



Life cycle impacts from Rosamunde© Shampoo relative to the life cycle impacts of spending the same amount of money on "average toilet preparations".
Note: The "use stage" is not included in this figure as it is the same for both Rosamunde© Shampoo and "average toilet preparations."



Life cycle impacts from Rosamunde© Shampoo relative to the life cycle impacts of spending the same amount of money on "average consumer goods".
Note: The "use stage" is included in this figure.

Explanation (applies for both figures)
100% indicates same level.
Impacts cannot be added across impact categories.

Legend
Green/medium grey: More than 10% less than the reference
Yellow/light grey: Close to the reference
Red/dark grey: More than 10% higher than the reference

Product life cycle information

The calculations are based on 1 litre of shampoo [(2)].

The yearly consumption of shampoo depends on hair length and number of hair washes per week.
Assuming that the consumer wash her hair every second day and uses 5 ml per hair wash, 1 litre of shampoo approximately corresponds to 1 years use of shampoo.

Before our gate
"Before our gate" includes raw material extraction and suppliers. Emissions from electricity production are included here.
For "average toilet preparations" (figure 1) data is based on the upstream processes to "Toilet preparations" from the EIPRO input/output database [(2)].
For Rosamunde© Shampoo data is based on the upstream processes to "Toilet preparations" from the EIPRO input/output database with the following exceptions based on information from our green account (2005) and purchase information from 2005 from the plant in Austria:
- The electricity consumption is 9.7% lower than for the "Toilet prepatations" from the EIPRO database.
- The use of raw materials and chemicals are 12.3% lower than for "Toilet prepatations" from the EIPRO database.
- The packaging for Rosamunde© Shampoo is PE and PP plastic, hence the input of "glass containers" in "Toilet preparations" from the EIPRO database has been deleted.

Our Production
Data is site specific production data from the production of Rosamunde© Shampoo at the plant in Austria.
including emissions at the plant, but not emissions from electricity production (they are included under "before our gate").
For "Average toilet preparations" (figure 1) data is based on the direct emissions from "Toilet preparations" from the EIPRO input/output database [(2)].
(For this **example EPD**, data for the Rosamunde© Shampoo is identical to the EIPRO data).

Use
"Use" includes the water used for the hair wash.
The use stage is defined in PCR (2006) for shampoo (**a fictive PCR**). The assumptions from the PCR are mentioned below.
They are used for both Rosamunde© shampoo and for "average toilet preparations".
It has been assumed that the consumer use 5-10 ml of shampoo per wash (this will depend on length of the hair).
This means that 1 litre of shampoo is used for 100-200 hair washes (150 used ind the calculations) [(2)].
A shower consumes 30-35 litres of water [(2)]. It is assumed that 15 litres is use for hair wash [(2)].
It i assumed that heating of the water is based on natural gas in the household [(2)].

End-of-Life
Shampoo is discharged to water after use.
The scenario for "End-of-Life" is defined in PCR (2006) for shampoo (a fictive PCR).
In the calculations it is assumed that 100% of the shampoo is discharged to water (assuming that the consumer fills water in the bottle to use the last remain of shampoo).
Furthermore, "End-of-life" includes the sewerage systems for the discharged water (using "Water supply and sewerage systems" from EIPRO).
It is assumed that the PE bottle and the PP lid is disposed as municipal waste and incinerated with heat recovery.

*[(2)] in accordance with PCR 2006 for "Shampoo" (**Fictive PCR** for this **example**).*

List of materials and chemical substances (above 0,1% of weight of the product)

	kg	Weight %
Materials, substances and preparations		
Water	No data	
Sodium Laureth Sulfate	No data	
Glycerin	No data	
PEG-7 Glyceryl Cocoate	No data	
Cocamidopropyl Betaine	No data	
Lauryl Glucoside	No data	
Glycereth-2 Cocoate	No data	
Sodium Chloride	No data	
Hydroxypropyl Guar Hydroxypropyltrimonium Chloride	No data	
Behenoyl PG Trimonium Chloride	No data	
Hexylene Glycol	No data	
Propylen Glycol	No data	
Citric acid	No data	
Parfume	No data	
Phenoxyethanol	No data	
Sodium Benzoate	No data	
Substances classified according to EU legislation		
None		
Total		

Inventory

Inventory parameter	Before our gate	Our production	Use	End-of-Life	Total
Non-renewable energy [MJ primary]	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Mineral extraction [MJ]	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Carbon dioxide	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Nitrogen dioxide	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Sulphur dioxide	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
…. The list of inventory parameters can be continued as long as wanted. It has not been done as this an EXAMPLE.					

Environmental impacts

Impact category	Before our gate	Our production	Use	End-of-Life	Total
Nature occupation [m^2 eq arable land]	0.91	No data	0.32	0.330	1.6
Global warming [kg eq CO_2]	5.4	1.3	15.1	11.8	33.5
Acidification [m^2 unprotected ecosystem]	0.63	0.02	1.33	0.85	2.8
Eutrophication [g eq NO_3 -]	0.034	0.0035	0.091	0.1764	0.31
Photochemical ozone formation [m^2*hr*ppm ozone]	96	25	369	144	634
Human toxicity (into air, only carcinogenic effects) [kg chloroethylene-eq]	2.0	0.1	5.7	3.3	11.1
Injuries [fatal injuries equivalents]	1.39E-08	8.64E-10	3.13E-08	1.85E-08	6.46E-08

Additional environmental information

Animal testing
Rosamunde© Shampoo has not been tested on animals.

Hazardous substances
- None of the constituent substances in the shampoo are classified as carcinogenic, mutagenic or toxic to reproduction.
- None of the constituent substances are on the EU list of substances that cause endocrine disruption class 1 or 2.
- All surfactants are readily biodegradable [(1)] or anaerobically biodegradable [(2)].
- The preservatives used are approved according to the EU Cosmetic Directive, Annex VI.
- Preservatives used in the Rosamunde© shampoo and its raw materials/ingredients are not bioaccumulable [(3)].
- Organic colouring agents used in the Rosamunde© shampoo are not bioaccumulable [(3)].

Rosamunde© shampoo does **not** contain:
- Linear alkylsulphonates (LAS), alkylphenol ethoxylates (APEO) or alkylphenol derivates (APD).
- Nitrilotriacetate (NTA, CAS-no. 139-13-9).
- Ethylene diamine tetra acetate (EDTA) and salts hereof (e.g. CAS-no. 64-02-8) or phosphonates.
- Musk xylene (CAS-no. 81-15-2) or Musk keton (CAS-no. 81-14-1).
- Boric acid, borates or perborates.

[1)] According to test method No. 301 (A to F) in OECD Guidelines for the Testing of Chemicals (ISBN 92-64-1222144)
[(2)] According to ISO 11734, ECOTOC No. 28 (June 1988). The requirement is a minimum of 60% degradability under anaerobic conditions.
[(3)] In accordance with OECD test guideline 305 A-E.

The company

Rosamunde Rose Waters GmbH has been producer of soap, shampoo and perfume since 1989.
The plant is situated in Austria.

Contact info:
Rosamunde Rose Waters GmbH Dr. Scheiber-Strasse 54, A-4870 Vöcklamarkt, Österreich. Tel: +43 (0) 7682-5531
www.rosamunderosewaters.at

Date of publication and period of validity

2006.03.01
The EPD is valid for 3 years.

Verification

PCR[a] review[b], was conducted by:
< name and organization of the chair, and information on how to contact the chair through the programme operator >
Independent verification of the declaration and data, according to ISO 14025:
☐ internal ☐ external
(Where appropriate [c]) Third party verifier:
<name of the third party verifier>

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This is an example of an Type III Environmental Declaration for a fictive product. Data are based on literature.
It has been prepared by 2.-0 LCA consultants Aps for ANEC (the European Association for Consumer Participation in Standardisation) as a part of the project "Consumer demands on type III environmental declarations"
Environmental Product Declarations from different programmes may not be comparable.

Environmental product Declaration

for a

CECERION© Family car

Environmental Product Declaration

for a **CECERION© Family car** (a fictive product).

This environmental declaration applies for a functional unit of:
10 years use of a CECERION© Family car
assuming 21.000 km per year and a life time of 10 years [(1)].

This EPD is only valid for CECERION© Family cars sold and used within EU.

*[(1)] in accordance with PCR 2006 for "Passenger cars" (**Fictive PCR** for this **example**).*

Photo of the product

Product specifications and recommendations for use and disposal

The CECERION© Family car is the perfect car for the family: Compact outside and spacious inside. It has numerous active and passive safety features and optimized fuel economy.

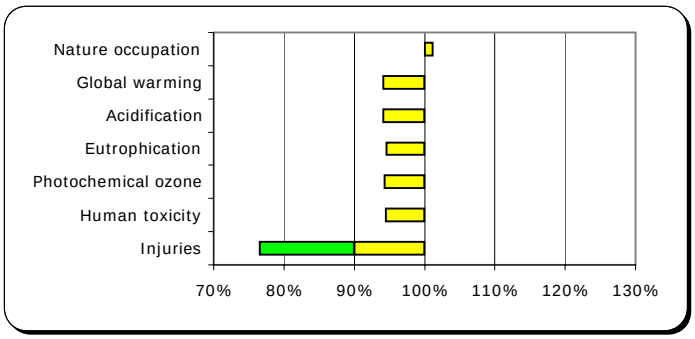
Properties, qualities and standards
Vehicle Category: Small Family car (Category M1 according to PCR 2006 for "Passenger cars" (**Fictive PCR**)).
Passenger capacity: 5 seats.
Engine Type: 75hp 1.4i petrol engine. Maximum velocity: 150 km/h.
Weight: 1600 kg (maximum load). Width: 1710 mm. Length: 4237 mm. Height: 1.696 mm. Wheelbase: 2697 mm.
Fuel tank capacity: 55 litres.
Fuel economy: Energy class B. Urban cycle 13.5 km/l, Extra Urban Cycle: 19.4 km/l, Combined: 16.4 km/l [(2)].
Range: 700 kilometres (using a full fuel tank, with maximum load, according to driving test cycles defined in [(2)]).
CO_2 Emissions: 155 g/km [(2)].

Recommendations for use
- Try to avoid using your car for short journeys - use public transport, ride a bicycle or walk.
- Plan ahead - choose uncongested routes, combine trips, use car share.
- Drive smoothly and efficiently - harsh acceleration and heavy braking have a very significant effect on fuel consumption, driving more smoothly saves fuel.
- Slow down - driving at high speeds significantly increases fuel consumption.
- Use higher gears, as soon as traffic conditions allow.
- Switch off - sitting stationary is zero miles per litre, switch off the engine whenever it is safe to do so.
- Reduce weight - don't carry unnecessary weight, remove roof racks when not in use.
- Regular servicing helps keep the engine at best efficiency.
- Keep the pressure up - make sure the tyres are inflated to the correct pressure for the vehicle.
- Do not compromise safety but be aware that the use of onboard electrical devices increases fuel consumption.
- Check your fuel consumption - changes in overall fuel consumption may indicate a fault.
- Use air-conditioning sparingly - running air-conditioning continuously will increase fuel consumption significantly.

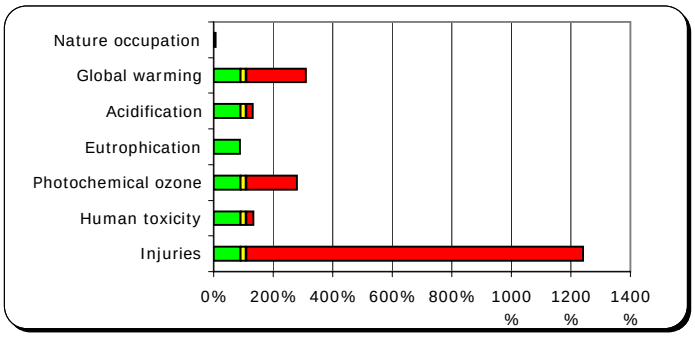
Recommendations for disposal
Cars should be disposed off according to legislation in your country.

[(2)] as defined in Directive 93/116/EC as amended by 1999/100/EC.

Environmental Performance



Life cycle impacts from the CECERION© Family car relative to the life cycle impacts of spending the same amount of money on "average cars".



Life cycle impacts from the CECERION© Family car relative to the life cycle impacts of spending the same amount of money on "average consumer goods".

Explanation (applies for both figures)
100% indicates same level.
Impacts cannot be added across impact categories.

Legend
Green/medium grey: More than 10% less than the reference
Yellow/light grey: Close to the reference
Red/dark grey: More than 10% higher than the reference

Product life cycle information

Before our gate
"Before our gate" includes raw material extraction and suppliers. Emissions from electricity production and other energy production are included here.
Data for "Average cars" (figure 1) is based on the upstream processes to "Motor vehicles and passenger car bodies" from the EIPRO input/output database [(2)].
Data for CECERION© Family car is based on a combination of purchase information for 2005 and the upstream processes to "Motor vehicles and passenger car bodies" from EIPRO input/output database (For this **example EPD**, data for the CECERION© Family car is identical to the EIPRO data).

Our Production
Data is site specific production data from the production of the CECERION© Family car in Sweden.
For "Average cars" (figure 1) data is based on the direct emissions from "Motor vehicles and passenger car bodies" from the EIPRO input/output database [(2)]
(For this **example EPD**, data for the CECERION© Family car is identical to the EIPRO data).

Use
"Use" includes driving in the car:
- Gasoline consumption (16.4 km per litre for the CECERION© Family Car (Energy class B). The gasoline consumption for "average cars" is defined in PCR (2006) for "Passenger cars", i.e. 14.7 km per litre for "average cars" (Energy class C)).
- Maintenance of the car (same assumptions for CECERION© Family Car and "average car" [(2)])
- Construction and maintenance of roads, bridges etc. (same assumptions for CECERION© Car and "average car" [(2)]).
- The life time is assumed to be 10 years for both the CECERION© Family Car and for "average cars" [(2)]).
- Injuries, mainly due to traffic accidents. Data for traffic injuries for "Average cars" is based on PCR (2006) for "Passenger cars". For the CECERION© Family Car, injureis has been reduced by 16.5% due to the speed pilot (see "Additional environmental information page 4") as speed higher than the speed limit is involved in 16.5% of all traffic accidents (ETSC, 2006).
  Injuries has been further reduced by 12.5% due to the Alcolock (An Alcolometer connected to the starter, see "Additional environmental information page 4") as alcohol is involved in 25% of all traffic accidents and as the chance of recidivism is about half for people with an alcohol lock in their car compared with sentenced drivers with no alcohol lock in their car (Saab 2004).

End-of-Life
"End-of-Life" includes recycling of iron and steel, aluminium and some of the plastic components, electronics etc (2).
Same assumptions has been used for the CECERION© Family Car and "average cars", see details in PCR (2006) for "Passenger cars".

*[(2)] in accordance with PCR 2006 for "Passenger cars" (**Fictive PCR** for this **example**).*

List of materials and chemical substances (above 0,1% of weight of the product)

	kg	Weight %
Materials, substances and preparations		
Reinforced steel	891.0	67.5%
Polyethylene (HDPE)	102.0	7.7%
Steel, low-alloyed	99.0	7.5%
Aluminium	51.8	3.9%
Polypropylene (PP)	49.0	3.7%
Synthetic rubber	44.1	3.3%
Glass	30.1	2.3%
Copper	10.1	0.8%
Polyvinylchloride (PVC)	16.0	1.2%
Zinc for coating	5.9	0.45%
Nickel (99.5% alloy)	1.4	0.11%
Platinum	0.0016	0.00012%
Palladium	0.0003	0.000023%
Substances classified according to EU legislation		
Lead	13.0	0.98%
Chromium	2.4	0.18%
Alkyd paint, white, 60% in solvent	4.2	0.32%
Total	1320.0	100%

Inventory

Inventory parameter	Before our gate	Our production	Use	End-of-Life	Total
Non-renewable energy [MJ primary]	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Mineral extraction [MJ]	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Carbon dioxide	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Nitrogen dioxide	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
Sulphur dioxide	No data as this is only an EXAMPLE for a FICTIVE PRODUCT				
.... The list of inventory parameters can be continued as long as wanted. It has not been done as this an EXAMPLE.					

Environmental impacts

Impact category	Before our gate	Our production	Use	End-of-Life	Total
Nature occupation [m^2 eq arable land]	488	No data	1048	-19	1516
Global warming [kg eq CO_2]	5745	519	78351	-405	84209
Acidification [m^2 unprotected ecosystem]	584	26	5003	-91	5521
Eutrophication [g eq NO_3 -]	28	3	254	-3	283
Photochemical ozone formation [m^2*hr*ppm ozone]	90778	15956	1113307	-10507	1209533
Human toxicity (into air, only carcino-genic effects) [kg chloroethylene-eq]	1883	141	16864	-296	18592
Injuries [fatal injuries equivalents]	1.5E-05	6.9E-07	2.2E-03	-1.7E-06	2.2E-03

Additional environmental information

Safety

The CECERION© Family car has been developed with focus on safety. Safety for the adults at the front seats, safety for children and adults at the back seats - and safety for pedestrians and bicyclists outside the car.
The CECERION© Family car features an enhanced level of standard, with new-generation ESP to correct the vehicle's course with precision and efficiency, and a new steering column airbag to protect the driver's knees and shins. That is why EuroNCAP awarded the CECERION© Family car 5 stars for safety with 36 out of 37 maximum points, which makes it one of the world's safest cars. Additional features include:

- ABS with Electronic Brakeforce Distribution (EBD)
- Emergency Braking Assistance (EBA)
- Airbags: Adaptive driver's and front passenger's airbags, front lateral airbags, side window airbags
- Cruise control with speed limiter
- Lane Departure Warning System.
- Belt Reminder
- Height adjustable front seat belts with pre-tensioners with force-limiters
- Front parking assistance, cruise control with speed limiter and a brand new Lane Departure Warning System.
- Speed pilot (Recieving signals via the CECERION© GPS System. The speed pilot resticts the speed to the allowed limit).
- "Alcolock", i.e. an alcohol meter connected to the starter. The Alcohol meter concept includes a small mouthpiece in the car's key fob. A transponder communicates with the car's electronic control unit, keeping the engine immobilised if a breath sample from the driver is found to contain alcohol above the permitted level (depending on the laws in your country). (Saab, 2004).

Euro NCAP provides motoring consumers with a realistic and independent assessment of the safety performance of some of the most popular cars sold in Europe. The CECERION© Family car get high safety ratings according to Euro NCAP's crashworthiness testing:

Adult Occupant Rating: ★★★★★

Pedestrian Test Rating: ★★★☆☆

Child Protection Rating: ★★★★☆

Read more about the test conditions at www.euroncap.com

Energy consumption

The CECERION© Family car has been developed with focus on environment. The fuel economy has great influence on the environment impacts from cars.
Fuel economy: Energy class B. Urban cycle 13.5 km/l, Extra Urban Cycle: 19.4 km/l, Combined: 16.4 km/l [(2)].

The company

CECERION AB has been producer of cars since 1978. The plant is situated in Sweden.

Contact info:
CECERION AB, Kiliansgata 225, 22350 LUND, Sweden. Tel 08-54066990 www.cecerion.se

Date of publication and period of validity

2006.03.01
The EPD is valid for 3 years.

Verification

PCR[a] review[b], was conducted by:
< name and organization of the chair, and information on how to contact the chair through the programme operator >
Independent verification of the declaration and data, according to ISO 14025:
☐ internal ☐ external
(Where appropriate [c]) Third party verifier:
<name of the third party verifier>

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