Making Life-Cycle Information and Interpretative tools available

Date November 2005

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Order no. 36192.01.01

Keywords Life-Cycle Thinking
  Awareness
  Promotion
  Tools
  Communication

Intended for EU DG Environment
  Brussels

Please note that this study has been undertaken for the European Commission but that it does not necessarily represent the views of the Commission on any of the subjects covered in this report.

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Summary

Introduction

In the Communication on Integrated Product Policy, published in June 2003, the European Commission set out its strategy for putting Integrated Product Policy (IPP) into practice. Life-cycle thinking is one of the key principles of IPP.

Life-cycle thinking

Life-cycle thinking (LCT) considers the whole life-cycle of a product and aims for a reduction of its cumulative environmental impacts - from the “cradle to the grave”. In so doing it also aims to prevent individual parts of the life-cycle from being addressed in a way that just results in the environmental burden being shifted to another part. By looking at the whole of a product’s life-cycle in an integrated way, IPP also promotes policy coherence. It encourages measures to reduce environmental impacts at the point in the life-cycle where they are likely to be most effective in reducing environmental impact and saving costs for business and society.

The Commission plans several activities at the Community level to make life-cycle information and interpretative tools more available. One of the activities is providing a Community Platform to facilitate communication and exchange of experience between stakeholders. This study concerns the specific needs of small stakeholders with regard to this Platform. The objective of the study is to establish a baseline of knowledge about the level of awareness regarding life-cycle thinking in small European firms, retailers and consumer organisations (registered and operating in the EU, Candidate Countries, EEA and Switzerland), and their needs for further communication and exchange of information and support. From this knowledge, the elements are derived needed for a Community Platform to facilitate communication and information exchange for the target groups.

Approach

For assessment of the awareness regarding life-cycle thinking in the target groups and their needs for information and support, the specific position in the product chain and the related current and potential role in promotion and communication processes is very important. For example, a small and medium-sized enterprise (SME) can be a producer or a supplier of either raw materials, semi-finished or final products. Often an SME will be active in the supply chain of products, manufactured by large companies setting the demands for product design and production. The specific position in the product chain defines to a large extent the form and intensity of communication with other partners in the chain. Due to their position in the product chain the retail sector is an important intermediary between
manufacturers and consumers. The retailer is in the position to communicate with both manufacturers and consumers about the product’s environmental properties. Consumer organisations, as a representative of the consumers interests, focus on the consumers need for (and right to) information.

The target groups are analysed in more detail with the help of a sector differentiation. Sectors covered are the automotive sector, electronic and electrical consumer goods, building sector, food/agriculture, packaging and the pulp & paper industry.

It is shown that the function, position, attitude and behaviour of the considered target group is strongly dependent on the kind of products that are produced and also on the industrial structure.

The results of the study are primarily based on published information and own experiences of the three organisations which have executed the study. In addition interviews are held to fill in some of the crucial gaps in the available information.

The additional measures regarding life-cycle thinking that can be taken on a Community level follow from the state of awareness in the target group (section 2), the main trends in the use of life-cycle assessment (LCA) tools (section 3), the current promotion of life-cycle thinking (section 4) and the main findings (section 5). A form for a Community platform, in which the target groups can be addressed, is proposed in a scenario of actions and events to raise the awareness (section 6).

**State of awareness regarding life-cycle thinking**

*Small and medium-sized enterprises*

SMEs are often unaware, or not fully aware, of the environmental impacts of their activities. SMEs, and particularly, micro and small businesses, are not used to work with concepts such as LCA. These enterprises have very short term planning, due to the fact that they must cope with urgent daily problems. As a result of this situation the environment has not been one of their main priorities so far, and most micro and small enterprises have still not adopted any environmental policy. Most SMEs do not apply concepts such as LCA and/or eco-design in their production processes and, on average, less SMEs have eco-labelled products in their product ranges. In the case that the firm is a supplier of intermediate products to larger companies, there is little influence on the specifications of the products produced. Requirements concerning the environmental performance of the company/product typically move upstream in the value chain, because the main suppliers involved in environmental improvement become increasingly aware of the environmental impacts of the raw materials and components of their products. Already there is an increasing pressure for SMEs to adopt environmental management systems, to label products and to pay attention to the concerns of stakeholders.
The main operational tools applied by SMEs (in the manufacturing industry) for internal use are eco-design, (product oriented) environmental management systems, checklists and quick scan LCA. Operational tools for external use applied by the SMEs selling final products (both the manufacturing and trade/service oriented companies) are ISO-type I or type III eco-labels.

It can be stated that in general the level of awareness within SMEs is rather low. Despite this overall low awareness many differences exist between SMEs depending on their size, sector/product group, country and the position in the product supply chain.

Retail sector

Retailers are major players in influencing the market for products with an improved environmental performance. With respect to the awareness regarding life-cycle thinking it can be said that overall most IPP tools and concepts are difficult to understand and still need clarification. LCA is seen as an important tool in IPP, but simpler tools are needed to improve the environmental performance of products. Initiatives in this area are rather taken by the large retailers, as they are in the position to pressure producers and at the same time have the human resources to adequately inform customers. By placing requirements on their suppliers (e.g. determining product specifications, guidelines, checklists) the retail can influence suppliers towards environmental product innovation. The small retailers do not have the capacity of influencing producers and therefore are little inclined to take action in the supply chain. Their awareness and involvement in the area of life-cycle thinking is basically just about selling eco-labelled (or organic) products. Examples of activities to increase awareness regarding life-cycle thinking by the large retailers are corporate and customer communication initiatives, such as training programmes for employees or in-store communication with consumers on eco-labelling. Differences in the awareness regarding life-cycle thinking of retailers can be found based on size, sector/product group and country involved. The operational tools used by retailers are in particular the tools for external use, associated with the marketing phase of the product development chain (ISO-type I labels and Environmental Product Declarations/ISO-type III labels).

Consumer organisations

The right to information is a basic consumer right\(^1\), and therefore consumer organisations in general support product labelling, the main tool for consumer information. Apart from product labelling, consumers are also informed about the environmental performance of products through consumer (test) magazines, or the

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\(^1\) The new Article 153 (ex Article 129 a) of the EC Treaty has the objective of ensuring a high level of consumer protection. Moreover, it emphasises promoting the consumer’s right to information and education and their right to organise themselves in order to safeguard their interests

[http://europa.eu.int/scadplus/leg/en/lvb/a17000.htm]
internet. The more traditional product testing, which concentrated on quality and health aspects, is gradually being expanded to include environmental considerations. However, the environmental performance information provided to consumers is still largely related to the use phase and is often only available for members of the consumer organisation. Just like retail (and retail organisations), consumer organisations are active in promoting sustainable consumption. Nevertheless consumer organisations seem to have taken up the issues of sustainable consumption on their agenda to a varying extent. The activities are limited due to limited financial and human resources.

The general awareness of consumer organisations regarding life-cycle thinking differs throughout Europe. In general the Northern European countries are more aware. Basically, there are three groups of countries:

- high awareness: the Scandinavian countries, Germany/Austria/Switzerland and The Netherlands;
- little or no awareness: Greece, Portugal and the new member countries;
- medium awareness: other EU countries.

**Sector and country differences**

From the analysis of several industrial sectors it is obvious that the function, position, attitude and behaviour of the considered target groups is strongly dependent on the kind of products which are produced and also on the industrial structure (which can differ in the different European countries).

An analysis of the differences in the awareness regarding life-cycle thinking between (groups of) European countries shows that in the EU the Nordic countries are the most proactive countries with respect to life-cycle thinking and the application of related tools. Looking at other economic blocks it appears that activities in Japan are comparable with those of the Northern European countries. The general image is that the USA is lacking behind the EU in life-cycle thinking.

Overall the awareness regarding life-cycle thinking in the target groups is rather poor, but large differences can be found based on the specific position in the product supply chain, sector, product group or country involved.

**Monitoring possibilities**

To measure progress in the awareness regarding life-cycle thinking the following aspects can be monitored:

- SMEs: the amount of SMEs with a (product-oriented) environmental management system (EMS) according to EMAS/ISO 14001, and the amount of SMEs producing products with an ISO-type I or ISO type-III eco-label
- Retail/consumers: the amount of products - sold by the retail - with an environmental product declaration (EPD) and the amount of products with an ISO-type I eco-label (such as EU Flower)
- Consumer organisations: the amount of LCT related, and published product tests, and the amount of LCT related consumer magazine articles.
Main trends in the use of LCA tools

Application
The application of LCA tools by the target groups is limited; results of the market survey show that they hardly buy software tools themselves. For small firms it was recognised that they are mostly involved by large companies or that they hire consultants; also large companies mostly consult universities or specialised organisations. The internalisation of LCT tools by the target groups is therefore limited. The developed tools are more general and for that reason no remarkable, specific differences between industrial sectors are observed. The main and most likely reasons for not applying LCA tools are: a lack of positive experience and demonstrable results with LCA studies; a lack of resources (human and financial) to buy, learn and apply LCA tools; the complexity of current LCA tools; and a limited control over the life-cycle.

Availability
Regarding the developments in the availability of LCA tools, it can be concluded that the booming period for LCA software was 1994 to 1997. Today there are in total about 50 different LCA software packages available. Most LCA software tools are developed in Europe (and within Europe mainly in Germany, The Netherlands and Switzerland). The buyers of LCA tools are again mainly European. It is expected that growth in the overall use of LCA tools (amount of licenses) will continue in the near future. Furthermore it is expected that new LCA tools will be developed, which will have an improved user-friendliness and quality, and that more customised solutions will be available. These developments indicate a lowering of the threshold for the use of LCA.

Affordability
A review of the average affordability has shown an increase of the price level of software packages over the last decade. On the one hand this is due to market demand and supply relations (commercialisation), on the other hand development costs, databases and services are increasingly included in the prices. For the future there is no clear picture how prices will develop, but no big changes are expected. The majority of providers indicate that they foresee no changes regarding the prices of LCA databases and software in the next 3 to 5 years.
Main promoters of life-cycle thinking

Small and medium-sized enterprises

The promoting role of SMEs depends on their position in the product chain and the product group involved. For example, in case SMEs are in the supply chain of large companies, their promoting role is often fairly limited. The large companies are usually the main promoters of life-cycle thinking within the product chain. In this situation, SMEs mostly react to the needs of large companies in terms of business-to-business communication. On the other hand, in some sectors and countries, SMEs selling final products on the market are important promoters of life-cycle thinking in the product chain. In addition, as with the awareness regarding life-cycle thinking, the promotion varies from country to country. The existing national legislative and incentive framework, as well as the level of environmental awareness of consumers, influence the promoting role of SMEs.

The role of SMEs in promoting life-cycle thinking is also emerging and increasing with respect to industrial districts, in various countries. Initiatives are not necessarily focused on the life-cycle of a single product but can also be focused on several life-cycles. This is for instance the case when by-products and/or production waste streams of one product chain become secondary raw materials for another product chain.

Sector organisations can have an active part in informing their members about life-cycle issues. Initiatives in the promotion of life-cycle thinking to SMEs are also taken by the SME associations. For example, at a European level the UEAPME (the European Association of Craft, Small and Medium-sized Enterprises) has largely contributed to the last, more SME friendly revision of the EU-Flower scheme and has collaborated with the Commission in the drafting of the EMAS guidelines.

Retail sector

Retailers can have a high potential information and educational role (in particular for durable products). However in practice their influence is limited with respect to informing and influencing consumers, for example due to insufficient knowledge of the meaning/requirements of eco-labels.

In the promotion of sustainable consumption retailers encounter several interrelated problems, such as lack of explicit consumer demand, wariness of media and NGOs, lack of a robust business case and unconvinced senior management. Practical barriers are for example a lack of resources (in terms of staff time), lack of a clear consensus about the environmental performance, reliability of supply and the product’s ‘sacrifice’ (in terms of price, quality and appearance). These problems and barriers reflect the complexity of issues facing retailers, and show the difficulties that even the leaders in the field must overcome in order to offer and
promote greener products. Obviously, just the large retailers have the economic bargaining power to pressure producers and also have the human resources to adequately inform customers. The promoting role of retailers varies from country to country and depends on considered product group categories. In some countries retailers have played a crucial role for the diffusion and promotion of eco-labels, mostly for short-life consumable and food products.

*Consumer organisations*

Consumer organisations and environmental non-governmental organisations (NGOs) could play a major role in promoting life-cycle thinking, e.g. in the definition phase, selection of product groups and monitoring of eco-labelling. The fact is, a recent consumer survey revealed that they are first-ranked in consumer trust as source of environmental product information as well as administrators and/or guarantee bodies for eco-labels. Though their 1st rank in consumer trust, the actual concrete promoting role of consumer organisations is limited so far, mainly due to lack of financial resources and still insufficient involvement in research and promotion initiatives. Product tests and the publication of consumer interest magazines is mainly a domain for consumer organizations supported by governments. However, some consumer organizations have been able to develop independent product information services into non-profit but self-financing services. Consumer interest magazines report on the results of comparative product quality tests e.g. for energy-using home appliances. At times consumer magazines report on product tests including environmental considerations, or feature articles educating readers regarding the connection between household energy consumption and the emission of greenhouse gases. Apart from product testing, some consumer organisations also promote life-cycle thinking in other ways, such as education regarding life-cycle thinking and eco-labelling or the organisation of seminars about sustainable consumption.

*Providers of LCA tools and services*

Providers of LCA tools and services offer a wide range of LCA products in order to realize a full service level. Main sales channels of providers are distribution through the website and through the sales department. Almost unanimously providers use their website to distribute LCA databases and software. Customers can order databases and software without any personal interaction. This distribution has a reactive character, aimed at already convinced interested parties and users. Direct sales is being used by half of the providers, also partners/resellers are used in the distribution of their products. Promotion is directed at the maintenance of existing contacts. The present strategy of providers can be characterised as a penetration strategy: growth in the past years and expected future are realized from a growing market (growth by selling more products in an existing growing market).
In addition to this present growth strategy, there is a growth potential among potential users with a low current awareness level. The creation of awareness in this group of new users is essential for the further use of LCA. However providers of LCA products do not contribute to this creation of awareness as can be derived from their marketing communication / message.

**Authorities**

Creation of awareness is a main objective in the promotional activities of authorities. This is done by actively communicating the ultimate advantages and objectives of LCT and LCA to SMEs, consumers and other end-users. Promoters and supporters of life-cycle thinking from governments and industry say that, in future, they will use more of a pull strategy coming from consumers. An increased awareness will lead to a demand for LCT/LCA information by end-users. The authorities, or related administrative bodies, are currently the main promoters of LCT in the target groups. Regarding the promoting role of administrations towards small firms, three clusters of countries are identified for which the level of support to SMEs largely differs:

− countries with a divers system of specific support structures aiming to assist SMEs in applying eco-design;
− countries with an effective SME support structure aimed at environmental issues in general, and
− countries with a rather limited support structure aimed at environmental issues.

Especially in the Northern European countries supporting initiatives are planned or already implemented. But also across the EU there are many initiatives to support manufacturing companies in making the shift to more LCT oriented practices. Many are specifically tailored to meet the needs of SMEs or at least are applicable to support them (e.g. funding, subsidised consultancy, training etc.).

Governments have also shown a growing interest in sustainable consumption. This growing interest is not only reflected in policy documents, but there are examples of a more formalised cooperation with consumer agencies. Furthermore life-cycle thinking is promoted by the establishment of national competence centres. On a European level, the European Commission promotes LCT by various initiatives, such as research programmes, projects and studies aimed at the introduction, promotion and implementation of the EU’s Integrated Product Policy. Globally the initiatives of UNEP also support life-cycle thinking in Europe, for example by the UNEP/SETAC Life-Cycle Initiative. Promotion activities will be stronger when different stakeholders collaborate, see for example the European marketing campaign on the European Eco-label involving national authorities, producers, retail organisations and consumers organisations.
Needs for intensified communication and exchange of information

It was found that the awareness as well as the promotion regarding life-cycle thinking depends on various aspects (a.o. sector, product group and country). In spite of this it can be said that overall the potential to raise LCT awareness is considerable. In a general sense the needs for intensified communication and exchange of information can be defined for the target groups.

Small and medium-sized enterprises

The three basic needs of small firms are:
1. the need to raise knowledge on the concept of life-cycle thinking;
2. the need to know how life-cycle thinking can benefit their company, and
3. the need for targeted knowledge, training and tools on how to implement life-cycle thinking in their business operations.

In particular small firms need simple information about the concept of life-cycle thinking. After all, life-cycle thinking is a difficult concept and there is a need for facilitation in the communication. Information needs to be understandable by non-experts in the field and needs to be targeted to small firms and their specific problems.

Retail sector

For the retail the basic needs are:
1. an increase of knowledge with regard to life-cycle thinking from the top management level up to the shop assistants;
2. increased consumer awareness and demand for products with a lower environmental impact and
3. a greater visibility of eco-labels.

Increasing the knowledge of the shop assistants is highly important as they are an important source of product information for consumer in the buying decision, in particular for durable products. Though some consumers are even willing to pay more for a product with a lower environmental impact, the consumer’s lack of knowledge on the environmental performance of products prevents them from translating their willingness into actual action when they purchase. Retailers can play an important role in increasing the awareness of the consumer regarding the benefits of eco-labelled products. For this the shop assistants must have sufficient knowledge of the life-cycle aspects of the products sold. Furthermore a greater visibility of eco-labels, including the EU Flower, is necessary. This can be done by raising the number of products groups for which criteria have been established and by promoting the scheme through marketing campaigns targeting both retailers and consumers.
Consumer organisations

Regarding the needs of consumers organisations it can be said that they basically need more funding and more human resources. Furthermore it was also expressed that they need more easy-to-use information and tools that can help them to compare products in an easy and cheap way.

The basic needs of the consumer are:
1. comparable and reliable environmental product information that they can use in purchasing situations, e.g. eco-labels/information from shop assistants
2. information about where to buy products with a lower environmental impact,
3. a greater visibility of eco-labels, including the EU Flower.

Proposed approach to raise awareness

Function/position Community Platform

The objective of a Community Platform is to facilitate LCT communication and exchange of experience for the target groups in the different countries, and thereby achieve an increased awareness level regarding life-cycle thinking. This Platform’s objective to raise the awareness of life-cycle thinking among the target groups will include elements of the following successive stages of the AIDA-model: Attention, Interest, Desire and Action (AIDA). These are the stages an individual passes through before coming to a decision or an action, in this case: before putting life-cycle thinking into practice. Because of the current level of awareness in the target groups the first two steps will dominate, but also partly step three in the AIDA-model will be emphasized in the scenario for a Community Platform. Even after these first stages the final stage ‘action’ will follow in order to actually implement life-cycle thinking.

There is not one best communication medium, therefore a platform with the objective to raise the awareness of life-cycle thinking among the target groups is suggested to use a combination of communication media, using both electronic and written media as well as personal communication.

Roles Community Platform

In the dissemination of life-cycle thinking to the target groups a Community Platform should build on and support existing local and national initiatives. After all, educational and awareness raising activities are best undertaken closest to the citizen, i.e. on a national and regional level. Furthermore the national/regional associations and authorities are already in contact with the target groups or representatives of these target groups.
An EC Community Platform could play two roles. The first role could be to support the fulfilling of generic needs for information and communication of the target groups. This is in particular an informing and facilitating role towards the national authorities and the European associations. The exchange of information and experiences should be supported and stimulated by such a Community Platform in order to actually learn from each other. This exchange of knowledge and experiences will take place between countries and sectors.

The second role of a EC Community Platform could be to stimulate and facilitate the national/local authorities and sector/target group associations in taking national, and local LCT initiatives. For small firms and retailers the national, or even local, SME or retailer associations and sector associations should be involved in the development of this targeted approach towards life-cycle thinking. European and national funding programmes and/or initiatives can be developed aimed at supporting the target groups to start the necessary initiatives. For instance in a European funding programme projects or European sector networks could be promoted with the objective of gathering best practices and the diffusion of ‘lessons learnt’.

An outline of the potential actions of a Community Platform is given. The establishment of national (or regional) LCT expertise centres is chosen as the basis for communication and exchange of information. In concurrent initiatives the approach of establishing national/local centres has proven to be successful in the transfer of knowledge and experience. Looking at concurrent initiatives also directions have been provided for the means of communication. The following main elements, or communication means, of a Community Platform are selected: newsletter, brochure, internet platform (website and discussion forum), congress, workshop/training, direct funding and funding in the form of EU RTD programmes.

Scenarios of actions and events to rise awareness

The set up of a Community Platform and the organisation and implementation of its activities can follow a step by step approach. Three scenarios of actions and events to rise awareness are elaborated for a period of 4 years. Every scenario has two versions: an average version and a low cost version. The scenarios (and costs estimates) of the three scenarios differ due to an increased degree of awareness raising. The costs estimates of the three scenarios amount to 1) 6950 - 11050 k€, 2) 13750 - 22200 k€ and 3) 18900 - 31150 k€ respectively (see table).
### Monitoring proposal

The following suggestions for monitoring are proposed:
- The amount of SMEs with a (product-oriented) environmental management system (EMS) according to EMAS/ISO 14001
- The amount of products with an ISO-type I eco-label, sold by the retail
- The amount of published, LCT related product tests

When a limited amount of monitoring issues is preferred it is advisable to follow the increase/decrease of EMAS certifications (may be in combination with ISO 14001) and products with ISO type I labels, sold by retail and bought by consumers (actual registration figures are presented in the report).

In co-operation with the European and national target group and sector associations/organisations a monitoring programme could be developed for measuring the progress in the uptake of life-cycle thinking. The results of the monitoring could be registered and published, thereby creating a transparent and imitable monitoring procedure.

### Recommendations

Given the successes of the Innovation Relay Centres Network (a European network of 68 IRCs) and the UNEP (a network of Cleaner Production centres), it is advisable to support the establishment of an European network of LCT expertise centres. The Danish, Swedish and Dutch initiatives can serve as an example; they can explain their services and can present lessons learnt, success stories and observed needs of the different target groups/stakeholders. Further expansion can be strongly supported by the EU DG Environment.

Furthermore the EU can stimulate the development of simple and user-friendly, customised tools. The EU could also support the promotion of eco-labelling by supporting co-operations on this area between retail organisations and consumer organisations in the different EU member states.
A monitoring system to measure the uptake of life-cycle thinking in the target groups is needed. It is recommendable to set up monitoring systems in co-operation with the European and national target group/sector associations and organisations. Also the national authorities (or the already established expertise centres) could play a supporting and facilitating role.
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1. Introduction

1.1 Integrated Product Policy (IPP) and Life-Cycle Thinking

In the Communication on Integrated Product Policy, published in June 2003, the European Commission set out its strategy for putting Integrated Product Policy (IPP) into practice. Life-cycle thinking is one of the key principles of IPP.

Life-cycle thinking (LCT)\(^1\) considers the whole life-cycle of a product and aims for a reduction of its cumulative environmental impacts - from the “cradle to the grave”. In so doing it also aims to prevent individual parts of the life-cycle from being addressed in a way that just results in the environmental burden being shifted to another part. By looking at the whole of a product’s life-cycle in an integrated way, IPP also promotes policy coherence. It encourages measures to reduce environmental impacts at the point in the life-cycle where they are likely to be most effective in reducing environmental impact and saving costs for business and society. [2]

A schematic life-cycle of a product is shown in Figure 1.1, showing all phases from the mining of raw materials to the production, distribution, use, recycling and/or recovery and final disposal of a product.

![Figure 1.1 Schematic life cycle of a product [1]](image)

For IPP to be effective life-cycle thinking needs to become second-nature for all those who come into contact with products. Educational and awareness-raising

\(^1\) As opposed to Life-Cycle Assessment (LCA) which is different and involves the quantification and assessment of the environmental impacts of a product throughout its life-cycle, albeit for practical reasons, in narrowly defined boundaries.
measures are best undertaken closest to the citizen, i.e. on a national and regional level. On a Community level the Commission plans several activities to make life-cycle information and interpretative tools more available. One of the activities is providing a platform to facilitate communication and exchange of experience between stakeholders. [3]

This study concerns the specific needs of small stakeholders with regard to this platform. Knowledge is developed about the level of awareness of life-cycle thinking in small European firms, retailers and consumer organisations and their needs for further communication and exchange of information and support.

1.1.1 Relation with total IPP program

The results of the study will contribute to the establishment of framework conditions for the continuous environmental improvement of all products throughout the production, use and disposal phases of their life-cycle.

In addition to the establishment of framework conditions a focus is developed on products with the greatest potential for environmental improvement. A research project was started to identify these products. Pilot projects on particular products have been initiated in 2004. In these pilot projects the potential benefits of IPP can be demonstrated in a practical way. The results from the research project as well as the pilot projects will however be made available too late to be incorporated into this study.

1.1.2 Specific target groups

In this study a baseline of knowledge is established about the level of awareness regarding life-cycle thinking in small European firms, retailers and consumer organisations, and their needs for further information and support.

The three target groups in the study are first described in more detail.

Small firms

‘Small firms’ or ‘small and medium-sized enterprises’ (SMEs) in this document refers to organisations and enterprises with up to 250 employees, full-time equivalent.

This is a very heterogeneous group and large differences exist between individual companies, both in terms of sector and size. Enterprises are included ranging from the microenterprises (fewer than 10 persons) to the medium-sized enterprises (fewer than 250 persons) [4].
Retailers

‘Retailers’ refers to the firms at the end of the distribution chain, which normally buy a product from a wholesaler in order to sell it to the final consumer. Again the differences within the group of retailers are large, both the independents and the large multiple stores are included, selling a wide selection of products.

The target groups of small firms and retailers overlap. EuroCommerce (representing the retail, wholesale and international trade sectors in Europe) indicates that SMEs make up 95% of companies in the commerce sector [5]. For the sake of clarity the small retailers are considered in the target group of retailers here.

Consumer organisations

Consumer organisations are defined here as organisations with the general aim to defend and promote the interests of consumers, as purchasers or users of goods and services. Consumer organisations represent the interests of the consumer and act exclusively on behalf of the consumer, furthermore they are non-profit making in character. The type of consumer considered here is the individual, acting as private consumer. The professional or corporate consumer in the supply chain of manufacturers, and agencies of government carrying out public purchasing are out of the scope of the study.

A consumer organisation can also be a federation of consumer organisations, e.g. the European Consumers' Organisation BEUC representing a number of 36 independent national consumer organisations from the EU and EEA (European Economic Area) countries.

1.2 Objective and tasks

1.2.1 Objective

The objective of the study is to establish a baseline of knowledge about the level of awareness regarding life-cycle thinking in small European firms, retailers and consumer organisations, and their needs for further information and support.

This “level of awareness” refers to the knowledge about and experience with underlying technical and environmental principles of life-cycle thinking as well as the exposure to life-cycle principles in product-related policies.
This baseline of knowledge can be used as a benchmark in future investigations. The elements needed for a Community platform to facilitate communication and exchange for the target groups are derived from this baseline.

1.2.2 Scope

The study is primarily based on published information. In addition interviews are held to fill in some of the crucial gaps in the available information.

The target groups in this study are European firms, retailers and consumer organisations. In this context ‘European’ means registered and operating in the EU, Candidate Countries, EEA\(^1\) and Switzerland.

1.2.3 Description of tasks

In this study the following five tasks are performed to achieve the above objective:
1. Analyse the state of awareness regarding life-cycle thinking in small firms, retailers and consumer organisations;
2. Analyse the main trends in the use of life-cycle assessment tools in the target groups;
3. Analyse who are the main promoters of life-cycle thinking in industry and business and how they target small firms, retailers and consumers;
4. Based on the results of tasks 1 to 3 define what are the main needs for intensified communication, exchange of information and promotion activities in Europe. Recommend specific additional measures that can be taken on the Community level;
5. Attendance and presentations at a workshop.

The results of the tasks 1 to 4 are successively described in the chapters 2 to 5. A report of the workshop is given in appendix 4.

1.2.4 Relation between tasks / report structure

The additional measures regarding life-cycle thinking that can be taken on a Community level follow from the state of awareness regarding life-cycle thinking in the target groups (chapter 2), the main trends in the use of life-cycle assessment (LCA) tools (chapter 3), the current promotion of life-cycle thinking (chapter 4) and the main findings and needs for intensified communication, exchange of information and promotion activities (chapter 5). A form for a Community platform, in which the target groups can be addressed, is proposed in a scenario of

\(^{1}\) In the European Economic Area (EEA) the 25 EU Member States and the three EEA EFTA\(^2\) states Iceland, Liechtenstein and Norway are united.
actions and events to raise the awareness (chapter 6). The conclusions and recommendations of the study are presented in chapter 7. See Figure 1.2.

A workshop was organised to review the results of the study. The input from stakeholders participating in the workshop is incorporated as much as possible within the scope of the study.

![Figure 1.2 Relation between tasks]

1.3 Study approach

1.3.1 Chain approach

Target groups in the product chain

For enterprises, life-cycle thinking brings about a shift of focus from within the enterprise’s fence to the entire product chain. Materials (and services), information and value/cash flow throughout this product chain (Figure 1.3); materials from the producers of raw materials towards consumers and disposal, and cash and value from the consumer to the producer. From the environmental point of view, so far attention has been focused on the flow of materials, for example by carrying out life-cycle assessments. In addition to
this environmental optimisation of the material flow in the supply chain, at the same time a focus needs to be developed on the customer’s expectations regarding environmental considerations in the value chain. Communication and cooperation in the product chain relates to mutual exchange of knowledge and experience between all partners involved, connecting the supply and value chain. [6]

The target groups of the study are small firms, retailers and consumer organisations. Their position in the product chain, see again Figure 1.3, defines to a large extent the form and intensity of communication with other partners in the chain.

![Figure 1.3](image-url)  
**Figure 1.3** Target groups in the product chain (adapted from a figure of [6])

Small firms for example (as defined in this study), can be located in the beginning of the product chain. Regarding the stage of the product chain, several possibilities exist, thus making this group a very heterogeneous one. A small firm can be a producer or a supplier of either raw materials, semi-finished or final products. As a result the suppliers and customers of a small firm can be very different as well, the customer can for example be an industrial client or the final consumer. The position in the product chain is therefore an important issue, when analysing the level of awareness regarding life-cycle thinking for this target group and will therefore be considered throughout the report.

For the target groups retailers and consumers, the position in the product chain is more obvious. Retailers (including the small ones), as an intermediary between producers (/distributors\(^1\)) and consumers, are highly important in marketing greener products and communicating the environmental qualities of a product to the consumer. They influence to a great extent the purchasing decisions of the consumers by what they offer in their stores and by communicating the advantages of greener products. On the other hand retailers, through their purchasing

\(^{1}\) i.e. wholesalers.
requirements to suppliers, are able to specify standards of environmental performance. This all makes that retailers are potentially a major force in the product chain.

In addition to this it is highly important to differentiate between the different sizes of retailers. The larger retailers have more means, in the form of human and financial resources, for taking environmental initiatives and have, through their larger purchases, more influence in the product chain compared with smaller retailers.

Firms or retailers, using the environmental characteristics of a product in product marketing, can do this in different ways. The three main ways are:

1. eco-labelling, primarily aimed at consumers,
2. environmental characteristics (particular aspects of the product’s environmental profile, e.g. recyclability or degradability of a product) and
3. environmental product declarations (EPDs), primarily aimed at professional buyers. [6]

Consumer organisations, as a representative of the consumer’s interests, focus on the consumer’s need for (and right to) information. As indicated above, eco-labelling is central in the communication of a product’s environmental characteristics to consumers. Other ways to inform consumers about the environmental characteristics of products are product tests, published in consumer testing magazines. These product tests often focus on specific aspects of a product’s environmental profile, e.g. the energy consumption or the application period of a product.

In analysing the awareness regarding life-cycle thinking in the target groups and their needs for information and support, the specific position in the product chain as well as the current, and potential, role in the product chain will be considered throughout the study.

Applications of LCT in the product development chain

The level of awareness is defined as the knowledge about and experience with underlying technical and environmental principles of life-cycle thinking as well as the exposure to life-cycle principles in product-related policies (section 1.2.1).

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1 Other more informal ways of communicating the environmental qualities of a product are for example: figures or fact sheets of a product’s environmental impact (during production), conversations with customers, newsletters, manuals for environment-friendly use and disposal of a product, lectures or presentations at conferences, contacts with media and articles in trade journals.
The knowledge about and experience with life-cycle thinking can be expressed by the application of tools for various kinds of tasks. The three main types of tasks, mentioned in [6] and considered in this study are:
1. Assessment of the most significant environmental impacts from cradle to grave
2. Ideas for environmental improvement of a product (eco-design)
3. Environmental communication in the product chain and cooperation with partners.

Tools for life-cycle thinking, for example life-cycle assessment (LCA), can be used in many different ways in companies and several classification methods have been proposed in literature. Berkhout [7] and Smith et al. [8] link the use of LCA to the position of the company in the product chain. So do Jensen et al. [9], who also specify the level of detail in LCA (conceptual, simplified, detailed) related to each use. In general the criteria mainly used in literature to classify LCA applications distinguish between internal and external uses with respect to the firm [10] [8] [11].

Frankl and Rubik [11] and Tukker et al. [12] suggest a classification according to the product development chain. Frankl & Rubik [11] further highlight that uses can be classified along the product development chain and can either be retrospective, e.g. giving just a picture of the existing situation, or prospective, leading to innovation and systematic use.

In Figure 1.4 the possible applications of LCT are shown for four stages in the product development chain:
1. Strategy definition
2. R&D and design (eco-design)
3. Procurement and production
4. Marketing
   and along the product development chain:
5. Information, training and education
1. STRATEGY DEFINITION

- Negotiate long term legislation
- Radical changes in product life cycle
- Shift from product to service and creation of new markets
- Anticipate legislation

2. R&D AND DESIGN

- Product innovation

3. PROCUREMENT AND PRODUCTION

- Procurement specifications, supplier screening, product stewardship and co-makership
- Process optimisation
- Cost allocation

4. MARKETING

- Compare existing products and services
- Compare product performances with standards and eco-labeling criteria

5. INFORMATION, TRAINING AND EDUCATION

- Inform employees (internal)
- Negotiate legislation and lobbying, inform consumer and stakeholders (external)

Figure 1.4 Classification of LCT and LCA applications according to the product development chain [11]

Figure 1.4 also distinguishes between internal and external use of applications. Operational tools used for internal uses (environmental product innovation) are for example:

- Checklists
- Eco-design
- Environmental Management Systems (EMS) and product-oriented EMS (POEMS)
- Life-Cycle Assessment (LCA)
- Material balances / material flow accounting
- Environmental impact assessment
- Environmental risk assessment

Due to their specific position and function in the product chain (e.g. in the manufacturing industry or in closer contact with the manufacturing industry), it can be expected that the target groups of small firms and retailers are more involved in product development in the strict sense, and as a result in the use of the before mentioned tools.

The LCT and LCA applications for external purposes are mainly related to Environmental Product Information Schemes (EPIS). For external uses the following operational tools can be used:

- ISO-type I labels
- ISO-type II labels
- LCA / ISO-type III labels / Environmental Product Declarations (EPD)
- Environmental / Sustainability Reports
- Supply chain management
The tools mentioned before, such as EPIS and eco-labels, enable the transfer of environmental product information towards business clients and final consumers. The target groups of retailers and consumers (organisations) are involved in the use of these tools, while the small firm manufacturers may provide the basic data and promote their use for marketing purposes.

The tools listed are not exhaustive, they do however give a good impression of the kind of tools applied in general in life-cycle thinking.

In analysing the knowledge about and experience with life-cycle thinking in the target groups the application of tools is outlined, taking into account the stage of the product development chain, with a focus on the most relevant tools for the target group involved.

1.3.2 Sustainable Consumption and Life-Cycle Thinking

Integrated Product Policy (IPP) seeks to minimise the environmental impacts of a product by looking at all phases of a products' life-cycle and taking action where it is most effective. One of the basic principles of IPP is life-cycle thinking. The life-cycle of a product covers all the areas from the extraction of natural resources, through their design, manufacture, assembly, marketing, distribution, sale and use to their eventual disposal as waste. At the same time it also involves many different actors such as designers, industry, marketing people, retailers and consumers. [147] Obviously the retailers and consumers are particularly oriented towards the use of services and products. A term often used in this context - and related to life-cycle thinking - is ‘sustainable consumption’.

Sustainable Consumption has been defined as: ‘The use of services and related products which respond to basic needs and bring a better quality of life while minimizing the use of natural resources and toxic materials as well as the emissions of waste and pollutants over the life-cycle so as not to jeopardize the needs of future generations.’ (UN CSD International Work Programme, adopted in 1995).

The concept of life-cycle thinking, as the key subject of this study, can be seen as a basic principle to achieve sustainable consumption. And so life-cycle thinking and sustainable consumption are clearly related. Moreover, when addressing the environmental impacts of products ‘sustainable consumption’ is a term often used by the target groups of retailers and consumer organisations. Sustainable consumption activities can therefore be an indication of the level of life-cycle thinking.

Nevertheless there is an important difference between both concepts as well. Apart from the environmental perspective applied in life-cycle thinking (in this study), sustainable consumption also involves social and economic issues. From this point
of view the concept of sustainable consumption is broader than the concept of life-
cycle thinking.

*Therefore whenever the term sustainable consumption is used further on in the
report, just the environmental issues are considered.*

Another remark to be made here is that the retail and consumer organisations each
have their own particular areas or sectors of interest in sustainable consumption.
These interests can be overlapping, but there can also be differences.
Environmental issues addressed by both retailers and consumer organisations are
for example energy labels, environmental labels and the EU Flower. On the other
hand environmental issues addressed by retailers are more often related to
packaging, transport efficiency and waste management.
The EuroCommerce ‘Annual Report 2003, Action Plan 2004’ covers the following
LCT related priorities for commerce for the year 2004 and beyond: European
chemical strategy, Integrated Product Policy, thematic strategy on the prevention
and recycling of waste, transport and environment, packaging waste, eco-design of
energy-using products, batteries and accumulators.
From a consumer protection perspective consumer organisations currently
underline the importance of consumer information on the manner in which
products are produced or what is in them (e.g. dangerous chemicals in everyday
consumer products). Sustainable consumption is one of the current campaigning
priorities of the BEUC. The campaign addresses the following LCT related issues:
‘chemicals in our daily shopping basket’, toiletries, hair dyes, labels and green
claims.
These differences in priorities between the target groups of retailers and consumer
organisations illustrate the possible differences in interpretation and
implementation of a concept such as sustainable consumption, or life-cycle
thinking. Both retail and consumer organisations will emphasize their own target
group specific (and sector specific) issues of interest, described in more detail in
chapters 2 and 4 of the report.

### 1.3.3 Baseline for future assessment of progress

The study establishes a baseline of knowledge about the level of awareness
regarding life-cycle thinking in the target groups, and their needs for further
information and support. This level of awareness (and also the related baseline of
knowledge) is dependent on the position of the target group in the product chain
and the kind of communication the target group activates with other stakeholders.
This internal or external communication will be facilitated by the application of
tools (see 1.3.1).
The magnitude, the volume of this application can be interpreted as an illustration for the level of awareness. Monitoring this magnitude (volume) or changes in it can be the base for benchmarking.

In order to use this approach as a benchmark in future investigations monitoring evaluation in chapter 2 (task 1; state of awareness regarding life cycling thinking) and chapter 3 (task 2; main trends in the use of LCA tools) are based as much as possible on quantifiable and verifiable information. During gathering the information for these tasks the attention was focused on data that are likely to be available in an updated form in future years.

The proposed monitoring methods for the individual target groups and related collected data and information for the execution of these tasks are documented in the relevant chapters and appendices.

1.3.4   Information gathering process

The information gathering process starts with consulting and evaluation of the available information sources. These sources are the available and collected literature and the own experiences of the project team, supported by knowledge/experience, which is traceable in their own organisations.

*Literature*

The study is primarily based on published information. The literature search is restricted to recent publications (not older than five years), apart from some key information sources which are older. The information sources consulted include studies carried out by the Commission, UNEP, research institutes, universities, target group organisations, sector organisations. Regarding the information from sector and target group organisations annual reports, position papers and general information on topics, priorities and campaigns were used for this study.

Some of the main references (titles) include (list not exhaustive):
- Developing Effective and Efficient Product Information schemes (DEEP) [41];
- ‘Eco-design: European State of the Art’ [17];
- ‘Eco-design: Strategies for Dissemination’ [12]
- ‘Evaluation of Environmental Product Declaration Schemes’ [39];
- ‘LCA in industry and business - adoption patterns, applications and implications’ [11];
- INTEND project - Definition of an EPD system that can be applied at international level and its implementation in two pilot countries (Sweden and Italy), [69];
- A survey on Italian eco-districts [105]
Own experiences

The many years of experience and the knowledge built up in this area of the organisations TNO, Ecobilancio and CML were considered and applied during the execution of the study.

Some of the critical information gaps were filled in with the help of consultation of external people (including participants of the workshop) and with the help of a market survey. This part of the information gathering process is described more in detail hereafter.

Experts

Additional information was gathered by contacting a number of experts for specific issues in the report. This happened for example in gathering information for task 2 (affordability of LCA tools) and task 3 (promotion activities).

Market survey

In addition to the use of published information the services of an independent market research company were used for gathering additional information. A telephonic survey was conducted to obtain objective, representative and reliable information about the marketing strategies of:
1. providers of LCA software and databases, and
2. promoters and supporters of life-cycle thinking.

The information available from the survey was used in tasks 2 (affordability of LCA tools) and task 3 (marketing strategies of promoters).

A selection of companies and organisations was contacted for this survey, including commercial and non-commercial providers of LCA services, consumer/retail/industrial associations, ministries and governmental organisations. The survey consisted of both open and closed questions. In total 52 people have been surveyed. The results are based on 21 interviews among providers and 31 interviews among promoters/supporters.

The international survey was focused on Europe and completed with responses from the United States, Japan, and Australia. All respondents have been interviewed in either Dutch or English.

The information has been collected in April 2004 with a combined telephonic/written survey. Potential respondents who could not be reached by phone or indicated that they preferred a written or digital survey have been
sent a written or email questionnaire. More detail information on the survey can be found in chapters 3 and 4.

**Workshop**

A workshop was organised on June 14th 2004 to discuss the draft results of the study with stakeholders from the target groups and promoters or experts in the field of LCT from industries, public authorities, research organisations and universities. A report of the workshop can be found in appendix 4.

At the workshop representatives from the target groups of retailers and consumer organisations were unable to attend. For obtaining additional information from these target groups a selection of retailers and consumer organisations have been interviewed. An additional questionnaire was made for this purpose (see appendix 5).

**Additional questionnaire**

An additional questionnaire was sent to twelve retailers/retail organisations and eleven consumer organisations. The main subjects in the questionnaire are the awareness regarding life-cycle thinking, the use of LCA tools, the promotion of life-cycle thinking and the needs for further support regarding awareness increase.
2. State of awareness regarding life-cycle thinking

2.1 Introduction

In this chapter the current state of awareness regarding life-cycle thinking in the target groups is analysed and evaluated for Europe in general, and in particular for some specific sectors. This level of awareness refers to the knowledge about and experience with underlying technical and environmental principles of life-cycle thinking as well as the exposure to life-cycle principles in product-related policies.

In section 2.2 this knowledge of and experience with life-cycle thinking is analysed for the three target groups in general. The following issues are addressed:

− The understanding of the concept of life-cycle thinking, translation of the concept into operation and the use of LCA tools.
− Communication of life-cycle thinking, within the target group and to external stakeholders (means of communication used, e.g. ISO type I, II and/or III eco-labels).

Special attention is given to the specific position of the target groups in the product chain (see section 2.2), as this position (and function) in the product chain relates to the operational tools, that can be used.

In section 2.3 the more generic findings, results, for the targets groups are analysed in more detail with the help of a sector approach (industrial product chain approach). Especially the specific LCT issues receiving attention by the target groups are described and evaluated here.
A selection of LCT issues which could be monitored are recommended in section 2.2. The observed differences in the actual application of tools (kind of tools and use intensity) as well as the differences between sectors are the basis of a monitoring method to measure the progress in the level of awareness.

The differences between (groups of) European countries and between the EU and other economic blocks (US and Japan) are described in section 2.4.

This chapter is finalised by section 2.5, the summarizing conclusions, which gives an indication of the level of awareness regarding LCT in the target groups. Moreover the main differences observed are presented:

− between target groups, specific positions in the product chain
− between (industrial) sectors, products (categories)
− between (groups of) countries.
Dedicated conclusions with respect to the awareness of the target groups are described at the end of the sections 2.2.1, 2.2.2 and 2.2.3 respectively. For the sector analyses an evaluating conclusion is given in section 2.3.8. Dedicated conclusions with respect to region differences are described at the end of section 2.4.1 “differences between European countries” and at the end of section 2.4.2 “differences between economic blocks”.

2.2 Target groups

In this section the level of awareness regarding life-cycle thinking is analysed for the three target groups in general. Regarding the translation of the concept of LCT into operation the (possible) position within the product chain (see section 1.3.1) is considered.

2.2.1 Small firms (SMEs)

General

For an overall picture of the level of awareness of SMEs throughout Europe the remarks of the European Association of Craft, Small and Medium-sized Enterprises, the UEAPME, on LCT related issues were considered.

The UEAPME says that, overall SMEs are not very familiar with the concepts of Life Cycle Analysis (LCA). The application of IPP concepts by micro and small businesses requires, therefore, a profound cultural change in the way they conceive and manufacture their products, which cannot be immediate [13].

In ‘UEAPME’s opinion on the Green Paper on Integrated Product Policy’ of June 2001 [14] the UEAPME claims that the current reality is that:
- Most SMEs do not have any environmental policy and still do not consider the protection of the environment as one of their daily priorities;
- Most SMEs do not apply concepts such as LCA and/or eco-design in their production processes;
- On average, very few SMEs have already implemented EMAS and/or other forms of environmental management systems and have eco-labelled products in their product ranges.

The ‘UEAPME Position Paper on the Commission Draft Proposal for a Directive on establishing a Framework for Eco-design of End Use Equipment’ [15] states that SMEs, and particularly, micro and small businesses, are not used to work with concepts such as LCA. Most of these businesses have very short term planning, due to the fact that they must cope with urgent daily problems (such as financing, excessive bureaucracy, harsh relations with main contractors, etc.). As a result of
this situation the environment has not been one of their main priorities so far, and most micro and small businesses have still not adopted any environmental policy.

UEAPME believes [13] that in order to implement IPP:
− SMEs must be made aware of the concept;
− Technical and financial assistance and training must be provided in order for businesses to change their production processes accordingly.

This view on the state of awareness regarding life-cycle thinking in SMEs is confirmed by several other literature sources, such as [16] and [17] regarding eco-design (see hereafter).
The report of the Best Project Expert Group [16] states that SMEs themselves are often unaware, or not fully aware, of the environmental impacts of their activities, and that they are not always well informed about their obligations under environmental legislation.

However, it is essential to underline once again that many differences exist between SMEs and that there is not one uniform kind of organization. After all, a manufacturing company with 220 employees is rather different from a consultancy company with 2 employees1.

Regarding the size of the SME, literature source [16] indicates that evidence suggests, that there is a correlation between a company’s size and its environmental engagement: the bigger the company, the more likely it is to have a pro-active environmental policy.

Apart from the differences in size, it is important to make a distinction between SMEs according to their position in the product supply chain. These differences are expressed in the translation of life-cycle thinking into operation and the use tools, described in more detail hereafter.

**Position in the supply chain**

With Figure 1.3 in mind SMEs can be distinguished according to their position in the product supply chain; they can be either:
− a supplier of intermediate products to larger companies, or
− selling final products to distributors/retailers.

In the case that the firm is a supplier of intermediate products to larger companies, there is little influence on the specifications of the products produced. In fact many SMEs are not involved in product-related activities or have little or no influence on the specifications of the products they produce. They act as so-called

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1 In the EU, 99 percent of the more than 20 million (non-primary sector) private enterprises are SMEs. The overwhelming majority of these (19 million) employ fewer than 10 people. [16]
jobbers that just produce according to the specifications and needs formulated by larger actors\(^1\) such as main suppliers or original equipment manufacturers. [12][17]

These main suppliers in the industrial value chain have usually been the first to face the various environmental demands of other stakeholder groups and have already been forced to improve their environmental performance. The requirements concerning environmental performance of companies/products typically move upstream in the value chain, because the main suppliers involved in environmental improvement become increasingly aware of the environmental impacts of the raw materials and components of their products. [18]

According to Bradford [19] there is already an increasing pressure for SMEs to adopt environmental management systems, to label products and to pay attention to the concerns of stakeholders. Eventually this will lead to a situation where even the smallest companies in the value chain are required to improve their environmental performance [18].

Cases of SMEs involved in life-cycle thinking through their industry clients can be found in for example the automotive or white goods sector.

In case the firm is selling final products, e.g. paper products or furniture, the firm is in general more pro-active.

As shown in Figure 1.4 life-cycle thinking can be implemented into several phases of the product development chain. The operational tools used, both internally and externally, are largely defined by the position of the SME in the product supply chain. For example, while manufacturing SMEs may be active in the field of eco-design or cleaner production, the merely trade or service oriented companies may focus on eco-labelling activities. These different issues are further elaborated hereafter.

**R&D and Design**

The research of Tukker et al. [17] suggests that in many firms, particularly SMEs, eco-design plays a very small role:

- Some SMEs have experiences with eco-design in single projects, but these projects rarely lead to implementation of eco-design in product development processes.
- Strategic goals regarding environmental product policy are very rare, and eco-design is not a management issue in SMEs.
- When eco-design is practised by SMEs, the focus is on the environmental redesign of products rather than the development of new product concepts (eco-innovation)\(^1\).

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\(^1\) The study by Tukker et al [17] on the European state of the art of Eco-design mentions the fact that the actual application of eco-design in SMEs lags behind may be irrelevant if multinationals influence most design decisions with regard to the products that cause the highest environmental burden.
The study also concluded that the intensity of eco-design activities in SMEs lags behind that in large companies. In relation to dissemination programmes set up, in particular in Denmark, The Netherlands, Austria and Sweden a few hundred SMEs in each of these countries have become acquainted with eco-design. However, this was often rather passive and in many cases did not lead to actual implementation. The research of Tukker makes clear that even where good support structures exist, actual design lags behind. The findings suggest that even in the front-runner countries\(^2\) 90% or more of the firms in general are at best aware of the issue of eco-design. Part of these firms is self-specifying\(^3\), while a large number of SMEs just routinely apply a process and design is no issue at all. [17]

**Production**

The practice of ‘cleaner production’ is quite common for a group of SMEs in frontrunner countries. Both production and design dedicated to green products is present at only a small group of SMEs (mainly in Germany, Spain, The Netherlands and Sweden), but these are exceptions [17].

The report of the Best Project Expert Group on public policy initiatives to promote the uptake of EMS in SMEs [16] describes environmental management systems (EMS) as a key tool to help reduce environmental impacts and achieve sustainable production patterns. EMSs are amongst the most well-known and most important voluntary tools used by enterprises to improve their environmental performance, and help ensure compliance with environmental legislation. The two formal EMSs are the international standard EN ISO 14001 and the EU’s Eco-Management and Audit Scheme (EMAS) formalised in the form of an EU Regulation. EMSs can also take a number of less formal, “adapted” forms.

At present, the uptake of both formal and less formal EMSs by SMEs across Europe is low. Nonetheless, some countries and regions clearly perform better than others. [16]

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1. Here it can be noted that innovations may require rather different production structures and while large firms may be large and flexible enough to adapt, many smaller firms may discover that functional innovations mean the end of their current business. [16]
2. Particularly Denmark, Germany, The Netherlands, Austria and Sweden [16].
3. With an in-house design function and/or major influence on the design of the product(s) they produce, enabling them to consider the environment and the sustainability in the product design strategy.
The 2nd edition of ISO 14001 ISO 14001:2004 was released for publication November 15, 2004. Changes to the new standard clarify and simplify the requirements, and align the standard with ISO 9001:2000. An important change is the stronger focus on the life-cycle approach of environmental management according to ISO 14001.

This International Standard specifies requirements for an environmental management system, to enable an organization to develop a policy and objectives taking into account legal requirements and information about significant environmental aspects. It applies to those environmental aspects which the organization can control and those which it can influence.

In table 2.1 an overview is given of the registered EMAS organisations and sites with the distribution in Europe. Currently there are 4221 sites in 3160 EMAS organisations.

Table 2.1 Overview of registered EMAS organisations, sites and SMEs

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of EMAS registered organisations</th>
<th>Number of EMAS registered sites</th>
<th>Number of SMEs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>262</td>
<td>344</td>
<td>210</td>
</tr>
<tr>
<td>Belgium</td>
<td>33</td>
<td>179</td>
<td>20</td>
</tr>
<tr>
<td>Cyprus</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Czech Republic</td>
<td>18</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td>124</td>
<td>266</td>
<td>93</td>
</tr>
<tr>
<td>Estonia</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finland</td>
<td>40</td>
<td>46</td>
<td>10</td>
</tr>
<tr>
<td>France</td>
<td>20</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>Germany</td>
<td>1595</td>
<td>2041</td>
<td>556</td>
</tr>
<tr>
<td>Greece</td>
<td>6</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Hungary</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Ireland</td>
<td>8</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>Italy</td>
<td>315</td>
<td>388</td>
<td>193</td>
</tr>
<tr>
<td>Latvia</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lithuania</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Luxembourg</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Malta</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>The Netherlands</td>
<td>25</td>
<td>29</td>
<td>2</td>
</tr>
<tr>
<td>Norway</td>
<td>25</td>
<td>25</td>
<td>1</td>
</tr>
<tr>
<td>Poland</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Portugal</td>
<td>27</td>
<td>30</td>
<td>18</td>
</tr>
<tr>
<td>The Slovak Republic</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Slovenia</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Spain</td>
<td>494</td>
<td>628</td>
<td>362</td>
</tr>
<tr>
<td>Sweden</td>
<td>100</td>
<td>115</td>
<td>57</td>
</tr>
<tr>
<td>The UK</td>
<td>62</td>
<td>63</td>
<td>11</td>
</tr>
</tbody>
</table>
For EMAS it is possible now (for the first time) to give an overview of the SMEs, which have an EMAS certificate. The EMAS helpdesk in co-operation with the Chambers of Commerce has sent such an overview: see Table 2.1 for the number of registered SMEs per country. The helpdesk mentioned that the data are still not fully representative, but rather gives an impression on the situation. The helpdesk updates the figures constantly, so these overview can be a base for benchmarking [148].

**Marketing**

As far as the involvement of SMEs in LCT for marketing purposes and the involvement in eco-labels and environmental product declarations is concerned, no recent systematic assessment studies focused on SMEs exist in literature. However, some indications can be given.

According to the UEAPME [20] the participation rate of SMEs in the EU eco-label system is 80% (about 80% of enterprises which have the EU Eco-label are SMEs), but the total of EU Eco-labels distributed is still at a low level.

Roughly this corresponds with the participation of SMEs in the Dutch Milieukeur (appr. 70%). Nonetheless, according to UEAPME, despite the positive progress there are still improvements to be made in order to increase the participation of SMEs in the Eco-label system [20].

In specific industry sectors (mostly short-medium life products) and in some countries, SMEs selling final products use eco-labels as a marketing tool, mostly to differentiate their positioning on the market.

Figure 2.1 presents an overview of the amount of SMEs with the EU Flower by product group. In the product groups of paints/varnishes, textile products and tourist accommodation service the amount of SMEs is largest.
Figure 2.1  Amount of SMEs with the EU Flower by product group

An overview by country of SMEs with the EU Flower can be found in section 2.4.1.

As far as business-to-business communication is concerned, the participation of SMEs in the EPD systems reported by GEDnet [21] is very limited. This is also the reason why in Sweden, an approach for a stepwise introduction to EPD for SMEs is currently being developed [22].

SMEs also participate in some sector-specific environmental declaration systems (i.e. in the building sector) and/or use other communication tools referring to the life-cycle of products (e.g. environmental/sustainability reports). However, the direct use of LCT for marketing purposes is very limited. In business-to-business relations SMEs are mostly involved through their industry clients (large companies) and usually other communication / data format tools are used. The most widely used operational tools for communication of life cycle information in this case are checklists (mainly developed by large industrial clients) and/or other data sheets, with which SMEs provide the required data to their clients.

The use of EPD as data communication tool within the supply chain is in principle possible, but so far, with exception of the building sector, this use of EPD by SMEs is still very limited. This reflects the difficulties of SMEs for carrying out complete LCA studies and participating in EPD schemes.

Table 2.2 presents the share of SME companies in the total amount of companies having an EPD registered at www.environdec.com [21].
Table 2.2  Amount of companies with EPD (by country) [21]

<table>
<thead>
<tr>
<th>Country</th>
<th>SMEs</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Finland</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>Sweden</td>
<td>3</td>
<td>14</td>
</tr>
<tr>
<td>Japan</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>6</td>
<td>32</td>
</tr>
</tbody>
</table>

Conclusions

It can be stated that in general the level of awareness within SMEs is rather low. Some beginning initiatives are observed in several European countries. On the European level a stimulating role can be filled in by the European branch association of SMEs (UEAPME), which has good contacts with national branch organisations.

The operational LCT tools applied by SMEs (in the manufacturing industry) for internal use are:
- Eco-design
- (Product oriented) environmental management systems
- Checklists
- Quick scan life-cycle assessment

Furthermore the SMEs selling final products (both the manufacturing and trade/service oriented companies) apply the following operational tools for external use:
- ISO-type I or type III labels

With regard to the mentioned labels the application of “Eco-design” and “Checklists” is internal and sometimes ad hoc, which means that these applications are difficult to monitor and are mostly not registered. The same can be concluded for the execution of “Quick scan life-cycle assessment” methods.

Suggestions for benchmarking are: the amount of SMEs with a (product-oriented) environmental management system (EMS) according to ISO 14001/EMAS. In Table 2.1 we have presented an overview of registered EMAS organisations and especially registered SMEs. The increase/decrease of these EMAS registrations form a base for benchmarking.

In chapter 2.4.1 (country differences) with corresponding appendix 7 we have given an overview of the ISO 14001 certifications per country. This overview contain enterprises, but not the degree of SMEs. Reinhard Peglau (UBA Berlin) states that it is not possible to register the amount of certified ISO 14001 SMEs per country; UBA has checked this with the ISO bureau [149]. The reason for this is
that all kind of organisations and also parts of an organisation can have an ISO 14001.
The amount of SMEs selling products with an ISO-type I or ISO type III eco-label can also be a starting point for benchmarking and these amount of eco-labels is registered per eco-label, country and product group (see for example Figure 2.1 and 2-7 for the amount of SMEs with the EU flower by product group and by country respectively; Table 2.2 for EPDs and also section 2.4.1).

To conclude the most useful benchmark possibilities for the EC are:
- The amount of SMEs with an EMS according to ISO 14001/EMAS.
- The amount of SMEs producing products with an ISO-type I or type III label. In this section (2.2.1) and section 2.4.1 the available figure overviews are presented; therefore the best references have been consulted worldwide.

In co-operation with UEAPME and the national SME organisations it must be possible to decide which monitoring system is most suitable: EMAS (in combination with ISO 14001 possibly) and/or EU flower (in combination with national systems possibly). The inclusion of an EPD monitoring system for the latter one is an option. It takes a lot of work to set up such a monitoring system and is beyond the scope of this study.

2.2.2 Retailers

General

For an overall picture of the level of awareness of retailers throughout Europe the remarks of Eurocommerce were considered. Eurocommerce is the European association, representing the retail, wholesale and international trade sectors in Europe.

Eurocommerce expresses [115] that retail and wholesale organisations are familiar with the concept of life-cycle thinking, but that global initiatives in this area are rather taken by the large retailers.

EuroCommerce stresses that most IPP tools and concepts still need clarification. They state that LCA is an important tool in IPP and that it is useful for researchers and universities which can identify areas where industry must focus its efforts upon. In the opinion of EuroCommerce business for its part needs simpler tools to improve the environmental performance of products. [23]

In the EuroCommerce report ‘The Use of LCAs on Plastic Bags in an IPP Context’ [116] it was concluded that the retail sector is striving for a life-cycle approach in product policy, but up to now there is no clear policy of the commerce sector on how IPP tools (LCA, voluntary agreements, regulations, labels, EMS, eco-design)
should be integrated. As EuroCommerce puts it “We are still on the starting blocks”.

Furthermore EuroCommerce, in their Position Paper of June 2003 regarding IPP, expresses concern over the practical implementation of the proposed concept of eco-design. For instance, the geographical and international diversity of the supplier as well as the number of persons intervening in the supply chain make it difficult to collect the information and to influence design choices. In the view of EuroCommerce voluntary systems for eco-design may however be positive tools to permit environmental considerations to systematically be integrated into the design and production processes [23].

In EuroCommerce’s view, Environmental Product Declarations (EPDs) are relatively new tools and not commonly used yet. So far they are mostly used in a business-to-business context and they are not generally seen as a useful tool for communication to consumers as they are too complex and detailed to be of direct use to end-consumers [24].

In general, the principle of eco-labelling is supported by EuroCommerce as a tool to inform consumers about products having a reduced environmental impact. Nevertheless, retailers wish to keep the possibility to create their own label scheme(s) as a marketing tool distinguishing them from their competitor [23]. One of EuroCommerce’s key messages in their Position Paper regarding environmental labels and the EU Flower, is to obtain an increase in visibility of the EU Eco-label by raising the number of product groups for which criteria have been established and by promoting the scheme through marketing campaigns targeting both retailers and consumers.

Due to their position in the product chain the retail sector is as an important link between manufacturers and consumers. The retailer is in the position to communicate with both manufacturers and consumers about a product’s environmental properties. Therefore retailers are potentially a major player in influencing the market for products with an improved environmental performance.

The operational tools used by retailers are in particular the tools for external use, associated with the marketing phase of the product development chain:
− ISO-type I labels, and
− Environmental Product Declarations (EPDs).

As stated by EuroCommerce, EPDs are not commonly used yet and so far, they are mostly used in a business-to-business context.

**Different sizes of retailers**

As can be expected the size of the retailer is relevant in analysing the awareness and activities by retailers in the field of life-cycle thinking. As the target group of retailers varies from the small Italian 2 persons greengrocer’s to the large
international retailer chain with stores all over the world, it is important to differentiate between the different sizes of retailers.

From a recent study by UNEP and HEC [25] it becomes clear that several large retailers are active in the promotion of sustainable consumption (SC), which has a clear relation with life-cycle thinking. The study includes large retailers with a proven commitment in this particular field\(^1\). The activities to increase LCT awareness include both corporate and customer communication initiatives, such as training programmes for employees or in-store communication with consumers on eco-labelling.

Some examples of active retailers are described hereafter:

**Kesko** (the largest retailer in Finland) developed a K-environmental store diploma which is an environmental management system for retail stores. The system is tailored for the K-food, agricultural and hardware retailers. The system was first launched in 1998 and today about 221 stores have been granted the diploma. The K-environmental store concept consists of a set of 160 checking-points in ten different categories, including environmental management at store level, training of personnel, environmental related marketing activities including numeric targets for eco-labelled and organic products in all product categories. [25]

In Switzerland, where there is no national environmental label, **Coop** (2\textsuperscript{nd} largest retailer in Switzerland) is the most important retailer to have developed environmental labels for products. Because for a company it is difficult to develop criteria for an environmental label on a multi-stakeholder basis, Coop Switzerland tries whenever possible to have a double labelling. Coop could take into account the EU Eco-label. However, the criteria developed by Coop Switzerland are stricter than the criteria developed for the EU Eco-label and for some products there are no Eco-label criteria. [24]

**Castorama** in France carried out a LCA of its garden gloves. As a result, the company designed and produced ‘Green Gardening Gloves’ which went on the store shelves thereafter. [25]

\(^1\) Retailers mentioned in the study are Kesko, Groupe Casino, Kingfisher Group, Marks & Spencer, Coop, Sonae, Delhaize and Ahold. See also section 4.2.2, promoters of life-cycle thinking.
The life-cycle perspective is laid down in the *IKEA* strategies for developing products. *IKEA* also uses the life-cycle checklist eWheel, a guideline considering the holistic perspective. Furthermore they use specifications for certain (chemical) issues; eco-labels are not used by *IKEA*.

It is obvious, that in particular the large retailers are in the position to pressure producers and at the same time have the human resources to adequately inform customers. The SME retailers do not have the capacity of influencing suppliers and therefore will not take action in the supply chain. Their awareness and involvement in the area of life-cycle thinking is basically just about selling eco-labelled (or organic) products. [115]

**Conclusions**

LCT awareness is recognised, but especially large retailers play a relevant role regarding this issue. Because of their important link between manufacturers and consumers, retailers form a very important stakeholders group. Their communication with consumers makes it possible to influence the selling behaviour of the consumers in the direction of sustainable consumption, thereby including life-cycle aspects from the environmental point of view. On the European level the European association EuroCommerce can fill in this role. This organisation can stimulate the national retailers organisations.

Because of their position in the product chain the operational tools used by retailers are in particular the tools for external use:

− ISO-type I labels
− Environmental Product Declarations (ISO-type III labels)

The national ISO-type I labels are registered per country, the EU Flower is registered for Europe. EPDs are also registered per country and worldwide at the Global Type III Environmental Product Declaration Network [21]. Figure 2.5 indicates how many awarded products are sold by retail.

So the benchmark possibilities are:

− The amount of products with an ISO-type I eco-label (EU Flower and national eco-labels), sold by the retail.
− The amount of products with an EPD, sold by the retail.

In co-operation with EuroCommerce and the national branch organisations it must be possible to set up a monitoring system to get an overview of the registered products with an ISO-type I eco-label. It takes really an amount of work to set up such a system and this is beyond the scope of this study. EuroCommerce agrees with this statement that it takes a lot of efforts to set up a transparent benchmark system, because of many national and branch/sector initiatives [115].
2.2.3 Consumer organisations

General

For the overall picture of the awareness regarding life-cycle thinking first the remarks of the European Consumers’ Organisation BEUC are considered.

BEUC is the Brussels based federation of independent national consumer organisations from all the Member States of the EU and from other European countries. BEUC has sustainable consumption as one of its key campaigning issues. Informing consumers about the environmental impact from products is a key element in their promotion activities. In the opinion of BEUC consumers need more information on how to lead a more “sustainable” way of life. Product safety is one of the key issues and BEUC wants information about chemicals used in every-day consumer products to be made available to the public. [26]

The right to information is a basic consumer right1, and therefore consumer organisations in general support product labelling, the main tool for consumer information. BEUC supports the EU Eco-label as it facilitates green consumer choice and allows consumers to find their way in the jungle of green claims on consumer articles. BEUC would like to see the use of one single ecological label that would inform all European consumers. However consumers will have to be better informed about the European Eco-label and the information will have to be targeted more to the needs of individual consumers. Also information should be provided where to buy these products. [26]

The Association of European Consumers AEC [27] also strongly appreciates constant reference to LCT expressed in the EC Green Paper on IPP, and implementation of LCA tools for it and for simple but certain information to consumers on environmental aspects of products.

The general awareness of consumer organisations regarding life-cycle thinking differs throughout Europe. In general the Northern European countries are more aware. Basically, there are three groups of countries [117]:

1. High awareness in the Scandinavian countries, Germany/Austria/ Switzerland and The Netherlands;
2. Little or no awareness Greece, Portugal and the new member countries; and
3. Medium awareness in other countries.

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1 The new Article 153 (ex Article 129a) of the EC Treaty has the objective of ensuring a high level of consumer protection. Moreover, it emphasises promoting the consumers’ right to information and education and their right to organise themselves in order to safeguard their interests.

[http://europa.eu.int/scadplus/leg/en/lvb/a17000.htm]
The responses to the questionnaire [117] sent to several consumer organisations in Europe (see appendix 5) roughly agree with the picture presented before. For example, for the Czech consumer organisation the LCT concept is almost unknown and the Polish consumer organisation does not have much experience with IPP or LCT. The Belgian consumer organisation claims to be more familiar with the concept of LCA than LCT.

**Activities**

Apart from product labelling, consumers are also informed about the environmental performance of products through consumer magazines. Information is gathered through product testing by consumer organisations and the test results are published by these organisations in a consumer (test) magazine, or sometimes also on the internet. This information is often only available for members of the consumer organisation. But it is also possible that information of tests (not executed by consumer organisations) is communicated by commercial magazines.

In a study by Jensen et al. [9] it was concluded that at that time (1997) most consumer organisations and campaigners had paid little attention to LCA. And many also paid surprisingly little attention to eco-labelling.

According to Dalhammer and Mont [28] the international consumer organisations seem to have taken up the issues of sustainable consumption on their agenda to a varying extent. It has been argued that consumer organisations lack a comprehensive strategy for incorporating sustainability concerns to their agenda, but that the situation varies a lot from country to country and from issue to issue.

The more traditional product testing, which concentrated on quality and health aspects, is gradually being expanded to include environmental considerations [28], [29]. The study ‘Tracking Progress: Implementing sustainable consumption policies’ by UNEP and Consumers International [30] shows that progress has been limited to the testing of only a small range of products, and is often only connected to those products and services accredited by green labelling schemes. The specific products being tested range widely. In the survey for the study [30] the following countries indicated to test the following products:

- Sweden: household products
- The Netherlands: passenger cars
- Poland: packaging items
- Denmark: detergents.

The survey shows that 64% of the governments\(^1\) were involved in some form of environmental product testing; a large proportion is involved in this process only by way of eco-labelling schemes. However, many of the governments in the survey

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\(^1\) The global governmental survey includes 53 countries (20 OECD and 33 non-OECD countries).
highlighted the need for expanding these efforts to include a wider range of products and services.

Some consumer organisations, for example the German Verbraucherzentrale Bundesverband and the Austrian Consumer Association, are involved in the development of eco-label criteria (PSR).

Dalhammer and Mont [28] state that the weak but clear indications of consumer organisations increasingly considering environmental issues is a sign that the core consumer interests might in a long run also include the environment. For example, Swedish consumer organisations more and more incorporate environmental issues into their agendas. They claim that consumers nowadays consider not only the price and function of a product, but also increasingly its ethical, environmental and health aspects. This claim is supported by the significant increase of the number of eco-labelled products and the increase of sales of eco-labelled products. [28]

In a press release [31] from OIVO-CRIOC (Consumer Organisations Research and Information centre) in Belgium, some of the trends in the criteria for choosing food and non-food products, and food and non-food shops, in Belgium are presented. In their study (Consumer Behaviour Monitor 2004) [32], it was concluded that price is still the most important criterion for the shopping bag, but when prices are (almost) identical, other criteria come on: freshness (for food products) and quality (of a product or of information). More and more ethical criteria appear to be an opportunity for shops to present oneself and to attract new customers. It was found that since two years an increasing interest in ethical criteria (such as working conditions, fair trade, respect for animal welfare and environment) can be observed. For the year 2004 the interest is explicit, especially in the higher social classes. In the criteria for choosing food products/food stores, the environment is mentioned by two out of three interviewees; labels are mentioned as a criterion by roughly one out of two interviewees.

The Danish Consumer Council has started adding the dimension of ethics and corporate social responsibility to the tests on a small scale. It is however recognised that there is still a long way to go before all products also cover an assessment of the CSR performance. [118]

The Belgian consumer organisation Test-Achats claims that life-cycle thinking will soon be integrated in the internal management, but that it is not yet integrated in the product tests and publications they do. They indicate that consumer organisations in general are used to test products regarding their use phase (‘we test the product and not the production phase’).

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1 The percentage of interviewees that mention the environment as a criterion in shopping: food products: 67%; food stores: 66%; non-food products: 63%; non-food stores: 65%.

The percentage of interviewees that mention labels as a criterion in shopping: food products: 46%; food stores: 57%; non-food products: 52%; (non-food stores: 57%. [32]
The environmental performance information which is sometimes provided to consumers is largely related to the use phase. For example, for white goods information is provided about water and energy consumption and for cars information is given about fuel consumption and emissions. Life-cycle aspects are considered in product tests by Test-Achats only in few cases; sometimes information is given about packaging, waste generated by products at the end-of-life, life duration of the product or harmful substances in products. [117] Also the German Stiftung Warentest includes life-cycle aspects in some of their product tests. The tests in the category ‘environment and energy’ as published on their website include for example energy saving lamps, solar panels and heating units.

Considering the life-cycle approach the different national consumer organisations select their own key attention areas. With respect to food issues consumer organisations are very active. They provide information about environmental aspects of food production and consumption. For durable products the issues considered in product tests, comparing several different brands of a product, are for instance energy use, application of hazardous substances, life span or end of life implications.

Examples of the activities of national consumer organisations are described hereafter:

**The National Consumer Council (NCC) of the UK commissions market research that explores consumer concerns. In 2003 the NCC published ‘Green choice: what choice?’ , the findings of a research project with the aim to develop an understanding of consumers’ attitudes to sustainable consumption through discussion of their daily life and concerns. The aim was to uncover consumers’ perceived barriers to sustainable consumption, their views on who is responsible for it, and their motivations for sustainable consumption. [33]**

**The Dutch Consumentenbond surveys products and companies on their ‘sustainable business level’. The results are made available to the consumer. In comparative product tests not just quality and price of products/services are central, but also the level of ‘sustainable business’ of suppliers and/or producers. From 2005 sustainable business will be considered in half the regular tests. [34]**

The Dutch Consumentenbond thinks the government cannot leave sustainable business to the free market without legislation providing that the market operates in the right way. In 2002 the Consumentenbond made the enactment ‘Wet Openbaarheid Productie en Ketens (WOK)’, (in English: Law on Publicity of Production and Chains) and urged the government to introduce this law. This law states that consumers have the right to an honest and complete answer to questions about products and production circumstances. [34]
The Belgian OIVO-CRIOC on their website (www.oivo-crioc.org) provides numerous documents in the field of sustainable consumption (such as eco-labelling), e.g. articles, publications, research studies, activities, press releases.

The OIVO ‘Website Verde’ (www.ecoline.org/verde) regarding sustainable consumption provides a.o. a series of information sheets, publications, links, an agenda, discussion forum. The ‘Website Réseau Eco-consommation’ (available in French) is a cooperation of a.o. the OIVO and environmental associations.

The Austrian Consumer Association (VKI) is partner in the EU LIFE-Projekt ‘ProCool’ – Development and successful market penetration of HFC-free and eco-efficient cold appliances for the commercial use. The project will be finished in November 2006.

The objectives are: 1) to stimulate and support the development and market penetration of eco-efficient plug-in cooling and freezing appliances for commercial use; 2) to stimulate the demand side market for eco-efficient cooling and freezing appliances by informing and motivating buyers and product users and directly involving them in the development process; 3) to apply, evaluate and improve methods for integrated and eco-efficient product development in industry; and 4) to disseminate methods, experiences and results of the project for an EU-wide application. [35] [36]

At the beginning of 2000 the Austrian Consumer Association (VKI) and the Austrian Competent Body (BMLFUW) were authorised by the EC to develop eco-label criteria for hard surface and sanitary cleaners. The project was performed in co-operation with the German Federal Environmental Agency (UBA Berlin) and the Austrian Federal Environmental Agency (UBA Vienna). The project included an indicative assessment matrix of the life-cycle of cleaners. [37]

**Conclusions**

Consumer organisations stimulate sustainable consumption and from that point of view LCT awareness is reasonable. The different national organisations are active in this area, but regarding the limited financial and human resources these activities are also limited.

At the European level the European consumers organisation plays a relevant role considering their activities with regard to life-cycle thinking. This organisation communicates with the national organisations regarding the mentioned area.

Because of their function and representing the consumers fulfilling a specific position in the product chain, the consumer organisations try to stimulate the consumption of products with an ISO-type I label. Furthermore the product testing, including environmental considerations, has a strong interest from these
organisations. Regarding this testing and certification of products mostly governments are involved.

The results of product tests can be published and form a basis for EC benchmark possibilities for the target group of consumer organisations. The publications and product tests will have to be published by independent organisations. So the benchmark opportunities for the EC are:
- The number of LCT related, and published, product tests
- The number of LCT related consumer magazine articles.

So the increase/decrease of published, LCT related product tests form a base for benchmarking. In co-operation with BEUC and the national consumer organisations it must be possible to set up a monitoring system to get an overview of the yearly published test results. It takes a lot of work to set up such a monitoring system and is beyond the scope of this project. BEUC agrees with this statement, because first of all you have to define when a product test is a LCT related product test. People have to formulate the minimum criteria to mark a test as a LCT related product test. As a second step a common transparent benchmark system has to be organised [117].

2.3 Sector approach

2.3.1 Introduction

The awareness of the target groups depends for a large part on the sector involved. In this section a number of sectors will be studied in more detail. These sectors are:
- Automotive sector
- Electronic and electrical consumer goods
- Building sector
- Food/agriculture
- Packaging
- Pulp and paper industry

The main actors in the product chain are indicated in a brief description of the sector structure. Furthermore a general impression of the state of awareness regarding life-cycle thinking in the sector is given, including for example the role of eco-labelling in the sector.
2.3.2 Automotive sector

Sector structure

In the automotive sector some large companies determine the design and manufacturing performance of cars. But also at the beginning of the supply chain large companies produce automotive materials and some parts, such as Corus (automotive steel), BASF (automotive plastics), Bosch (electronic parts). Suppliers in general are responsible for no less than 70% of the output chain in the automotive industry [38]. In the supply chain also small firms are active, they manufacture parts and accessories, but especially in the replace market small enterprises are active.

Within Europe, the manufacturing of cars is concentrated in Germany, France, United Kingdom, Italy and Sweden. Roughly also the parts manufacturing companies are located in these countries. However, global manufacturing has become one of the crucial factors in worldwide competition. Increasing cooperation with suppliers is a key factor in success as well. The supplier SMEs are positioned between the large players in the supply chain. These players, dictate the R&D, design and manufacturing of cars, e.g. by determining the product specifications of the parts they purchase. As a result suppliers will have to deliver these parts according to the specifications issued. Small firms will also be involved in LCT by information requests of these companies (mostly composition and materials data to be delivered in the form of checklists).

The new cars are distributed to (mostly company related) dealers, selling the car to individual consumers. These dealers are distributed over all Europe and the individual ones are relatively small firms, small retailers.

The retailers are key actors considering LCT awareness of consumers as they play an important role in the communication of environmental performance information to the consumer. Commercially oriented employees or the managing dealers themselves communicate with the individual consumers. However, they heavily depend on the information given by the car manufacturers. During the procurement decision LCT related issues, such as fuel consumption, could be communicated. The energy efficiency label for passenger cars is one of the instruments that can be used by retailers.

LCT awareness

The large car manufacturers are aware of the LCT issues. The Directive regarding the disposal of End-of-Life Vehicles, corporate environmental policies, product stewardship and marketing aspects have lead to the inclusion of environmental criteria in the decision making process of the large automobile manufacturers. Furthermore the automobile manufacturers have acknowledged their responsibility in the World Business Council for Sustainable Development, which mission it is to
act as a catalyst for change towards sustainable development, and to promote eco-
efficiency, innovation and corporate social responsibility [38].

Literature reference [38] indicates that German and Swedish car manufacturers
have implemented the life-cycle inventory approach (a tool that enables
manufacturers to obtain detailed information of material flows and energy
consumption).
A clear expression of life-cycle thinking in the automotive industry is that by now
numerous LCA related projects have been carried out. E.g. Volvo Cars and Volvo
Trucks have developed their own schemes of environmental product declarations
based on LCA methodology. Other companies like Saab, Scania and Toyota also
provide environmental declarations. These are however not based on a full life
cycle approach but are concentrated exclusively on the manufacturing activities
and the use stage. [39]
Most automotive manufacturers use LCA as an internal monitoring and
development tool. They often oppose declarations such as prepared by Volvo,
mainly because they fear that sooner or later they will have to produce such
declarations themselves and will have to discuss the matter publicly.
Environmental issues are seen as very sensitive, with increasing pressure from
regulations but still little interest from customers. Many manufacturers do however
see a benefit in using EPDs because it is forcing communication between product
development engineers and LCA/Eco-design experts on one hand and marketing
experts on the other hand. Overall, many manufacturers regard EPDs as a time
consuming exercise with an ambiguous message because of the difficulty of
comparing complex products with each other. Moreover, little economic benefit is
perceived. [39]

The End-of-Life Vehicles Directive has encouraged automotive manufacturers to
form a strategic alliance to develop a common IT system to collect data on
product materials, called the International Material Data System (IMDS). This
central database will allow each part of the supply chain to enter data of their
products. As a hierarchical database, car manufacturers can then collate
information at various levels to be able to supply reports with the composition of
the vehicle itself, as the sum of the compositions of its various components. Full
compositional data are disclosed tier by tier by direct interaction with the
database. [1]

Compared with the large car manufacturing companies the small firms in the
automotive industry have a much lower level of awareness regarding life-cycle
thinking. The interest in applying life-cycle thinking for the small suppliers is
especially motivated by the demands of the large car manufacturing companies.
The interest in applying LCT of one’s own accord is much lower and mostly not
possible because of the large companies demands.
Automobile manufacturers are also involved in environmental education. Ford, for example, has initiated an eco-driving campaign. The Ford Eco-Driving philosophy is to learn and practice a driving style, that increases individual fuel economy, saves money, and benefits the environment all at the same time. Ford in Germany is offering Eco-Driving training courses based on extensive testing and a consumer research pilot phase. [38]

The level of awareness of retailers in the sector is, also due to mandatory tools like the energy labels, generally medium-high. The proactive behaviour however is fairly limited, because of the restricting policies of the large manufacturers.

In comparative tests of passenger cars fuel economy is nearly always one of the issues. Other LCT related issues may be car safety. In some cases these tests are made by consumer organisations, but more often by commercial car magazines.

2.3.3 Electronic and electrical consumer goods

Sector structure

To some extent this sector is comparable with the automotive sector. Large companies dominate the performance of and communication in the manufacturing chain. Regarding the sub-sectors “domestic appliances”, “consumer electronics”, “office equipment”, “information and communication equipment” the same phenomena are examined.

The large companies are the main actors in this sector. More than 70% of the value added in this sector is realized by these companies. With the exception of Italy, large enterprises accounted for half or more of this sectors value added in every EU state in 2000 [40].

These few companies determine the R&D, design and manufacturing of these products, so the evolution of the several groups of products and the related LCT issues are strongly dependent on the product policies of these companies. These policies will be influenced by three EU directives. The first directive is the Directive on the eco-design of Energy-using Products (EuP). This directive has been proposed by the European Commission and concerns the involvement of environmental aspects, especially energy use, in the design of new products. The EC issued a mandate to the three European standards bodies for a standards programme in support of EuP. CENELEC has accepted the mandate, liaising with CEN and ETSI, and has proposed standardisation principles and levels which could form the foundation of a standardisation programme. Standardisation efforts on the following items will be considered in particular:

− Use of materials derived from recycling activities
− Use of substances classified as hazardous to health and/or the environment according to Directive 67/548/EEC and taking into account legislation on the marketing and use of specific substances, such as 76/769/EEC or 2002/95/EC
Use of consumables
Energy consumption throughout the life cycle
Water consumption throughout the life cycle
Ease of reuse and recycling as expressed through: number of materials and components used, marking of plastics according to ISO, use of standard components, time necessary for disassembly
Avoidance of technical solutions potentially detrimental to reuse and recycling of components and whole appliances
Extension of lifetime as expressed through: minimum guaranteed lifetime, minimum time for availability of spare parts
Amounts of waste generated and amounts of hazardous waste generated
Emissions to air (greenhouse gases, acidifying agents, volatile organic compounds, ozone depleting substances, persistent organic pollutants, heavy metals, fine particulate and suspended particulate matter)
Emissions to water (heavy metals, substances with an adverse effect on the oxygen balance, persistent organic pollutants)
Pollution through physical agents (noise, vibration, radiation, electromagnetic fields)

In January 2003 the second Directive on waste electrical and electronic equipment (WEEE) was adopted. The directive makes manufacturers responsible for taking back and recycling of their own equipment. The third directive for the Restriction of the use of certain Hazardous Substances in electrical and electronic equipment (RoHS) also directs design alternatives to environmentally sound options. Together with market information these directives determine LCT oriented developments. The reaction of the large companies clearly indicates that the design of products will be adjusted, including autonomous developments in this sector.

Because of the high industry concentration distributors/retailers have a restricted power to influence producers. Moreover it depends on the market structure which is diverse concerning different countries. For white goods for instance in Norway the retailers possess a considerable power because two large chains dominate the market [41]. Their influence in Italy is limited, where only 9% of white goods is sold by large chains and 61% are sold in (small) specialised shops [42]. The situation in Germany is somewhere in between, as several channels are important for white goods, i.e. mail order companies (21%), small ‘traditional’ shops (30%), large scale specialists (17%) and furniture stores (19%) [43, p. 31].

The consumers are also confronted with the energy consumption of the electrical and electronic equipment. During the tests executed by the consumer organisations the energy consumption is an important issue. Moreover the consumers get more LCT awareness, because of the existence or implementation of separate take back systems for discarded electrical and electronic products.
LCT awareness

In the sector of electronic and electrical consumer goods small firms are hardly present as producers of final products. As in the automotive sector the large multinational firms are the ones implementing life-cycle thinking, e.g. by imposing their specifications to small firms.

Regarding the awareness and understanding of eco-design a case study in the UK electronics sector [44] showed that this was generally at a zero or basic level, in particular amongst SMEs. Design engineers and product designers have not been educated about the environmental issues and eco-design training is not considered a corporate priority. It must however be noted that the information in this case study dates from the year 2000 and the situation may have improved in the meantime.

ECMA International, the European association for standardising information and communication systems, developed and issued the first version of the Technical Report 70 “Product-related Environmental Attributes” in 1997. Although it covers attributes from cradle to grave it is not based on LCA. The use of ECMA TR/70 is voluntary and unrestricted, it acts as a template and guidance against which manufacturers can make self-declarations which are “in accordance with TR/70”. Almost all the major multinationals within the EEE industry have actively supported the use of ECMA TR/70, and it has been well received by the industry as a whole. Some companies use ECMA TR/70 as their principle form of product environmental information. Others support its use alongside other information formats, for example Hewlett Packard uses eco-labels, Energy Star, ECMA and NITO. [39]

To generalise, the attitude of the industry towards standardised Type III schemes in accordance with ISO/TR 14025 can be described as unsupportive. The sector is generally characterised by rapid product development timescales and short product shelf-life. As such, many in the industry argue that a Type III declaration based on LCA is unsuitable, due to the time and resource implications of LCA. The main market drivers for environmental product information relate to energy use, hazardous materials content and recyclability. As such declarations such as ECMA and NITO have been designed to respond to specific market needs in a flexible manner, rather than being design around ISO/TR 14025. [39]

The Danish study ‘Consumers Opportunities of and Interest in Purchasing Green Electronic Products’ [45] reveals a positive consumer attitude to posing environmental requirements to purchasing electronic products¹. Many consumers in

¹ The study focuses on three main types of products: mobile phones, stereo/television equipment and PCs and accessories.
the survey\(^1\) for this study (25-40\%) respond that they attach great importance to the environment and energy when they buy electronic products.

This is inconsistent with retailers’ experience. According to them, consumers do not demand green electronic products. A survey among retailers\(^2\) shows that the environment is not a part of retailers’ agendas, which they explain is due to the tough price competition on the market for electronic products. A few had set up an environmental policy, but only one of them had established environmental requirements directly related to products. According to the retailers, they do not consciously offer alternatives of environment-friendly electronic products because consumers do not demand them, and until they start doing so, retailers will not be active in the area.

The survey [45] also shows that retailers knew very little about electronic products having a less adverse impact. More than 50\% stated that they were unaware of any environmental aspect of consequence to electronic products other than energy consumption. To this should be added that several retailers stated that electronic products have no other significant environmental problems and therefore no activities need to be targeted at the area. The study shows that precisely retailers and shop assistants are significant sources of consumer information. Thus, 58\% of consumers receive information from the shops before they buy an electronic product.

None of the retailers purposefully offer or market environment-friendly electronic products. However, they do offer electronic products carrying eco-labels or energy labels such as TCO 95/TCO 99, Energy Star or the Danish Energy Arrow, but this is more or less coincidental.

Also for specific appliance groups like dishwashers and refrigerators the energy-efficiency label is an operational tool mandatory used by retailers. During tests executed by the consumer organisations the energy consumption is an important issue as well.

In general ISO type III activities with regard to washing machines or white goods are rare. In Germany, the Foundation Warentest regularly carries out product tests for washing machines. The German industrial association ZVEI has elaborated a general and a washing-machine specific ‘Eco pass’ (an information sheet addressed towards retailers, which should be used by manufacturers of washing machines to declare some environment related data). [41]

In the ‘\(\pi\) - certified’ project European manufacturers of large household appliances, represented by CECED, have set up a common standard structure for product information to help retailers to take full advantage of electronic communication and data processing. This new standard structure for product information includes

\(^1\) A quantitative consumer survey where 701 consumers answered a questionnaire and a qualitative consumer survey where a total of 17 consumers took part in focus group meetings.

\(^2\) A qualitative supplier survey of ten interviews with major Danish retailer chains.
energy label information. The ‘π - certified’ product information is basic information, energy label information/performance, features and marketing/communication information. The initiative should be spread through the internet, specifically to distributors and retailers. [41] [46]

2.3.4 Building sector

Sector structure

SMEs are active in the building chain, for example as material and product suppliers, product manufacturers, architectural firms, contractors, consultancies and retail. The amount of small firms is not exactly known, but rather high dependent on definition of the sector.

Figure 2.2 [47] indicates the importance of the contribution of small and medium-sized enterprises in the construction processes. Differences between EU countries exist and especially in Italy the contribution of SMEs is relatively high.

![Figure 2.2 The importance of small and medium-sized enterprises: number of persons employed in construction, broken down according to enterprise size-class, 2000 (share of total) [47]](image)


Many construction projects are prototypes in the sense that they are one-off designs. Construction is also a highly heterogeneous sector depending on a large number of very different professions. The structure of the construction sector can be viewed as a pyramid, with project coordinating enterprises at the top, subcontracting out work to smaller, specialised enterprises in lower tiers. Logistical and transport aspects are very important, as construction is one of the most geographically dispersed sectors with marked regional differences. Construction is traditionally a local activity that is dominated by small enterprises and displays little export activity.
The products of the construction sector are non-transportable and form the physical infrastructure where people live and work. Because of the society relevance not only industrial actors (single firms, branch and sector organisations), but also authorities and public administrations interfere with regard to LCT oriented issues. Especially with the help of national or regional initiatives the authorities try to stimulate the change of the construction sector in a LCT oriented direction. The incorporation of LCT is mainly carried out by branch/sector organisations of small firms and the small firms themselves are less active, but the branch/sector organisations communicate with the small firms.

Because the final products are non-transportable the retail sector is less active (or forms a part of the mentioned pyramid) in the situation of the delivery of new infrastructural products, such as buildings.

In the situation of renovation and maintenance the retail sector is more active. Customers are mainly self-employed enterprises and individual consumers (do-it-yourselfers). In this area some of the larger retail companies inform customers. Also the consumer organisations are more active with respect to this kind of activities in and around buildings and especially regarding specific products such as paints to be applied for the described activities.

**LCT awareness**

The building sector is perhaps the sector in which life-cycle thinking first emerged. The energy or oil crisis in the early seventies draw the attention to the impact of buildings on the energy consumption for heating of these buildings. Energy consumption reduction measures such as using insulation started to be used. Later on the use of materials also draw the attention of the building sector and its surroundings. Depletion of abiotic resources and the use of (potentially) toxic materials were items that emerged in the eighties.

Sustainable construction has been an issue in Europe since the early nineties. In 1995 the CIB (International Council For Research And Innovation In Building And Construction) workgroup 82 started with a large study regarding sustainable construction. In this study the life cycle of constructions was the key issue. [49]

In The Netherlands for example, during the mid nineties it became clear that the use of the so-called preference lists used for sustainable building products was not supported by objective and scientific foundation. The use of life-cycle based information was seen as necessary. The Dutch building industries therefore took the initiative for implementing an Environmental Product Declaration (EPD) for building and construction materials. This scheme is a so-called Type III EPD, which is known under the name MRPI®. In 1998 the first guidebook for conducting the MRPI® scheme was issued. [50]

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1 MRPI® stands for MilieuRelevante Product Informatic. MRPI® aims at providing objective and validated environmental information on materials both for business to business applications as for informing decision makers in the building process.
Also in other European countries EPD schemes have been developed, e.g. France (AIMCC), United Kingdom (BRE), Germany (AUB), Finland (RTS) and Switzerland (SIA) [39]. As these schemes are comparable at the highest levels but not in the actual elaboration a need exists within Europe to come to a harmonization and standardisation of these EPD schemes [51]. The European Commission and CEN, the European Committee for Standardization, are currently working on these issues.

One of the benefits of a systematic use of environmental information schemes is that they can be used to facilitate eco-design of new products and improvement of existing products. Furthermore EPD information could assist architects, specifiers, contractors and purchasers in their choice of products, in the use and maintenance, and could help contractors and recycling companies in the environmentally friendly recovery or safe disposal of waste materials in the end-of-life phase of a building or construction. [51]

At the European level the development of the guidance document “for the Provision of Environmental Information for Construction Products” by CEPMC (Council of European Producers of Materials for Construction) is an important document. It was published by CEPMC in reaction to the developments across Europe of environmental profiles for construction products. CEPMC wanted environmental information to be presented and used in a fair way without bias. Therefore the CEPMC guidance document underlines some important points in the production of environmental profiles. [50]

Considering the number of EPD programmes, relevant for the building and construction sector, established in different countries, this sector is clearly ahead of other sectors in providing environmental performance information about its products. However, due to the relatively high costs, the drawing up of EPDs is mainly commissioned by the large (international) firms. For small firms, it is our impression that the main drive for incorporating life-cycle thinking comes from the branch organizations of these small firms (like the Dutch NVTB); of one’s own accord the small firms are less active.

Some of the large retailers, e.g. Intergamma, pay attention to the environmental aspects of building materials and provide the customers with information on sustainable do-it-yourself. Also the Kingfisher Group in the UK has led communication initiatives towards customers to promote life-cycle thinking. Consumer organisations like Stiftung Warentest occasionally test building products and include environmental aspects in these tests.
2.3.5 Food / agriculture

Sector structure

Shopping patterns within the EU have changed considerably in recent years. It is now less common for people to purchase food on a daily basis and especially in Northern Europe, consumers tend to make less frequent trips and these are usually to large retail outlets. In Southern Europe there is still a predominance of small specialised retail outlets selling particular food items and shopping patterns are more likely to be on a daily basis. Among others from that point of view the food products and beverages sector is very diversified, ranging from small and medium-sized enterprises, that are often family-owned, to major multinationals (such as Nestlé, Unilever, Diageo, Danone).

In general terms, the vast majority of food and beverage enterprises are small and medium-sized and this is particularly the case in southern EU states. However the overall share of SMEs in total added value was just under 50% in 1999, as large EU enterprises generated some 51.7% of total value added. The share of large enterprises in total value added was below one third (31.9%) in Italy in 1999, while rising as high as 73.5% in Denmark in 2000.

There were more than 700,000 food retailing enterprises in the EU in 1999. The retail trade of food items is principally done through non-specialised food stores. Non-specialised food stores generated 85.4% of turnover of food retailing in the EU in 2000 and specialised food stores the remaining 14.6%. Among the specialised food stores the largest activities in turnover terms were the retail sale of meat products and tobacco products. The largest food retailing sub-sectors in terms of the number of enterprises within the EU in 2000 were in Italy and Spain with 194,800 and 174,600 respectively, more than double the number of food retailers in each of the three other large EU states. Relative to the population in each country the density of food retail enterprises was even higher in Portugal in 2000. These three states had the smallest average sized enterprises in 2000 in both the specialised and non-specialised parts of the food retail.

[LCT awareness]

Life-cycle thinking in the food/agriculture sector is largely driven from a health, safety and quality perspective. With this respect the influence of the consumer, and also the consumer organisations, is relatively large.

In the study ‘Retailers’ communication to promote sustainable consumption’ [25] it was found that consumers generally believe that they are not given enough information about their food. They are increasingly interested in production methods, and how and where their food is produced. Labelling will allow consumers to identify products produced in a more sustainable way, and make a choice. In particular, the application of post harvest chemicals should be labelled,
and the indication of the country of origin should be extended to a wider range of products than currently (fruits and vegetables, some meat, etc.). Consumer organisations are very active with respect to food issues, they provide information about environmental aspects of food production and consumption. One might think that the power of the producing multinationals (e.g. Nestlé, Unilever) or retailing multinationals (e.g. Carrefour, Ahold) is real, but they are very sensitive for consumer demand developments.

Especially in this sector the larger retail is active. Product information, regarding health, safety and some environmental aspects is requested by and communicated to the final consumers (for instance by means of labels). So food retailers play an important role in the increase of LCT awareness, both in the direction of their suppliers as towards the consumers. Towards the consumer, labels are the most frequently used form of communication.

An important action for life-cycle thinking in the food and agriculture sector was the LCAnet Food project, which started in November 1997 and ran for two years. LCAnet Food, the European Network for LCA Research and Development for the Food Chain, was a concerted action in the Food and Agricultural Programme (FAIR¹). The members were mainly from research organisations and universities, Unilever Nederland was the only company involved. Involved groups were the farming sector (farmers and agricultural advisors) and ‘wider society’ including consumers, governments, companies and academic institutions. [54] In several countries projects have been realised in which LCI and LCA information on food and agricultural products has been collected and analysed. In Denmark the site http://www.lcafood.dk/ provides LCA data on basic food products produced and consumed in Denmark. The site covers processes from primary sectors such as agriculture and fishery through industrial food processing to retail and cooking. For consumers in Switzerland it is possible to calculate the life-cycle impact of food consumption at http://www.ulme.ethz.ch/.

In The Netherlands the Agri Chain Competence Foundation (ACC) [55] has the aim to find more sustainable agri chains by developing chain knowledge and stimulating innovative projects. Although the focus is only partially on the environment, economy and other topics are also included, life-cycle thinking is clearly present. Projects may include environmental labelling following the Dutch Milieukeur scheme.

Labelling activities in the food sector do not focus on the establishment of typical EPD schemes. Numerous labels are on the market in the food sector. All are type I or single issue labels, which is due to the fact that the main target group for communicating environmental and health information about food is the final consumer.

¹ FAIR is an acronym for the 4th framework specific RTD programme “Agriculture and Fisheries (including Agro-Industry, Food technologies, Aquaculture and Rural Development)”. 
An example [41] is the organic agriculture label ‘Bioland’. For this label a large number of criteria has to be complied with, all backed up by extensive documentation of the underlying data. The data thus gathered already includes LCA considerations although in general information on energy and resources is lacking. [39]

2.3.6 Packaging

Sector structure

Packaging fulfils a specific need in our modern EU economy. Any kind of conservation or transportation of products requires packaging and the products follow the packaging chain. The first link in the chain is the manufacturer of the packaging material, whether it be a paper paste firm or a metal sheet manufacturer. Mainly large companies fulfil this need (e.g. Corus, packaging steel; Alcoa, aluminium; Kappa, cardboard; Dupont SA, PET plastic). These basic materials are sold to companies specialised in packaging manufacture. In this sub-sector SMEs are active. It is this packaging manufacturer that will provide companies with the “generic” packaging which they often adapt to fit their own identity, by adding a label, the brand logo, etc. These companies are mostly large firms who pack their own products in the delivered adapted packaging (e.g. Nestlé, Heineken, Unilever) or smaller enterprises who deliver dedicated packaging for the product manufacturers. The life span of the packaging does not end here, but packed products will pass through the hands of the wholesaler, the retailer and the consumer. All these stages, and the earlier ones, require another type of packaging, namely transport packaging. At the stage wholesaler/retailer the transport packaging will be removed. Mostly the consumers unpack the real products and will discard the packages and so the packaging materials. At the end of the chain the packaging will be reused or the packaging materials will be recycled/disposed.

This description shows that a lot of stakeholders are involved and are dependent on an optimal functioning of the selected packaging. In general the large companies at the stages “packaging material manufacturing”, “filling/packing products”, “retail” defend their interests in the political area and sometimes they support the introduction and application of LCT related approaches. SMEs follow the activities of the large companies and mostly answer the LCT related requests of large enterprises. So the influence of SMEs in this sector is rather small.

Comparable with the food sector the level of LCT awareness of retailers is crucial for the packaging aspects. They may give additional information from the life cycle perspective, for instance about source separation of specific used packaging materials. The larger retailers also commissioned to a limited extent packaging related LCA studies.
Comparable with the food sector also the consumer organisations are active according to LCT related issues. They communicate and publish about take back systems for used packaging and LCA results for specific packaging materials.

*LCT awareness*

EUROPEN is the European Organisation for Packaging and the Environment, an independent trade association that represents the interests of packaging producers as well as fillers and retailers concerning issues related to packaging and the environment. EUROPEN [57] has contributed much to the debate concerning the most efficient way to deliver goods and services as well as how to deal with used packaging once it has served its primary function and is designated as ‘waste’. EUROPEN emphasises the importance of LCA as a decision support tool. In their response to the Green Paper on IPP [56], they said that LCA is a valuable tool for benchmarking and for showing the environmental applications of different choices and the trade-offs that need to be made, and, being able to take account of local conditions, it is preferable to a rigid hierarchy of options. Many organisations, including EUROPEN members, use LCA and life-cycle techniques to improve packaging designs and the efficiency of packaging systems. To a limited extent also the larger retailers commissioned LCA studies on packaging.

On the other hand EUROPEN expresses their concern regarding using LCA in policy making. Furthermore the opinion is that there may be unrealistic high expectations of what LCA methodology can achieve, since “the uncertainties of LCA interpretation are greater than the differences between the assessed options”. [57]

There is an ongoing debate in the sector about which type of packaging material should be considered as the ‘most environmentally friendly’, resulting in various self-claims. However so far, there have not been any major initiatives towards environmental product declarations in the packaging sector.

EUROPEN said that they are not convinced that third party verified eco-labels are the answer, as eco-labelling involves a more than simplistic classification of products as either ‘good’ or ‘bad’. As a label for a package will be confused with the contents of the package, and a label will never reflect the benefits or disadvantages of different packages in different situations, EUROPEN opposes the concept of Type I labels. [39]

In the view of EUROPEN information should be communicated through a variety of channels, selecting the methods appropriate to the goals in question. Company websites provide a way of communicating with prospective purchasers which did not exist when eco-labels were first introduced. They offer a way of presenting more detailed information than labels on packaging, and they offer greater
flexibility in the nature of the information provided. It is recognised that not every consumer has personal internet access but it is believed that this could be a much better way of placing information in the public domain.

The retailers may give additional information from the life-cycle perspective, for instance regarding source separation of specific packaging materials, such as glass. In this way retail reacts with specific life-cycle communication issues dependent on the observed groups of considered products.

The level of awareness of retailers strongly depends on product groups. For example, retailers of consumer goods play a major role in the implementation of recovery and recycling of packaging and adopt strategies and best practices for the reduction of packaging waste. For the food industry packaging may be one of the items where the attention for life-cycle implications is the most widespread. Especially the beverage industry has been involved in a number of LCAs. This has been certainly stimulated by the European packaging waste directive in which recycling and recovery targets play a central role.

According to BEUC consumers would like to see packaging made from material which presents a less negative environmental impact, from cradle to grave. However in general consumers do not have choices or they have minimal opportunities for influencing the amount or type of packaging used - consumers buy the goods inside, not what they are wrapped in. Consumers pay for the packaging when purchasing, when disposing and they also have to sort it. In other words consumers contribute in this way both to creating waste, but also to pre-handling it before it is re-used, recycled or recovered. Many consumers would like to select a packaging material based on its environmental impacts and its end-of-life implications. [58]

2.3.7 Pulp & paper industry

Sector structure

Paper is produced out of pulp and pulp as a resource is extracted from wood or waste paper. The delivery of wood or waste paper is mostly realised by small firms, but the pulp producing facilities are in majority owned by large enterprises. The production of paper or cardboard can be integrated or can be carried out separately. Large enterprises dominate this stage in the paper/cardboard chain. The manufacturing of paper and cardboard products is realised by large enterprises as well as SMEs.

Large enterprises accounted for 95 % of the value added in 2000 in Finland. In 7 of the remaining 11 countries for which data are available, large enterprises accounted for the majority of value added, with Denmark, Spain, Italy and the United
Kingdom the only EU states to report that SMEs accounted for more than half of total value added. [59]
The DEEP report [41] states that the SME structure of the paper industry is a typical Central and Southern European attribute. In the Northern Countries, structural change has resulted in large multinational companies – a development still to come for Central and Southern Europe. This is illustrated by Germany, the biggest producer of paper and board in Europe covering 21% of all European paper production (17,900 mill. tonnes in 2001). On the other hand in Italy, the 5th largest producer of paper and board in Europe and the 9th largest in the world (with its 9 mill. tonnes of products in 2000), industry concentration is still limited and the vast majority of firms are SMEs.

Paper and cardboard is used for a wide variety of applications, for example the transfer of information in the form of newspapers, books and business documents, the transportation of goods in bags, sacks and other forms of packaging or personal hygiene products, such as tissues, napkins or nappies.

Small firms are active with respect to the presentation and selling of products with an eco-label. Retailers are playing an increasing role in LCT awareness by the promotion and use of these eco-labels. Comparable with the packaging sector consumer organisations are especially interested in the recycling of waste paper as a secondary resource in the paper chain and the LCA results of specific paper/cardboard applications.

LCT awareness

The Confederation of European Pulp Industries (CEPI) presents the objectives of the European paper industry in their document ‘The European paper industry on the road to Sustainable Development’ [60]. Regarding life-cycle aspects, the European paper industry aims to, for example:
- increase the share of certified wood entering production
- raise the level of paper recycling in Europe
- ensure that all pulp and paper comes from mills with an EMS
- reduce the environmental impact of its in and outbound transport.

Eco-labels are frequently used in the paper industry. Thousands of paper products are awarded with the White Swan, hundreds with the Blue Angel and dozens with the EU-Flower. In the paper industry, characterised by competition between a large number of SMEs, eco-labels are a tool to differentiate themselves on the market.

With regard to the SME share of eco-label awarded companies, few data are available. Competent Bodies do not systematically collect data on applicant company characteristics. Anyway, research on SMEs representation among the Blue Angel awards on paper products reveals that the SME share is between 16% and 31% - being aware that the size of a considerable quantity of firms could not be
identified. Figure 2.3 shows the characteristics of companies certified with the German Blue Angel for selected paper product groups. A reason for this considerable share of SMEs is the market pull in the paper sector, which is exerted both by consumer demand and requirements of large firms.

As far as the adoption of the EU-Flower in Italy is concerned, all paper manufacturing companies awarded in Italy are SMEs. This rather reflects the country’s paper industry structure. On the contrary, in Nordic countries the White Swan is widely adopted by large corporations, which have participated in the elaboration phase of the label from the early beginning.

Very clearly, ISO-type I labels are considered an effective marketing tool, particularly in Nordic countries and Germany. In Italy and Spain, this is true to a lesser extent in absolute numbers.

Apart from the industry structure, literature source [41] also indicates the relevance of the role of stakeholders in the market adoption by industry and market diffusion among customers of eco-labels. Retailers are playing an increasing role in the diffusion of the EU-Flower on paper products. They are both raising the awareness of consumers and increasingly putting pressure on producers. The recent revision of the EU eco-labelling regulation, which now allows retailers to directly apply for the label, has further increased their crucial role. For instance, in Italy, half of the labels awarded on paper products were given directly to large retailers.

Many companies in the pulp and paper industrial sector do not sell to end consumers at all. As a consequence, although they might apply for an ISO-type I label (e.g. for graphic paper), they do not perceive enough the importance of the latter. In particular, the information contained in an ISO-type I label might not be enough for business to business environmental communication. With this respect, the potential of ISO-type III labels is obviously relevant and is also actually
increasing. This potential shall be further exploited in the future, and we think that ISO-type III labels might play a fundamental complementary role to classical ISO-type I eco-labels, for all the stakeholders manufacturing intermediate products or selling to business.

2.3.8 Evaluating conclusion

From the results of the sector analysis it is obvious that the function, position, attitude and behaviour of the considered target groups is strongly dependent on the kind of products that are produced and also on the industrial structure (which can be different for European countries). Dependent on the sector it is observed that the considered target groups can or actually play a relevant role. This conclusion is explained hereafter.

When large companies play a major role in the product chain the function of the target groups is more following than pro-active. This can be seen in the automotive, the electronics and the packaging sector. In the supply chain the SMEs will act more LCT oriented when the large companies require LCT based changes (for instance based on the results of LCA or eco-design analyses). In these sectors the retail is not so active regarding LCT issues. Consumer organisations and consumers are mostly interested in one issue with respect to these products: fuel consumption in the case of automobiles, energy consumption for electronic products, especially domestic appliances and end-of-life aspects regarding packaging, especially the recycling possibilities.

SMEs and retail are more active in the pulp&paper sector. The manufacturing of products with an eco-label gets more attention in this sector and environmentally based labels are observed as a marketing tool in the sales of products. The environmental impact of these products is also sensitive for consumers and so consumer organisations. They promote the manufacturing of paper products out of waste paper instead of wood. In the case wood is necessary as a primary resource it has to be certified wood.

Retail and consumer organisations are most active in the food sector. In this sector life-cycle thinking is largely driven from a health, safety and quality point of view. With respect to these issues the retail, especially the large retail, is relatively very active. A lot of products with type-I labels, among others eco-labels, are presented to consumers. Also information on these products is offered to consumers by retailers as well as consumer organisations.

The products in the building sector are non-transportable and form the physical infrastructure where people live and work. Because of the society relevance not only industrial actors (single firms, branches and sector organisations), but also authorities and public administrations are involved in LCT oriented issues.
Especially with the help of national and regional initiatives the authorities try to stimulate the changes in the building sector in a LCT-oriented direction. But also the SMEs and branch organisations are active in this sector. Most of the transactions in this sector are business to business transactions. From that point of view the EPDs are relevant to increase the environmental awareness. In several European countries EPD schemes are developed and applied.

2.4 Country differences

In this section the differences between European countries and between the EU and other economic blocks (US and Japan) will be described. With respect to the EU differences between groups of EU countries are considered where possible. A number of issues have been considered, based on the successive stages of the product chain:
- Eco-design;
- Environmental management;
- Eco-labels;
- Consumer behaviour.

2.4.1 Differences between European countries

Eco-design and environmental management

As regards method development, dissemination and education in the field of eco-design, in general countries such as Denmark, Germany, The Netherlands, Austria and Sweden are clear front-runners. Another group of countries, France, United Kingdom, Belgium, Luxembourg an Italy started dissemination activities more recently, and try to benefit from the knowledge available in the front-runner countries. In some EU Member States hardly any activities take place with regard to eco-design, apart from one or two firms or institutes which are very active in the field. [17]

Regarding differences in environmental management between countries an indication is given by Figure 2.4 representing the number of organisations with a registered or certified formal EMS as a percentage of the total number of enterprises.
Figure 2.4 shows that the uptake of formal EMSs by private enterprises in the EU is still very modest – well below 0.5 per cent in all Member States with the exception of Sweden. In most of these countries, SMEs constitute at least 50 per cent of the total (formal) EMS population. In relative terms their share is however much lower, given that SMEs themselves make up some 99 per cent of all European enterprises. In many countries the uptake of the various types of less formal EMSs by SMEs appears to be higher than that of formal EMSs, but reliable, comparative data are very scarce. [16]

The Observatory report of European SMEs [61] states that according to several estimations only 18% of EMAS registrations in the EU correspond to SMEs. However important variations may exist within the different EU countries. Available national data for ISO 14001 in some countries shows that the percentage of certified SMEs varies from 80% in the Swiss case to 36% and 25% in the Swedish and British cases.

Central and Eastern European countries have shorter experiences in product-oriented environmental policy comparing with other European Countries. In general the development of environmental legislation in these countries is related to the EU accession process.

The number of certifications to the ISO 14001 is often used as an indicator of a country's development in the use of voluntary environmental agreements, and is understood as a sort of country-level environmental performance indicator [145]. The ISO 14001 Speedometer (www.inem.org/iso/speedo.htm) [145] uses a

---

1 Non-primary private enterprises are all enterprises with the exception of state-owned enterprises and private enterprises from the forestry and fishing industry.
country’s population as an indicator of size, and gross domestic product (GDP) as an indicator of economic development. Several indicators have been developed:

- **Indicator 1:** Ranks countries according to the number of ISO 14001 certifications;
- **Indicator 2:** Shows the country's number of certifications in relation to its population. The smaller the ratio, the better. A small country with the same number of ISO 14001 certifications as a large country has a significantly better indicator rating; and
- **Indicator 3:** Relates the number of certifications to a country's GDP. A poorer country requires more effort to have a certain number of companies certified than a wealthier country, thus rates higher.

Combining the three indicators offers a better overall indication from which to judge a country’s environmental management development and progress, than the numbers of ISO 14001 certifications (Indicator 1) alone. See appendix 7 for the results of the Speedometer.

Regarding Lithuania, several surveys [62] indicated that eco-design practices, even at the most advanced companies, are not applied to a wide extent. Respondents in a survey were asked to indicate which eco-design strategies they use, taking into account the whole life-cycle of a product. Most of the improvements have been realised in the production phase, quite a lot also indicated the use of more environmentally friendly substances and several indicated to work with higher quality and durability products.

A study considering eco-design in the Baltic States’ industry [63] supports this view for the Baltic States in general. The awareness of eco-design in companies is low, and the attention is focused on processes, modernisation of equipment etc. However, some eco-design strategies are used for modernisation of products. These eco-design strategies usually concern a single issue, such as replacement of hazardous chemicals used in the product (or product finishing stage) or improvement of packaging, product quality or life span.

Most common methods for taking into account the environmental aspects in products are checklists to select less hazardous materials. The competence in eco-design is less developed compared to the Nordic countries. Companies mainly use internal competence sources that allow them to solve single issue problems, but essentially they lack a wider understanding of eco-design.

**Eco-labels**

Eco-labels are an important way to inform consumers about life-cycle aspects of products. The occurrence of national eco-labels indicates that LCT has developed to a certain extent.
ISO-type I eco-labels

The German ‘Blue Angel’ was the first official national eco-labelling scheme worldwide, launched in 1978, followed a decade later (1989) by the ‘White Swan’ in the Nordic Countries and the ‘Eco-Mark’ in Japan. The majority of national third-party labelling schemes have emerged during the late eighties and nineties. At supra-national level, the EU-Flower was introduced in 1992 and had a major regulation revision in 2000.

Slightly more than half of the EU countries (EU-25) have developed their own national ISO-type I labelling system. This reflects a quite relevant focus of environmental product policy in EU-member countries.

Several other ISO-type I schemes have been developed in other countries at worldwide level. Table 2.3 gives an overview of the EU Member States with a national ISO type I eco-label [64].

Table 2.3 National ISO-type I labelling systems in EU-25 and selected other countries with national ISO-type I labels [64]

<table>
<thead>
<tr>
<th>EU Member States with national ISO type I</th>
<th>EU Member States without national ISO type I</th>
<th>Other states with national ISO type I</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>Belgium</td>
<td>Australia</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>Cyprus</td>
<td>Brazil</td>
</tr>
<tr>
<td>France</td>
<td>Estonia</td>
<td>Canada</td>
</tr>
<tr>
<td>Germany</td>
<td>Greece</td>
<td>China</td>
</tr>
<tr>
<td>Hungary</td>
<td>Ireland</td>
<td>Croatia</td>
</tr>
<tr>
<td>Lithuania</td>
<td>Italy</td>
<td>Hong Kong</td>
</tr>
<tr>
<td>The Netherlands</td>
<td>Latvia</td>
<td>India</td>
</tr>
<tr>
<td>Nordic countries:</td>
<td>Luxembourg</td>
<td>Israel</td>
</tr>
<tr>
<td>Denmark, Finland, Norway and Sweden</td>
<td>Malta</td>
<td>Japan</td>
</tr>
<tr>
<td>Poland</td>
<td>Slovenia</td>
<td>New Zealand</td>
</tr>
<tr>
<td>Slovak Republic</td>
<td>United Kingdom</td>
<td>Taiwan</td>
</tr>
<tr>
<td>Spain / Catalonia</td>
<td></td>
<td>Thailand</td>
</tr>
<tr>
<td></td>
<td></td>
<td>USA</td>
</tr>
</tbody>
</table>

Table 2.4 summarises the indicators number of product groups, participating firms and awarded products for the main existing ISO-type I labelling schemes in different countries.
Table 2.4  Number of product groups, firms and products for the main ISO-type I labelling schemes, at the end of 2002 (adapted from[64])

<table>
<thead>
<tr>
<th>Country</th>
<th>Year of establishment</th>
<th>Product groups</th>
<th>Firms</th>
<th>Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>1978</td>
<td>94</td>
<td>995</td>
<td>3114</td>
</tr>
<tr>
<td>Nordic Countries</td>
<td>1989</td>
<td>55</td>
<td>658</td>
<td>2872</td>
</tr>
<tr>
<td>Sweden (Falcon)</td>
<td>1992</td>
<td>14</td>
<td>617</td>
<td>1226</td>
</tr>
<tr>
<td>Spain/Catalunya (DGQA)</td>
<td>1994</td>
<td>16</td>
<td>79</td>
<td>864</td>
</tr>
<tr>
<td>Austria</td>
<td>1991</td>
<td>44</td>
<td>334</td>
<td>645</td>
</tr>
<tr>
<td>EU</td>
<td>1992</td>
<td>19</td>
<td>128</td>
<td>576</td>
</tr>
<tr>
<td>France</td>
<td>1992</td>
<td>15</td>
<td>47</td>
<td>443</td>
</tr>
<tr>
<td>The Netherlands</td>
<td>1992</td>
<td>69</td>
<td>257</td>
<td>360</td>
</tr>
<tr>
<td>Spain (AENOR)</td>
<td>1994</td>
<td>13</td>
<td>71</td>
<td>77</td>
</tr>
</tbody>
</table>

Looking more specifically at the most diffused labels and at the different product groups, the following observations can be drawn:

− In Germany six product groups are responsible for 65% of all eco-labelled products, namely paints/varnishes (26%), wall paints (14%), recycled paper (6%), recycled board (5%), copiers (5%), and woodchip wall coverings (4%). ‘Zero-categories’\(^2\) represent around 36% of all product groups of the Blue Angel.

− In the Nordic countries seven product groups are responsible for 65%, namely toner cartridges (12%), printed paper (12%), printing paper (11%), sanitary paper (11%), all purposes cleansers (8%), detergents for sanitary facilities (6%) and primary batteries (5%).

The schemes in operation are in most cases “dependent” on only a small number of product categories. Most important product areas are paper products, paints, durable office equipment and some products addressing national/regional characteristics (e.g. products for water-saving, tourism, flower arrangements, bags, food, cat litter and recycled plastic products).

It is worth remembering that, since not all criteria developed for ISO-type I labels are explicitly linked to the product lifecycle for all product groups, the figures indicated before should be taken with care as an indicator for the diffusion of lifecycle information. This holds specifically for the ‘older’ product groups in the more ancient national ISO-type I labels (Blue Angel, EcoMark and White Swan). The criteria of more recent product groups are usually explicitly based on life-cycle thinking approaches, taking into account the whole life-cycle of the product or service.

\(^1\) As of June 2004, the number of product groups for which EU-Flower criteria exist is 21 and the number of firms is 185

\(^2\) Product groups for which eco-labelling requirements have been elaborated, but label holders do not exist.
It is striking that no systematic consideration of market penetration is undertaken by the EPIS competent bodies. Nearly no data, for instance, are available for special supply side characteristics such as the share of small and medium sized enterprises (SMEs) among companies having certified their products. Only some figures exist: According to EPA [65], up to 1997 more than 75% of awarded manufacturers were SMEs.

As far as the EU-Flower is concerned, absolute figures of awards are much lower, but rapidly increasing. The number of companies using the label was 37 in March 2000 [39], 59 in January 2001 [66], 128 at the end of 2002 and 185 in June 2004, corresponding to an increase by a factor four in four years. Acceleration is particularly strong in specific countries (e.g. Italy, France and Denmark). As shown in Figure 2.5, similarly to the other ISO-type I labels, for the EU-Flower four product groups alone correspond to 68% of companies using the label. Zero-categories represent 28.5% of all product groups.

![Companies with the Eco-label – by product group, June 2004 [67]](image)

The diffusion of the European EU eco-label, the EU Flower, over Europe can be seen in Figure 2.6.
Countries such as Italy and Greece, lacking a national ISO type I eco-label, appear to have a fair share of licences of the EU Flower.

Looking more specifically at the amount of SMEs with the EU Flower, it can be concluded that again Denmark, Italy and France are well represented (see Figure 2.7).

This information was not available from the EU Flower helpdesk. An overview was made based on the statistics per country and product group from the official EU Flower eco-catalogue (www.eco-label.com). One by one it was checked (by the company’s website, e-mail or by phone) whether the company involved is an SME.
ISO-type III eco-labels

In 2002, the results were published of a study commissioned by the EC/DG Environment [39] reviewing existing EPD schemes. The study reviewed over-sectoral initiatives in ten countries, three collaboration initiatives (GEDNet, NIMBUS and Asia), and sector-specific initiatives in the areas of automotive, chemicals, construction, energy & transport, electrical and electronic equipment, food, packaging, pulp & paper, textiles and tourism. In 2003, the study was further updated and expanded within the Task 1 of the EU-LIFE Project INTEND, whose main objective is to develop an EPD scheme at international level [69].

Table 2.5 gives an overview of existing national over-sectoral EPD programmes and selected sector-specific initiatives, regarding the situation early 2003.

<table>
<thead>
<tr>
<th>Countries</th>
<th>National Scheme (Scheme Owner)</th>
<th>Sectoral Scheme (Sector)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Europe</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td>Pilot Project EPD (DEPA – Danish Environmental Protection Agency)</td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>Experimental standard on type III environmental declarations (AFNOR - Association Francaise de Normalisation)</td>
<td>AIMCC (construction)</td>
</tr>
<tr>
<td>Finland</td>
<td>-</td>
<td>RTS (construction), Paper profile</td>
</tr>
<tr>
<td>Germany</td>
<td>-</td>
<td>AUB (construction)</td>
</tr>
<tr>
<td>Italy</td>
<td>Pilot EPD Programme (ANPA 2000-2001) EU-LIFE INTEND Project – Pilot international EPD system (2003-05)</td>
<td></td>
</tr>
<tr>
<td>Netherlands</td>
<td>-</td>
<td>MRPI (construction)</td>
</tr>
<tr>
<td>Norway</td>
<td>NHO Type III Project (NHO - Confederation of Norwegian Business and Industry)</td>
<td>-</td>
</tr>
<tr>
<td>Sweden</td>
<td>EPD programme (SWEDAC - Swedish Environmental Management Council)</td>
<td>Volvo Cars EPDs (automotive)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Volvo Trucks EPDs (automotive)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IT Eco Declaration (Information technology and telecom)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><a href="http://www.itecodeclaration.org">www.itecodeclaration.org</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Byggvarudeklaration (Construction)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Teko Environmental Declarations (Textile)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><a href="http://www.teko.se">www.teko.se</a></td>
</tr>
<tr>
<td>United Kingdom</td>
<td>-</td>
<td>BRE environmental profiles (construction)</td>
</tr>
</tbody>
</table>

Table 2.5 Overview of existing national over-sectoral EPD programmes and selected sector-specific initiatives [69], updated and adapted from [39]
Environmental product declarations are a very young communication tool and quite obviously their diffusion/adoption by companies is fairly limited in absolute numbers.

The first scheme was developed in Sweden. The Swedish government introduced a national system for a Type III declarations programme based on certified environmental product declarations in 1999. July 2004, in total 99 EPDs are reported in the official website of the Swedish EPD® system, 74 of which are certified. Not only Swedish companies participate in the system. Italian, Japanese, Norwegian and other countries’ EPDs have been also registered in the Swedish system. [21]

Table 2.6 shows the number of companies issuing an EPD registered under the Swedish system per country of provenance. As shown, a quite significant number of Italian companies¹ is currently participating in the system. This is the consequence of the Italian-Swedish LIFE project INTEND, currently being carried out. Also 5 Japanese companies have issued 13 EPDs certified under the Swedish system, further showing the increasing international dimension of the latter.

<table>
<thead>
<tr>
<th>Country</th>
<th>Certified EPDs</th>
<th>Reported EPDs</th>
<th>Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweden</td>
<td>23</td>
<td>23</td>
<td>14</td>
</tr>
<tr>
<td>Italy</td>
<td>18</td>
<td>18</td>
<td>13</td>
</tr>
<tr>
<td>Belgium</td>
<td>18</td>
<td>18</td>
<td>1</td>
</tr>
<tr>
<td>Japan</td>
<td>13</td>
<td>26</td>
<td>15</td>
</tr>
<tr>
<td>Norway</td>
<td>0</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>Finland</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Poland</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>TOTAL</td>
<td>74</td>
<td>99</td>
<td>55</td>
</tr>
</tbody>
</table>

EPDs in the Swedish system cover a wide set of products and services, ranging from consumable products like a beverage to electricity from a nuclear power plant.

As far as the target groups are concerned, just a few EPDs have been carried out by SMEs, for example Metalzinco in Italy. No declaration has been made by a retailer so far.

¹ The number of companies belonging to the same corporate group are aggregated
**Consumer behaviour**

In Switzerland the general appreciation of sustainable products is high compared to most other countries. The awareness among customers of environmentally friendly production is well-developed. [25]

The knowledge of eco-labels among private consumers has been dealt with quite often by a number of studies. Not surprisingly, the available empirical data reveals that ISO type I labels are well known especially in countries where a lot of products are eco-labelled, such as Germany, Japan and the Nordic countries.

In Germany, the eco-label is widely known. According to a survey, it was known by 78.9% of interviewed persons already in 1987. Other surveys in the years 1989 and 1991 showed that 91.3% and 91.1% knew that the Blue Angel is allowed to be used only after acceptance of specific requirements.

Various studies have shown that in the Nordic countries consumer knowledge about the White Swan increased dramatically during the nineties. Nowadays, more than 80% of consumers¹ in Sweden, Norway and Finland recognise the White Swan as the Nordic eco-label. Denmark and Iceland have significantly lower knowledge than the other countries. In these countries, the knowledge increases with education and income, and decreases with age of respondents.

For Spain, a survey [70] indicates that 60% of Spanish consumers know the recycling symbol, 35% the Green Dot, 20% the EU label and only 10% the Spanish AENOR-Medio Ambiente-eco-label.

In the consumer survey of the DEEP project [41], interviewed people in four countries were asked to mention a known eco-label spontaneously, namely Germany, Norway, Italy and Spain. Although with reasonably lower percentage figures the survey confirms the above mentioned results. Important additional information is that, up to 2001, the EU-Flower is practically unknown in all four countries (but the situation might have changed in the last years because of a much higher number of eco-labelled products in the meanwhile). Table 2.7 summarises the results of the consumer survey.

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¹ The figures vary from one study to another, depending on the design of the research.
Table 2.7 Knowledge of main eco-labels in four countries (in % of interviewed consumers) [41]

<table>
<thead>
<tr>
<th>Ecolabels</th>
<th>Germany</th>
<th>Norway</th>
<th>Italy</th>
<th>Spain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major ISO-I eco-labels:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EU Flower</td>
<td>1.0%</td>
<td>1.7%</td>
<td>0.4%</td>
<td>1.2%</td>
</tr>
<tr>
<td>Blue Angel</td>
<td>56.6%</td>
<td>0.2%</td>
<td>0.2%</td>
<td>0.4%</td>
</tr>
<tr>
<td>White Swan</td>
<td>0.3%</td>
<td>70.0%</td>
<td>0.7%</td>
<td>0.8%</td>
</tr>
<tr>
<td>AENOR</td>
<td></td>
<td></td>
<td>2.7%</td>
<td></td>
</tr>
<tr>
<td>DGQA</td>
<td></td>
<td></td>
<td>2.2%</td>
<td></td>
</tr>
<tr>
<td>EU Energy Label:</td>
<td>1.9%</td>
<td>0.6%</td>
<td>0.8%</td>
<td></td>
</tr>
<tr>
<td>No answer / Do not know any eco-label</td>
<td>14.8%</td>
<td>21.2%</td>
<td>89.2%</td>
<td>71.6%</td>
</tr>
</tbody>
</table>

As far as consumer behaviour is concerned, large differences can be observed for different product groups and different countries.

In Figure 2.8 these differences regarding consumer behaviour are shown. Three product groups are considered here: tissue paper, washing machines and holiday accommodation for the four countries Germany, Norway, Italy and Spain.

![Figure 2.8](image)

The first comment concerns the comparison between product groups. Quite reasonably, the significantly higher shares of consumers looking for environmental information about washing machines shown in Figure 2.8, reflects a specific different attitude of consumers buying a durable product. Also tissue paper shows high percentages in Norway and Germany. In contrast to this, the search for
environmental information on tourist accommodation is much lower in all countries, (extremely lower in Norway). In general this reflects the fact that people do not easily relate environmental impacts to tourism services.

These differences in product groups and in countries are qualitatively confirmed by data on market shares. For instance, in Germany, A-class and B-class washing machines represent respectively 54.8% and 33.5% of the total market sales in 2000. Although strongly increasing, these numbers are much lower in Italy (respectively 18.1% and 9.3%). In Spain, the share of A-ranked washing machines increased, whereas the share of B-ranked decreased with the effect that both groups together stagnated from 1999 to 2000.

For paper, the market share of eco-labelled paper products is very high in Nordic countries (around 70%), and significant in Germany. In Italy it is much lower (estimated around 10% for some specific tissue paper products) while it is negligible in Spain.

The estimate of market share of eco-labelled tourist accommodation services is negligible in all countries, confirming the very low awareness of environmental impacts connected to this service among consumers.

Regarding the general knowledge, Figure 2.8 also clearly confirms the significantly higher environmental awareness of consumers in Germany and Norway than in Italy and Spain. This is further confirmed by the fact that in Germany and Norway more than half the respondents search for two or all three of the commodities, while in Italy and Spain this is one-third.

This big difference among countries is also reflected by the fact that the level of awareness of EPIS among consumers dramatically varies among the four countries (Table 2.7). In fact, there is an enormous difference between Norway (70% of respondents know the White Swan) and Germany on the one hand (56.6% of respondents know the Blue Angel) and Italy (just 0.4% know the EU-Flower and 0.7% know the White Swan) and Spain on the other (2.7% know AENOR MedioAmbiente, 2.2% know DGQA). This reflects both the higher environmental awareness of consumers in Central and Northern Europe and historical reasons (the Blue Angel and the White Swan were introduced much earlier).

In general the EU-Flower is practically unknown in all four countries. The mandatory energy label is just slightly more known among consumers. On the contrary, high percentages are indicated for other labels, e.g. “Green Dot” in Germany and Spain, the recycling symbol, and the WWF logo.

There is no direct match between the described results of the 2 aforementioned studies. It gives a rough indication of the differences between the different European countries, but it supports the conclusion that in the Northern European countries there is more consumer awareness.
Conclusions

The differences in awareness between the European countries are indicated based on the successive stages of the product chain (R&D and design, procurement and production, marketing). At each stage of the chain it can be remarked that in the Scandinavian countries, Germany, Austria, Switzerland and The Netherlands more awareness is recognised compared with the other European countries, including the new member states.

First of all this phenomenon is observed regarding activities in the area of eco-design and the uptake of environmental management systems. In these areas the SMEs are more active in the countries mentioned. This conclusion is supported by the analyses of the application of EMAS/ISO 14001, see 2.2.1.

The same can be concluded from the analysis of products/services with the ISO-type I and ISO-type III labels. In the indicated countries more products with these labels are sold by SMEs and retail.

About retail and consumer organisations no differences between European countries were reported in the consulted literature. With respect to retailers and consumer organisations questionnaires are sent to selected groups (see appendix 6). The reactions regarding country differences are included in the sections 2.2.2 and 2.2.3, respectively for retail and consumer organisations. The European target group organisations support the before described conclusion regarding country differences [115, 117].

Regarding the next stage of the product chain, the buying and consumption of products, more environmental awareness is recognised for consumers in Germany and Norway, than for consumers in Italy and Spain. This conclusion demonstrates the aforementioned statement with respect to the awareness situation in Europe.

2.4.2 Comparison with other economic blocks

This section considers the awareness regarding life-cycle thinking in Japan and the USA. The survey was oriented primarily towards the use of LCA, EPDs and eco-labelling as these tools have turned out to be the main operational tools (for external use) used by the target groups.

Japan

Japan relies heavily on the marketing of high value-added consumer products to countries all over the world, therefore the Japanese industry must be highly responsive to global policies. For example, Japanese electronics companies were the first to develop lead-free solders and offer bromine-free printed wiring boards in response to the EU’s WEEE directive. Furthermore, a strong emphasis on ISO 14000 was observed and there is evidence of early adoption of emerging technologies in new products. [119]
In the environmental policy of the Japanese government an important term is environmental efficiency. Environmental efficiency is a concept concerning the environmental load generated in the production stage of goods and services. Environmental efficiency can be increased by reducing environmental impacts at each stage in the life-cycle of goods and services, i.e. the stages of production, utilization and disposal [71].

The concept of environmental efficiency is implemented in ‘The Law Concerning the Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities’ (Law on Promoting Green Purchasing). This law encourages consumers to consider environmental aspects of products and services when purchasing them. For specific products indicators may have been laid down, describing minimum performance (e.g. recycling content). The Law is the first of its kind in the world and is partly based on life-cycle thinking [72].

The Japanese government recognized that appraising only certain environmental aspects of products as waste generation or emission of hazardous substances the complete life-cycle impacts need to be considered. To this end, Article 24 of the Basic Environmental Law specifies “promoting the use of products that reduce environmental impact.” Therefore, comprehensive environmental-impact appraisal procedures for every stage of product life are required. Life-cycle assessment (LCA) is the all-encompassing appraisal method used for determining a product's environmental impacts through all phases of production, consumption, and final disposal. LCA provides procedures for critical environmental evaluations of raw material procurement methods, production, transportation, product use, and disposal [73].

In the Asia-Pacific region, which includes Japan, Green Productivity (GP) is one of the strategies to come to a more sustainable society. Life-cycle thinking is to some extent embodied in Green Productivity. The Asian Productivity Organization (APO), which is a regional inter-governmental organization based in Tokyo, defines GP as “a strategy for enhancing productivity and environmental performance for overall socio-economic development. It is the application of appropriate environmental and productivity techniques, technologies and management systems to produce environmentally compatible goods and services.” [74].

LCA is used by the large companies, e.g. Mitsubishi, NEC, Toyota, Sony, as a more internally focused tool for process and product improvement. Sony has developed practical LCA tools internally for use at each Sony product design department to help create products with minimal environmental impact. These tools estimate the total life-cycle CO2 emissions [75]. Mitsubishi Motors develops vehicles using Design for the Environment (DfE) guidelines, and will manufacture environmentally friendly vehicles employing LCA methods via their quality control system known as 'Quality Gate' [76].
LCA is also mentioned as one of the specific instruments to be used by the state and by companies to sustainable patterns of production and consumption. This is described in the Fundamental Plan for Establishing a Sound Material-Cycle Society [77]. Japan has not produced many LCA software tools itself. One is to be produced by the National Japanese LCA Project¹ (see section 3.3.1). The national LCA project shows the commitment to public development of data and software tools. In this project the Japanese government is working to develop a large LCA database that is specific to Japan.

A good example of an eco-label, in which the full life-cycle environmental impact is used, is the Japanese ‘Eco-Leaf’ eco-label scheme. The scheme is managed by JEMAI (Japan Environmental Management Association for Industry) [78]. It is a so-called Type III Declaration and the scheme is applicable to more than one product group/sector.

As of July 2004, the number of EcoLeaf declarations has further grown up to 161, with 27 companies involved [79].

A key feature of the Japanese ISO-type III declaration system is that, unlike in other countries’ Type III programmes, several companies have issued declarations within the same product category. This allows for a real comparison of products of different companies by clients and customers.

In total eighteen different product categories have been defined (see Table 2.8), the majority is electronical and electrical appliances for home and office use, like photocopiers and printers. Only two building materials are incorporated. Among participating companies, just 2 are SMEs ².

¹ Network system; www.jemai.or.jp/english/lca/index.cfm
² According to the Japanese definition of SME: less than 300 persons of staff or less than 300 million yen of capital.
Table 2.8  EcoLeaf declarations in Japan as of July 2004 [79]

<table>
<thead>
<tr>
<th>Product Category</th>
<th>No. of Declarations</th>
<th>No. of Issuing Companies</th>
<th>No. of Participating companies for PCR consultation meeting</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 EP (Electro photographic Printer) and LJ (Ink Jet) Printer</td>
<td>33</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>2 Electro photographic Dry Process Photocopyer</td>
<td>33</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>3 Single-Use Camera</td>
<td>21</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>4 Digital Camera</td>
<td>16</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>5 Notebook Personal Computer</td>
<td>14</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>6 Digital Printer-Duplicator</td>
<td>11</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>7 Facsimile</td>
<td>7</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>8 Data Projector</td>
<td>7</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>9 Analog Camera with silver film</td>
<td>4</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>10 Water Meter Box</td>
<td>4</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>11 Insulation Material (polystyrene foam type)</td>
<td>3</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>12 Electricity</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>13 Card Printer</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>14 Construction Aggregates</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>15 Drainage Cover</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>16 Power Saving Device for Facsimile</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>17 Photo Print Scanner</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>18 Instant Photo Printer</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>161</strong></td>
<td><strong>27</strong></td>
<td>-</td>
</tr>
</tbody>
</table>

*Some companies have issued Eco-Leaf within more than one product category.

In total 161 labels have been issued for diverse products such as copiers, cameras, insulation materials, et cetera.

In February 1989 the Japanese Eco Mark Program was launched. During this time, Eco Mark product categories and certified products have been growing annually, and as of December 31, 2002, the number of product categories was 64; the number of certified products was 5,391 [80], see Figure 2.9). The number of product categories is comparable to the number of product categories in The Netherlands (69) and in the Nordic countries (55), but is somewhat lower than in Germany (94) [80] [64]. The number of products labelled is over 5000, which makes it the most successful labelling scheme. Germany and the Nordic countries have each about 3000 products labelled.
Figure 2.9  Development of Eco-Mark Categories and Products [80]

In Japan six product groups are responsible for 58% of all eco-labelled products, namely plastic products using recycled materials (17%), clothing made from recycled PET-resin (14%), paper stationary (9%), printing paper (6%), packaging paper (6%), and tile-blocks made of recycled materials (4%). Moreover, it is worth highlighting that the share of “zero-categories”\(^1\) for the EcoMark has been progressively decreasing down to 7%, thanks to the progressive focus of the label on a more restricted number of product groups.

In general the concept of life-cycle thinking seems to be well accepted in Japan.

**USA**

From the early nineties on the interest in LCA was renewed. Within industry, interest in LCA is driven by the larger, usually multi-national, companies. These companies often apply LCA to their products to identify areas for environmental improvement. They may work closely with their suppliers in order to ensure a continuous supply of preferred materials, e.g. recycled packaging. The companies are often reluctant to make LCA results available publicly [81].

For the most part, US companies stay at the inventory level of methodology and focus on quantifying the inputs and outputs of the life-cycle. In this way, the practice is still basically at the “less is best” level. In general, there is a feeling of frustration in US industry, which wants to do LCA but is looking for the definitive, simple, relatively inexpensive and timely approach to do it. Further, there is still the underlying belief that an LCA can be used to get any answer the study sponsor

\(^1\) Zero-categories are product groups for which eco-labelling requirements have been elaborated, but label holders do not exist.
wants. Because there doesn't seem to be a single tool that can be applied and give reproducible results regardless of who does the study, many remain sceptical about the usefulness of LCA [81].

Some companies actively apply LCA in their product development process; Lucent Technologies is one of these. Lucent Technologies uses life cycle assessment (LCA) tools to measure environmental impacts of their products during each stage of their life-cycle [82]. The number of US companies that apply LCA seems however to be limited [83].

While some companies have attempted life-cycle impact assessment, the tendency has been to avoid using any formal approach to impact assessment, putting the U.S. practice behind European practice. In Europe, the majority regards LCA as a supporting tool for decision-making. Normative elements are not a problem as long as good procedure is followed with a clearly defined input from stakeholders, and as long as the results are presented in a transparent way [81].

Specifically for the building industry a rating system has been developed called LEED (Leadership in Energy and Environmental Design). The LEED Green Building Rating System™ is a voluntary, consensus-based national standard for developing high-performance, sustainable buildings. LEED certifies buildings and systems based on credits obtained in the following categories: sustainable sites, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality, and innovation and design process. Members of the U.S. Green Building Council representing all segments of the building industry developed LEED and continue to contribute to its evolution.

The US construction sector can also use the BEES (Building for Environmental and Economic Sustainability) software [84]. It enables the user selecting cost-effective, environmentally-preferable building products. It has been developed by the NIST (National Institute of Standards and Technology) Building and Fire Research Laboratory. The tool is based on consensus standards and designed to be practical, flexible, and transparent. BEES includes actual environmental and economic performance data for nearly 200 building products. Lately BEES has been adapted for application to biobased products.

BEES measures the environmental performance of building products by using the life-cycle assessment approach specified in ISO 14000 standards. All stages in the life of a product are analyzed: raw material acquisition, manufacture, transportation, installation, use, and recycling and waste management. Economic performance is measured using the ASTM standard life-cycle cost method, which covers the costs of initial investment, replacement, operation, maintenance and repair, and disposal. Environmental and economic performance are combined into an overall performance measure using the ASTM standard for Multi-Attribute Decision Analysis.
BEES is supported in part by the U.S. EPA Environmentally Preferable Purchasing (EPP) Program. BEES is being further developed as a tool to assist the Federal procurement community in carrying out Executive Order 13101.

Environmentally Preferable Purchasing (EPP) is a federal-wide program that encourages and assists Executive agencies in the purchasing of environmentally preferable products and services [85]. In the EPP program “environmentally preferable” is defined as: “...products or services that have a lesser or reduced effect on human health and the environment when compared with competing products or services that serve the same purpose...”

All federal procurement officials are required by Executive Order 13101 and Federal Acquisition Regulation (FAR) to assess and give preference to those products and services that are environmentally preferable. LCA is one of the tools to establish whether or not a product is environmentally preferable or not. However, also approaches in which only recycling content is the indicator are used [85].

In the USA SCS offers a certification program for Environmentally Preferable Products and Services (EPP) to address the growing demand for products that have the least impact on the environment. SCS uses a combination of techniques to establish environmental preferability, including life-cycle impact assessment (LCIA), risk assessment, and environmental resource-based studies, combined with knowledge of “best available” technologies and practices [86]. More than 200 products hold a Certified Environmental Profile (CEP) [69]. However this figure has to be considered with care for comparison with other ISO-type III systems, as the US programme is not fully compliant with ISO CD 14025.

The number of over 200 products is high when compared with Japan or European states. When related to the size of the country or its economic turnover the number of products are comparable.

In the early 1990s, SCS developed the independent, third-party recycled content certification program. To date hundreds of companies and thousands of products have been certified for recycled content, as well as salvaged wood, reclaimed agrifiber, and formaldehyde free claims. The certified products include: carpet, moulding, doors, drywall, pest control, paints, insulation, and cleaning products.

Environmental labelling schemes exist in the USA. One of these schemes is the Green Seal [87]. From 1992 onwards Green Seal has issued product certifications. To earn the Green Seal a product must meet the Green Seal environmental standard for that category. The criteria for the Green Seal standards are developed based on a “systems” or life-cycle approach. Until now nine product categories have been defined, which include about 180 products. Electrical household equipment and
lodgings are the main product categories. This is well below the number of around 15,000 certified products in Europe.

In general the USA lacks behind in the application of life-cycle thinking and its tools. There is perhaps a tendency that methods with an economic component, like total cost accounting, are relatively more applied than in Europe or Japan.

**Conclusions**

A paper based on a global benchmarking study of environmentally benign manufacturing [119] states that in Europe the public awareness of environmental issues is of a very high level. This paper, based on an international panel study with a focus in the automotive and electronics sectors, concludes that the EU is a world leader in the area of life-cycle assessment and the integration of LCA into business practices. Furthermore evidence was found of more collaborative relationships between government, industry and universities in the EU countries¹ than in either Japan or the United States.

The emphasis on recycling in Japan appeared to be between that of the US and the EU. Japan, however, appeared to have the greatest concern with CO₂ emissions and global warming. The observed trends indicate that the Northern EU countries are ahead in governmental and educational activities, while Japan appears to be focused on industrial activities. In the area of general research and development both Japan and Europe demonstrated roughly equal amounts of activity that exceeded that observed in the US. On the other hand, the US protection of media, particularly air and water, appears to be equal to or better than Japan and Europe.

In general however, it was found that the US lags in government activities, industrial activities, R&D activities and educational activities regarding environmentally benign manufacturing [119].

In the above study [119] it was found that LCA is widely used in Europe, that in Japan it is less commonly employed and in the US it is typically applied much less frequently than in either Europe or Japan, and then typically by large multi-national corporations.

When the number of EPDs per country is compared, it appears that when relating this to the Gross Domestic Product the EU, Japan and the USA have a equal performance of 0,02 EPDs per 10⁷ € (see Table 2.9).

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¹ European countries visited for this study are Belgium, Denmark, Netherlands, Germany, Sweden and Switzerland.
Table 2.9  Comparison of number of Environmental Product Declarations in Japan, USA and EU-15. The number of EPDs for the EU includes EPDs from the construction sector. [88] [21] [89]

<table>
<thead>
<tr>
<th>Country</th>
<th>EPD (number)</th>
<th>Inhabitants (millions)</th>
<th>GDP (10^9 €)</th>
<th>EPD/M Inh.</th>
<th>EPD/GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>J</td>
<td>76</td>
<td>127</td>
<td>4666</td>
<td>0.60</td>
<td>0.02</td>
</tr>
<tr>
<td>USA</td>
<td>200</td>
<td>278</td>
<td>11257</td>
<td>0.72</td>
<td>0.02</td>
</tr>
<tr>
<td>EU-15</td>
<td>218</td>
<td>378</td>
<td>8827</td>
<td>0.58</td>
<td>0.02</td>
</tr>
</tbody>
</table>

As described before no or little information with respect to the target groups is available in the public literature. For Japan quantified information is presented in Table 2.8 (Eco leaf declarations, mostly big companies), Figure 2.9 (Eco-Mark categories), Table 2.2 (Comparison number of EPDs in Japan versus number of EPDs in some European countries). For USA no quantified information is available.

That is why a general comparison is made between EU and Japan/USA in this section, regarding the general level of Life Cycle Thinking awareness (examples support the picture). It is assumed that the results regarding this general comparison are representative for the differences in LCT. Comparison of the different European countries results in such a recognized phenomenon: High respectively low general awareness results in high respectively low awareness in the target groups.

It appears that in Japan life-cycle thinking is comparable with the most pro-active countries in the EU. The number of products with the ISO type I eco-labels is seen as an important indicator. The general image, as indicated by the US EPA, is that the USA is lacking behind the EU in life-cycle thinking.

2.5  Summarizing conclusions

Because of their different function and position in the product chain there might be a different level of awareness between the target groups. Little differences can exist, but in general the awareness of life-cycle thinking in the target groups is rather poor and its improvement is needed.

SMEs activities can serve different objectives, according to the different positions in the supply chain. Design, production and marketing are aspects in which SMEs can be involved considering life-cycle aspects. Operational tools for internal use (LCA, (PO)EMS, checklists, eco-design) for clean production and the manufacturing of eco-products are possible options. Also marketing with the help of eco-labels (external use of tools) is relevant, but will get more attention from the retailers.
Considering benchmarking (monitoring the changes in the level of awareness) the amount of SMEs with an EMS according to EMAS/ISO 14001 and the amount of SMEs producing a product with an ISO-type I or ISO-type III eco-label are clear options (for final proposal, see section 6.6 “Monitoring LCT progress”).

With respect to the improvement of awareness the national and European branch/sector organisations can play an important facilitating role.

Retailers are an important link between manufacturers and consumers and that is why marketing, communication with consumers is really an important boundary condition. From that point of view operational tools such as labels and EPDs play a crucial role with respect to get more awareness for LCT. Branch organisations and big companies play key roles in the selection process for the kind of labels.

Considering benchmarking (monitoring the change in the level of awareness) the amount of products, as sold by the retail, with an ISO-type I eco-label (such as EU Flower) or an EPD is a clear option as an indicator for the changes in awareness for the retail sector (for final proposal, see section 6.6 “Monitoring LCT progress”).

With respect to the improvement of awareness the national and European branch organisations can play an important facilitating role.

Consumer organisations as representative bodies for consumers can stimulate lifecycle thinking by consumers as a support to realize sustainable consumption. Safety and environment issues regarding products are relevant in this area. The consumers choice for products with ecological labels can be an illustration of this approach. The availability of several label procedures is an issue regarding LCT. Consumer organisations compare the functional quality, but also environmental aspects (energy use, application of hazardous substances, etc.), of several types, brands of the same product from different manufacturers with each other. This approach can be interpreted as an illustration of LCT.

Considering benchmarking (monitoring the change in the awareness) the increase or decrease in the number of published, LCT related product tests or the number of LCT related consumer magazine articles are clear options as an indicator for the change of awareness for the target group of consumer organisations (for final proposal, see section 6.6 “Monitoring LCT progress”). These product tests will have to be carried out by independent organisations.

With respect to the improvement of awareness the national and European consumer organisations can play an important facilitating role.

Regarding the analysis of the different industrial sectors it is obvious that the function, position, attitude and behaviour of the considered target groups is strongly dependent on the kind of products which are produced and also on the industrial structure (which can differ in the different European countries). It means that the target groups can play a minor role, but can also be very active in a special sector. For instance the retail and consumer organisations are clearly active considering the food sector with respect to LCT aspects.
The results of the analysis regarding country differences show that in the EU the Nordic Countries are the most proactive countries with respect to LCT and the application of related tools. Analyses of the areas eco-design, environmental management, eco-labels and consumer awareness deliver the arguments. Looking at other economic blocks it appears that Japans activities are comparable with those of the Northern European countries. The general image is that the USA is lacking behind the EU in life-cycle thinking.

Summarizing, differences can be observed in the state of awareness with regard to life-cycle thinking for the three target groups with respect to different product categories. These differences are dependent on a combination of factors: Kind of target group, sector, industrial structure and country.
3. Main trends in the use of LCA tools

3.1 Introduction

This chapter describes the developments in the use of LCA tools in Europe and other large economic blocks. Main trends in the use, availability and affordability of LCA tools are the result. Future developments are mapped by asking providers of LCA tools and promoters/supporters of LCT about their experiences.

In section 3.2 a picture of the use of LCA tools is described; related questions are:
- Which stakeholders in society use LCA tools?
- What is the use by the target groups?
- Are there differences for several industrial sectors?
- Who in the organisation use the LCA tools?

Of course the use is related to the availability and the affordability of LCA tools. The availability of tools and services is analysed in section 3.3. The analysis of the developments in the availability of the tools is presented for different economic blocks, European countries and industrial sectors. Both developers and buyers of tools are distinguished for different countries and economic blocks. Also future developments are described. Not only the future application level, but also the possible features and performances of the next generation LCA tools and services are highlighted.

The analysis of the affordability of LCA tools and services is described in section 3.4. Besides from the absolute prices for various tools and services, also their ranges are analysed and evaluated and expected future developments are described.

*The last section of this chapter, section 3.5, presents the summarizing conclusions regarding the availability, affordability and use of tools by the target groups, differentiated if possible to countries, economic blocks and industrial sectors. Dedicated conclusions with respect to the use of LCA tools are given at the end of section 3.2.1.*

3.2 The use of LCA tools

Before identifying trends in the use of LCA tools, we need to define what we understand under LCA and under tools.

LCA is defined by ISO [90] as the “compilation and evaluation of the inputs, outputs and potential environmental impacts of a product system throughout its life cycle”.

LCA tools are understood as method handbooks, databases and software, helping and guiding a user of LCA to perform an LCA-study.
3.2.1 How commonly are LCA tools used

With respect to software tools, the question of how commonly are LCA tools used by the target groups can be transposed into: who in the target groups buy and use software tools?

With respect to buying there is no published information available. We made a brief inquiry into this for three of the main software suppliers. This learnt that maximum 5-10% of the buyers of their software exist of SMEs. As far as known, LCA software was not sold to retailers and consumer organizations at all.\(^1\)

It is however known that some large retailers, e.g. Migros and Coop in Switzerland and Italy, do use LCA software tools and Migros even developed its own (internal) software tool in the beginning of the 90s. IKEA [115] performed LCA case studies, but at present they use checklists, covering the whole life-cycle of a product, in product development. They still have the LCA software (but this is seldom used) and some LCA databases, to be used as a guidance in material choice. Carrefour expressed [115] that LCAs were made on carrier bags and some eco-labelled products. More generally environmental requirements are integrated into product specifications without the use of LCT tools.

The interviews with consumer organisations [117] learnt that the Belgian consumer organisation Test-Achats and the German Verbraucherzentrale Bundesverband do not use any LCT/LCA tools themselves. However the German VZBV uses the results of LCA studies (published by others), and both organisations have ordered LCA studies to be carried out\(^2\). Detailed data on the exact frequency and subjects of LCA studies as carried out by consumer organisations were not made available. Nevertheless the findings from the interviews illustrate that little or no LCA studies are carried out by consumer organisations themselves.

From Frankl & Rubik [11] it can be learnt that SMEs mostly use LCA tools in the form of software, that they often build their own internal databases and that most of them use LCA only once. Internalization of LCA hardly takes place as most studies are performed by consultants that are hired by the SME. If involved in LCA, then it is mostly by consultants or by larger companies; meaning that they will not use and internalize the tools themselves (see also [11]).

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\(^1\) Information regarding the use of LCA software by the target groups is difficult to obtain from providers. Providers of LCA software do not register the participation of the target groups in their database of customers; for example, the size of a firm (SME or not) is often unknown. Moreover this information is also considered confidential.

\(^2\) In 2003 Test-Achats ordered one study to analyse the environmental impacts of 3 categories of products (cars, detergents and white goods) throughout the life-cycle.
With respect to using the tools by SMEs, retailers and consumer organisation, there is one main source giving some generic information on this, which is Frankl & Rubik [11]. They made a survey involving 382 companies in Germany, Italy, Sweden and Switzerland. In total 190 companies responded. According to this survey on the average over the four countries, just 19% of the companies using LCA were SMEs (less than 250 employees). From Figure 3.1 it is clear that differences between countries occur. In Italy the reported percentage of SMEs using LCA was particularly low (7%), while in Switzerland it was higher (34%), thanks to state incentives existing at that time for companies applying EMS and related tools.

![Figure 3.1 Percentage of companies using LCAs by number of employees per company [11].](image)

The survey shows that so far LCA is mostly used for internal purposes. This is substantially confirmed also by other studies carried out in Nordic European Countries [91] and in Denmark [92].

A survey by IÖW [93] regarding the application of EPIS by German companies\(^1\) showed that the tools, dominantly used are tools such as ‘Environmental Performance Indicators’ and checklists. LCA is seldom applied, only by 3.8%. See Table 3.1, a distinction is made between original EPIS (developed exclusively for the assessment of environmental impacts of products), company-related tools (broader application in the environmental area) and cost-related EPIS (not developed for application to environmental issues, but can deal with such issues).

\(^1\) Size of these firms is unknown
Table 3.1 Application of EPIS tools by German companies [93]

<table>
<thead>
<tr>
<th>EPIS-tools</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Original EPIS</th>
<th>Company-related EPIS</th>
<th>Cost related EPIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Performance Indicator (EPI)</td>
<td>38</td>
<td>14.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost-benefit analysis</td>
<td>29</td>
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The general impression is that tools which are easy to handle dominate.

This modest application of LCA in industry is supported by IBEB [94]. The application of LCA in the IBEB countries is below 25%; the Swiss companies leading with 25% and followed by the German, British and Hungarian companies.

In Table 3.2 an overview is presented [95] of the LCA application in several European countries.

---

1. Switzerland, Norway, Sweden, Belgium, France, The Netherlands, Germany, Hungary, United Kingdom.
Apart from the number of companies using LCA, another important aspect to be explored to assess the use of LCA is to what extent the latter is fully integrated in decision-making processes. Several studies have been focused on this topic in recent years: [96][7][97][10][91][8].

Literature references [7] and [8] link important aspects of LCA integration in decision-making processes (i.e. orientation of life cycle activities, study practitioners and structure, adoption process, etc.) to the specific position of the company within the product chain, i.e. whether it produces commodity products, intermediate and simple products, or complex products. For instance, according to these authors, commodity producers mainly use LCA for external purposes (e.g. marketing, policy process), do not use evaluation methods and have a top-down adoption process. At the other extreme, the manufacturers of complex products use LCA for internal decision-support, use some evaluation methods and have a bottom-up approach. This aspect of the position in the supply chain is particularly important for SMEs.

Moreover, [96] and [11] point out that the adoption patterns of LCA in decision-making processes are a dynamic sequence of events which imply a learning process and cycles causing significant organizational challenges and changes within the firm. This implies that the role of LCA, the management tools and organizational structures adopted do vary with time and cannot be simply analyzed in a static way. Furthermore they stress the role and importance of subjective factors in this kind of evolution.

---

### Table 3.2  Application of LCA within business in several European countries [95]

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<td>-</td>
<td>36 %</td>
<td>27 %</td>
<td>26 %</td>
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<tr>
<td></td>
<td>(n = 26; &gt; 10 Employees)</td>
<td>(n = 20; &gt; 50 Employees)</td>
<td>(n = 18; &gt; 50 Employees)</td>
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<tr>
<td>Germany</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>16 %</td>
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<tr>
<td></td>
<td>(n = 12; &gt; 50 employees)</td>
<td></td>
<td>(n = 21; &gt; 10 employees)</td>
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<td>-</td>
<td>-</td>
<td>14 %</td>
</tr>
<tr>
<td></td>
<td>(n = 214; &gt; 50 employees)</td>
<td></td>
<td>(n = 31; &gt; 50 employees)</td>
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<tr>
<td>Hungary</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>8 %</td>
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<tr>
<td></td>
<td>(n = 157; &gt; 50 employees)</td>
<td></td>
<td>(n = 150)</td>
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<tr>
<td>Austria</td>
<td>-</td>
<td>-</td>
<td>21 %</td>
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<td></td>
<td>(n = 150)</td>
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<tr>
<td>Finland</td>
<td>38 %</td>
<td>19 %</td>
<td>40 %</td>
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<td>(n = 37; large-scale companies)</td>
<td>(n = 45; SME)</td>
<td>(n = 31; large-scale companies)</td>
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<tr>
<td>Norway</td>
<td>40 %</td>
<td>11 %</td>
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<td>(n = 20; large-scale companies)</td>
<td>(n = 100; &lt; 100 employees)</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Sweden</td>
<td>25 %</td>
<td>18 %</td>
<td>37 %</td>
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<tr>
<td></td>
<td>(n = 80; large-scale companies)</td>
<td>(n = 310; &gt; 10 employees)</td>
<td>(n = 112; joint-stock company)</td>
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</table>

1 This result has not evolved within the European Business Environmental Barometer, but from a separate study on cellulose and paper industry in the Norwegian region Buskerud (see Ytterhus/Aasobe 1996, 206).
The institutionalization theory describes the characteristics of the different phases of the introduction of a new phenomenon (a new idea, a new instrument, an innovation in general) into business activities until it becomes something taken for granted and a routine use. This process is called “institutionalization” using the terms of organization theory. The theory envisages three stages of the institutionalization process. The first stage of application of an innovation within the company is called **habitualization stage**. Often it concerns a small part or a restricted area of the company (e.g. most likely the environmental department in the case of LCA). The next stage, i.e. the one during which the new idea or tool begins to spread out within the company is called the **objectification or semi-institutionalization stage**. This is very likely the most crucial phase of the whole process. It is usually at this stage that the future adoption of the innovative idea or tool is determined. If the innovation is further systematically integrated within business activities, one enters the final stage of the full-institutionalization process, called the **sedimentation stage** in the original theory.

Literature reference [11] has applied the theoretical framework of institutionalization to interpret the results of 20 case-studies carried out in Germany, Italy, Sweden and Switzerland in several industry sectors. Furthermore more recently source [97] has applied the same theory to 16 studied companies in the energy sector in France, Germany, Italy, The Netherlands, Sweden and the United Kingdom. Figure 3.2 summarizes the results of the 36 case-studies by showing the position of the studied companies along the institutionalization adoption curve. The latter represents the level of adoption of LCA within a company in function of time.

![Figure 3.2 Possible adoption patterns of LCA according to institutionalization theory and positioning of 36 surveyed companies by 1998 [97]](image-url)
The first result to be observed is that just 5 companies of the 36 surveyed had fully integrated LCA into their decision-making processes. Two of these companies were from the automotive sector. The low number of companies which have fully integrated LCA basically confirms the results reported also by other authors, that LCA is still a young methodology and that “…companies have simply not, by and large, felt the need for LCA in their regular decision-making” [9]. The second and more important result with respect to the specific target groups, is that just 6 of the 36 case-study companies were SMEs (highlighted in green in Figure 3.2), and that all of them were still in the pre-institutionalisation phase. Retailers and consumer organisations were not present in the group of companies studied.

Conclusions

With respect to the use of LCA tools only for some large retailers it is common sense. SMEs and consumer organisations do not hardly use tools. When small firms are active they are mostly involved in the execution of LCAs by large companies; in that case consultants are hired often. So SMEs start with the introduction of tool applications or in other words with the internalisation of the LCT approach.

3.2.2 For what reasons are LCA tools used/not used

The identification of bottlenecks, i.e. of environmental critical points along the product life-cycle is by far the current most application of LCA in industry. This is not surprising since this is the first step in all kind of analysis, either retrospective or prospective.

The second most important internal application is the comparison of existing products with planned alternatives [11]. This still not always implies that the results will be actually implemented for product innovation. However in many companies already today LCA is used for Research, Design & Development, in particular in Nordic Countries. Literature source [91] refers that 32% of the almost 350 LCA studies reported in recent years in these countries are devoted to product development and improvement. It is clear that Nordic Countries are presently among the most pro-active countries with respect to a systematic use of LCA for environmental product innovation and improvement.

In principle, LCA is also very suitable to support long-term strategic decisions. Indeed it is very desirable that environmental assessment tools are used as early as possible in the product development process, as this can significantly reduce costs. On the other hand however, “for more complicated products the number of alternative possibilities is very high, and as the database on exotic materials is limited, the application of quantitative and detailed LCAs to such products may prove to be very resource demanding and at the same time not very precise” [9]. Source [11] reports that only very few companies had used LCA for radical changes in the product life cycle and/or to shift from products to services.
However, the use of LCA for strategy development is expected to increase significantly in the future, as the knowledge on LCA methodology, the internal know-how and data, and the availability of public data-base improve. Conceptual or simplified LCAs are also likely to be used instead of long and costly detailed complete LCAs. Hanssen [91] refers that already today 13% of LCA studies in Nordic Countries (25% in Finland) are intended for strategy development.

The even more important question is why the LCA use by SMEs, retailers and consumer organisations is limited? Again, there is not much information on this issue available, but there are a number of very likely reasons (see also [11]):

− No financial and human resources to buy, learn and apply LCA tools.
− Current LCA (software and methodologies) tools are too complex and theoretical.¹
− If SMEs are involved in LCA, they hired consultants or they are involved in LCA studies through larger companies and have a limited role, e.g. collecting data for their company.
− Lack of positive experiences and demonstrable results with LCA studies.
− The target groups perceive a limited control over the life-cycle.

Some examples confirm the before mentioned aspects. For example, Carrefour [115] expressed that the use of software tools is time consuming and requires specialist knowledge; LCA studies are currently subcontracted to specialist consultancies. Carrefour [115] expressed the need for simplified tools, which are quick, easy and inexpensive.

The Belgian consumer organisation Test-Achats [117] claims not to have the tools. Furthermore they say that existing tools are not always easy to use and that tests of environmental criteria are very expensive.

3.2.3 Who in the organisation uses LCA tools

If LCA tools are used at all by one of our three target groups, it will probably be the top manager of an SME [11] initiating a study and hiring an external LCA consultant. It has been recognised that retailer organizations or individual retailers will act in the same way although some of them (like Coop and particularly Migros in Switzerland/Italy) do also internal tool development and have a relatively high level of LCA-internalization [115]. The distinction between small and large retailers is again relevant here, as just the large (and multinational) retailers are in the position to amass knowledge and expertise of carrying out LCA studies.

¹ The eLCA project was initiated to provide a one-stop shop website to address the difficulties that SMEs are likely to face when adopting IPP. The eLCA was funded by the eContent European Programme. For more information see www.ecosmes.net or www.elca.enea.it.
The market survey revealed information regarding the groups that promoters and supporters of LCT (from governments, NGOs and industry) aimed at. Though not specifically related to the use of LCA, it does give an impression of the background of those likely to be involved in LCT and LCA.

While some promoters follow a generic approach in the promotion of life-cycle thinking, a substantial part of the promoters follow a specific, function oriented approach not limited to particular industries. On the production side, function groups in environmental management (81%) and product design (75%) were targeted with promotion activities. These function groups are therefore also the most likely users of LCA tools within a company. In the promotion activities less attention is given to function groups like production managers (60%) and members of the board (50%), almost two third of the promoters tries to influence and inform the buyers on the demand side.

3.3 Developments in the availability of LCA tools and services

LCA can be performed in a simplified and a more detailed way. Without further defining these terms, our survey comprises both these versions of LCA.

As mentioned earlier LCA tools are understood as method handbooks, databases and software helping and guiding a user of LCA to perform an LCA-study. Services are understood as consultants offering their support to a third party on a commercial basis.

Within the scope of the study it was not possible to make an extensive inquiry on the use, availability and affordability of all tools mentioned above. Therefore, we have focused our work on software tools and took these as representative for other tools and services. There are also good substantial reasons for this:

- LCA methods are mostly used through software;
- databases are not used independently, but generally as part of a software package;
- software packages are developed and sold both by consultants and academia;
- although not systematic of nature, there is at least some published information on the development in the area of LCA software tools.

In addition, a quick scan review of LCA methodology handbooks has been done. Because databases are not used independently, but generally as a part of a software package, they have not been considered separately here.
3.3.1 Software tools in the last ten years

In this section the developments in availability of LCA tools and services is described. On the basis of a literature inventory, an overview has been made of LCA software made available and commercialised during the last ten years. Attention has been paid to principal differences between:

− Europe and other large economic blocks (USA, Japan, etc.);
− European countries mutually;
− Different industrial sectors.

It has been attempted to answer these questions as much as possible in a quantitative way.

Table 3.3 shows the result of the inventory on software tools.
<table>
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<th>Taken from market (year)</th>
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<td>Japan</td>
</tr>
<tr>
<td>LCA Support</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Japan</td>
<td></td>
<td>Japan</td>
</tr>
<tr>
<td>LCAdvantage</td>
<td><a href="http://www.battelle.org/Environment/">http://www.battelle.org/Environment/</a></td>
<td>20</td>
<td>1996</td>
<td>?</td>
<td>1000</td>
<td>USA</td>
<td></td>
<td>USA</td>
</tr>
<tr>
<td>LCAIT</td>
<td><a href="http://www.lcait.com/">http://www.lcait.com/</a></td>
<td>400-500</td>
<td>1992</td>
<td>no</td>
<td>3930</td>
<td>EU</td>
<td>4.1</td>
<td>Sweden</td>
</tr>
<tr>
<td>LCA NetBaseTM</td>
<td><a href="http://www.sylvatica.com/lcnet.htm">http://www.sylvatica.com/lcnet.htm</a></td>
<td></td>
<td>2003</td>
<td>no</td>
<td>3900</td>
<td>USA</td>
<td></td>
<td>USA</td>
</tr>
<tr>
<td>LIMS</td>
<td></td>
<td></td>
<td>1996</td>
<td>?</td>
<td>25000</td>
<td>USA</td>
<td>1.0</td>
<td>USA</td>
</tr>
<tr>
<td>LISA</td>
<td><a href="http://www.lisa.au.com/index.html">http://www.lisa.au.com/index.html</a></td>
<td></td>
<td>2003</td>
<td>no</td>
<td>free</td>
<td>Australia</td>
<td></td>
<td>Australia</td>
</tr>
<tr>
<td>6Beb.Pro</td>
<td></td>
<td></td>
<td>1997</td>
<td>?</td>
<td>7000</td>
<td>EU</td>
<td>1.0</td>
<td>Switzerland</td>
</tr>
<tr>
<td>Oeko-Base</td>
<td></td>
<td></td>
<td>1991</td>
<td>?</td>
<td>6000</td>
<td>EU</td>
<td>2.0</td>
<td>Switzerland</td>
</tr>
<tr>
<td>Oeko-Pac</td>
<td></td>
<td></td>
<td>1991</td>
<td>?</td>
<td>1000</td>
<td>EU</td>
<td>2.0</td>
<td>Switzerland</td>
</tr>
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<td>PEMS</td>
<td><a href="http://www.piranet.com/pack/lca_software.htm">http://www.piranet.com/pack/lca_software.htm</a></td>
<td>90</td>
<td>1990</td>
<td>no</td>
<td>4500</td>
<td>EU</td>
<td></td>
<td>UK</td>
</tr>
<tr>
<td>PIA</td>
<td></td>
<td></td>
<td>1993</td>
<td>?</td>
<td>1000</td>
<td>EU</td>
<td>2.0</td>
<td>Netherlands</td>
</tr>
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<td>PTLaserTM</td>
<td><a href="http://www.sylvatica.com/ptlaser.htm">http://www.sylvatica.com/ptlaser.htm</a></td>
<td></td>
<td>2003</td>
<td>no</td>
<td>3000</td>
<td>USA</td>
<td></td>
<td>USA</td>
</tr>
<tr>
<td>REGIS</td>
<td><a href="http://www.slnum.com/ht/docs/le_software_regis.shtml">http://www.slnum.com/ht/docs/le_software_regis.shtml</a></td>
<td>150</td>
<td>1994</td>
<td>no</td>
<td>5900</td>
<td>EU</td>
<td>2.2</td>
<td>Switzerland</td>
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<tr>
<td>REPAQ</td>
<td><a href="http://www.fsl.com/lifecycle.html">http://www.fsl.com/lifecycle.html</a></td>
<td>5</td>
<td>1993</td>
<td>no</td>
<td>10000</td>
<td>USA</td>
<td>1.0</td>
<td>USA</td>
</tr>
<tr>
<td>SIB LCA tool</td>
<td></td>
<td></td>
<td>1997</td>
<td>?</td>
<td></td>
<td>EU</td>
<td></td>
<td>Denmark</td>
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<tr>
<td>SimaPro</td>
<td><a href="http://www.pre.nl/simapro/default.htm">http://www.pre.nl/simapro/default.htm</a></td>
<td>700</td>
<td>1990</td>
<td>no</td>
<td>3000</td>
<td>EU</td>
<td></td>
<td>Netherlands</td>
</tr>
<tr>
<td>SPINE@CPM Data Tool</td>
<td><a href="http://www.globalspine.com/">http://www.globalspine.com/</a></td>
<td>450</td>
<td>1999</td>
<td>no</td>
<td>free</td>
<td>EU</td>
<td>3.0</td>
<td>Sweden</td>
</tr>
<tr>
<td>TCAoTM</td>
<td><a href="http://www.sylvatica.com/tcaoe.htm">http://www.sylvatica.com/tcaoe.htm</a></td>
<td></td>
<td>2003</td>
<td>no</td>
<td></td>
<td>USA</td>
<td></td>
<td>USA</td>
</tr>
<tr>
<td>TEAMTM</td>
<td><a href="http://www.ecobilan.com/fr_team.php">http://www.ecobilan.com/fr_team.php</a></td>
<td>200</td>
<td>1993</td>
<td>no</td>
<td>3000</td>
<td>EU</td>
<td></td>
<td>France</td>
</tr>
<tr>
<td>TRACI</td>
<td><a href="http://epa.gov/ORD/NRMRL/std/ia/traci.htm">http://epa.gov/ORD/NRMRL/std/ia/traci.htm</a></td>
<td></td>
<td>2003</td>
<td>no</td>
<td></td>
<td>USA</td>
<td></td>
<td>USA</td>
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<td>Umberto</td>
<td><a href="http://www.ifeu.de/soft/life/soft/lm/lum.htm">http://www.ifeu.de/soft/life/soft/lm/lum.htm</a></td>
<td>350</td>
<td>1994</td>
<td>no</td>
<td>12200</td>
<td>EU</td>
<td></td>
<td>Germany</td>
</tr>
<tr>
<td>WISARD</td>
<td><a href="http://www.ecobilan.com/fr_wisard.php">http://www.ecobilan.com/fr_wisard.php</a></td>
<td>80</td>
<td>1994</td>
<td>no</td>
<td>1500</td>
<td>EU</td>
<td></td>
<td>France</td>
</tr>
</tbody>
</table>
Table 3.3 comprises 50 LCA software tools. These 50 tools include all kinds of software ranging from tools designated for eco-design purposes and doing a simple LCA to sophisticated tools including extensive databases for performing detailed LCAs by experts. Updates of software tools are not mentioned separately in Table 3.3, but if a software tool is “baptized” to a new tool with a new name, it is separately listed with the release date of that new tool.

The market survey among providers of software and databases (see also section 4.3, appendices 1 and 3) shows that the majority of providers offer a newer version or update of both the database(s) (65%) and the software (57%) every two years. A minority of providers indicates that on average they update their database (29%) and software (21%) annually.

The literature sources consulted for Table 3.3 are of quite different original dates, covering different economic blocks and using different questionnaires. This implies that, unfortunately, not the same kind of information was available for all tools and that in some cases expert guesses had to be made with respect to e.g. “first release dates” or that a question mark had to be filled in. It also implies that the information about “sold licenses” is very approximate and certainly imprecise. The information on this aspect is from different base years and thus not comparable, and of course developing continuously. It is also the kind of information that the software suppliers do not publish easily.

The literature sources cited above do not give information on the users of the LCA software tools listed in Table 3.3.

From the general users information known, it can be concluded that some software tools (e.g. KCL of the pulp and paper sector, GaBi for the automotive sector) are used in specific industrial sectors, although their use is not principally limited to these sectors and also not in practice.

From the market survey it appears that about 90% of the providers interviewed supply software that can be described as generic. A small minority (5%) of the providers offers industry specific software, a similar share offers both generic and industry specific software. The providers of industry specific LCA databases and software target a variety of industries such as automotive, agriculture, building and construction, electronic and electrical consumer goods, energy, forest industry, transport, retail, plastics, chemicals and steel.

Finally, it is unclear for a number of tools if they had been taken from the market in the meantime. As it was not possible within the scope of this project to inquire individually 50-60 different software tools, particularly as contact addresses often appeared to be outdated, a web search was performed. If for a tool no website or recent information on the web could be found, a question mark was put in the column “Taken from the market (year)”. However, despite the large number of tools, a shake-out seems to take place. A few LCA tools seem to dominate the market nowadays (SimaPro, ‘GABI and a few others).
Note, by the way, that Siegenthaler et al.[102] are preparing an update of their LCA software guide that is planned to be published in September 2004.

With the above limitations in mind the following results can be extracted from Table 3.3.

Figure 3.3  Total cumulative number of LCA software tools per year that has been released to the market during the period 1989-2003.

Figure 3.3 shows that 1994 - 1997 was the period with the highest growth, regarding the release of LCA software. As mentioned above, the LCA contents of these packages may significantly differ.

Figure 3.4  Total number of LCA software tools that has been released to the market in different economic blocks during the period 1989-2003. N.B.: Switzerland has been counted to EU in this graph.
Figure 3.4 learns that by far most software tools come from Europe. Figure 3.5 adds that Australia is merging right now. Japan has not produced many software tools but the one that is to be produced by the National Japanese LCA Project (Network system; http://www.jemai.or.jp/english/lca/index.cfm) is not yet included in this overview.

**Figure 3.5**  Total number of LCA software tools that has been released to the market during the period 1989-2003. N.B.: Switzerland has been counted to EU in this graph.

**Figure 3.6**  Total number of LCA software tools that has been released to the market in different European countries during the period 1989-2003.
Figure 3.6 shows that within the economic block of Europe, most LCA software tools originate from The Netherlands, Germany and Switzerland (40-50%). Noting that Switzerland is not a member of the EU, all other LCA software producers belong to the traditional EU 15.

Strikingly, the buyers of LCA software tools in general seem to come from everywhere around the globe as is shown for the Dutch CMLCA software in Figure 3.7.

![Figure 3.7 The number of CMLCA "licenses" per economic block.](image)

Figure 3.7 shows that downloaders of CMLCA are concentrated in Europe, the USA and Asia. Within Asia it is particularly Japan, while China is a clearly upcoming LCA tool nation. Note that for non-commercial applications, CMLCA is freely available software. For commercial software packages stemming from other countries the above picture may be different. Though tempting to conclude that “there is a global interest in LCA tools but the tools are only developed in the developed part of the globe”, this conclusion cannot be further substantiated unfortunately.

Three main suppliers were contacted about this issue, however information about the distribution of licenses over countries and economic blocks was not provided due to confidentiality of data.

Various software packages can be bought with integrated databases. In addition, databases have been developed independent of LCA-software, e.g. BUWAL [104], APME (http://www.apme.org/), Eco-invent (http://www.ecoinvent.ch/), Fefco (http://www.fefco.org/index.php?id=62), Eurosac/Eurokraft (http://www.eurosac.org/eurosac/frameuk.htm) etc. The number of databases is thus clearly increasing but so is the overlap; probably a lot of the background data of main materials is quite similar for the majority of databases. For users, it thus becomes more and more difficult to make an argued choice for the right one.
Moreover, the formats of various databases are often incompatible which makes exchange of data difficult and particularly the databases integrated in software packages have a limited national validity. For example, for Italian LCA users a number of the databases available for use with the SimaPro software will be limited of use, since these databases are predominantly oriented at the Swiss situation.

There is thus a need for possibilities to exchange data and particularly a need for a centralized database, bringing together the data from the various partial and sectoral databases and making clear to users what the validity of the various data is.

### 3.3.2 Handbooks

In addition to the software tools, a quick scan review has been done regarding LCA handbooks\(^1\). This review concerns handbooks including guidance and examples on all LCA phases (from Goal and scope definition until Interpretation) and not just focusing on one phase and/or one particular subject. ISO Standards 14041-14043, although very important milestones, are not included in this review as these focus on a particular phase. ISO 14040 is included, however.

Table 3.4 lists LCA handbooks released during the period 1991-2004. Considering the definition of a handbook, an extensive debate could be held. That is not the aim of this overview. The overview is meant to give an indication of how handbooks have developed. Figure 3.8 presents the total number of handbooks released per year from 1991-2004.

![Figure 3.8 Total cumulative number of LCA handbook per year that has been released to the market during the period 1991-2004](image)

\(^1\) As the Terms of Reference explicitly refer to LCA tools, handbooks are here focused on LCA methodology handbooks and not e.g. eco-design handbooks.
<table>
<thead>
<tr>
<th>author(s)</th>
<th>title</th>
<th>year</th>
<th>estimated price (€)</th>
<th>website</th>
<th>economic block</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grieshammer et al., 1991</td>
<td>Entwicklung eines Verfahrens zur ökologischen Beurteilung und zum Vergleich verschiedener Wasch- und Reinigungsmittel; Band 1 und 2. Umweltbundesamt, Berlin.</td>
<td>1991</td>
<td>5</td>
<td>EU</td>
<td></td>
</tr>
<tr>
<td>Fava et al., 1991</td>
<td>A technical framework for life-cycle assessments. SETAC, Washington, USA.</td>
<td>1991</td>
<td>29</td>
<td>USA</td>
<td></td>
</tr>
<tr>
<td>Braunschweig &amp; Müller-Wenk, 1993</td>
<td>Ökobilanzen für Unternehmen; eine Wegleitung für die Praxis. Verlag Paul Haupt, Bern.</td>
<td>1993</td>
<td>66</td>
<td>EU</td>
<td></td>
</tr>
<tr>
<td>author(s)</td>
<td>title</td>
<td>year</td>
<td>price (€)</td>
<td>website</td>
<td></td>
</tr>
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<td>-----------</td>
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<td>-----------</td>
<td>---------</td>
<td></td>
</tr>
<tr>
<td>Christiansen et al., 1997</td>
<td>Life cycle assessment.</td>
<td>1997</td>
<td>15</td>
<td>EU</td>
<td></td>
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<tr>
<td>Johnson, 1997</td>
<td>Life cycle assessment.</td>
<td>1997</td>
<td>75</td>
<td>EU</td>
<td></td>
</tr>
<tr>
<td>Christiansen et al., 1997</td>
<td>Simplifying LCA: Just a Cut? SET AC, Brussels</td>
<td>1997</td>
<td>10</td>
<td>EU</td>
<td></td>
</tr>
<tr>
<td>STEP, 1998</td>
<td>Environmental Assessment of products - A textbook on life cycle assessment. UETP-EE, Helsinki, Finland.</td>
<td>1998</td>
<td>337</td>
<td>EU</td>
<td></td>
</tr>
<tr>
<td>Graedel, 1998</td>
<td>Streamlined Life-Cycle Assessment. Prentice Hall.</td>
<td>1998</td>
<td>38</td>
<td>EU</td>
<td></td>
</tr>
<tr>
<td>Guinée et al., 2002</td>
<td>Handbook on Life Cycle Assessment.</td>
<td>2002</td>
<td>105</td>
<td>EU</td>
<td></td>
</tr>
<tr>
<td>Hauschild &amp; Wenzel, 1998</td>
<td>The hitch hiker's guide to LCA: - an orientation in life cycle assessment methodology and application. Lund.</td>
<td>2004</td>
<td>75</td>
<td>EU</td>
<td></td>
</tr>
</tbody>
</table>
Table 3.4 shows that the booming year for releases of handbooks was 1997 with six new releases.

In addition to the number of different handbooks, the sales/distribution of them may be important information to know. Published figures regarding sales/distribution of LCA handbooks are unfortunately lacking, but are estimated to be in the range of a couple of hundreds of copies for each handbook. For example, of the recently published “Handbook on LCA” by Guinée et al. (2002), more than 250 copies had been sold in the first year. Of the “Guide & Backgrounds” from 1992 by Heijungs et al. over 900 copies of the Dutch version and more than 500 copies of the English version have been sold.

3.3.3 Prospects of availability of LCA tools

The market survey showed that both providers of LCA software and databases and promoters/supporters of life-cycle thinking have high expectations about new LCA databases and software. The market for LCA appears to be in motion.

Providers

Providers in the market survey have been asked to indicate the number of license holders of software and/or databases. In April 2004 the average customer base was 253 database licenses and 215 software licenses. Figure 3.9 shows the average size two years ago and the prediction for the development in the next two years. It is expected that growth will continue in the near future.

Figure 3.9 Development customer base

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1 The largest customer base contained 1,000 database licenses. The smallest number of database licenses was 50. The distribution of the software licenses was similar.
Providers have been asked to give their expectations about future developments with regard to LCA in the short term (3 to 5 years). Four major developments were mentioned:

- **Simplification and extended use**
  The expectation most often mentioned is that LCA will become accessible to a larger group of potential users. Providers indicate that presently an abundance of methods exists and that potential users presently need to know too much about the software in order to be able to use it. The expected standardization of LCA and LCA protocols, as well as the development of LCA packages for SMEs, will lead to increased use of LCA. More companies will thus use LCA in the next three to five years for more products.

- **Harmonization en standardization**
  According to providers the standardization and harmonization of LCA is an important precondition for increased use of LCA. This standardization and harmonization is expected to follow soon after the EU study regarding an internet site for LCA tools and LCI data which has been issued in the field of IPP. One provider indicates that this is essential and that national governments must stop their local thinking and must realize that life-cycle thinking is a worldwide affair.

- **Regulation**
  A number of providers expect that the Communication on IPP will stimulate the focus on LCA. They expect that regulation following out of the IPP activities will make LCA a common part of product development.

- **Extended application**
  In addition to the general expectation with regard to the use of LCA, a number of providers also expressed their expectations with regard to the developments of the LCA products. These developments concern the extension of the use of this product. In particular they mention the impact of Land use and Toxicological Modelling, the integration of costing and social issues, as well as the use of hybrid LCA.

Providers were also asked to predict future developments about the availability of LCA databases and software (3 to 5 years). Four main developments were mentioned:

1. **Enhanced quality**
   Most frequently mentioned is the development of the increased quality of LCA databases, due to increased knowledge about LCA, increased experience with LCA, increased transparency of the data and an increased public availability of LCA databases. Condition for this positive quality development of LCA databases is that the industry realizes that LCA databases must be kept up to date due to the dynamic nature of the data. Various providers indicate that the industry presently unjustly assumes that a single investment is sufficient.
2. **Make data publicly available**
   The availability of data is a precondition for quality development. Part of the providers expects that LCA data will become publicly available. This availability makes it possible to harmonize the data and combine national databases into a highly qualified product.

3. **No change**
   Part of the providers does not expect any changes in the short term. This is particularly so for expectations with regard to LCA software.

4. **Simplification of LCA tools**
   Contrary to some providers who indicate that they do not expect any changes, other providers indicate that they expect that LCA tools will soon become more user-friendly. Providers expect to anticipate to these changed needs from (potential) users of LCA databases and software.

When providers are asked about the development of new LCA databases and software (in the coming 3 to 5 years) again four expectations were mainly mentioned:

1. **Customization**
   Providers expect to develop customized solutions for specific industries in the next three to five years.

2. **User-friendly user interfaces**
   In response to the increased demand for ‘easy to use, fast and quick’ LCA solutions, providers will focus on the development of user-friendly user interfaces in order to enhance the accessibility.

3. **Extended applications**
   Providers will develop new tools so that next to the traditional LCAs also studies can be done into among others ‘Complete Environmental impact’ and ‘Cost predictions’.

4. **Connecting LCA packages to other systems**
   In order to become an integral part of the production process, a number of providers indicate that they will develop LCA tools that make it possible to connect LCA to other systems such as purchasing systems and administration packages.

**Promoters/supporters**

When promoters/supporters are asked about their expectations for the next 3 to 5 years about LCA than four relevant ones were indicated:

- **Simplification**
  In correspondence with providers – promoters/supporters expect that LCA will become available to a larger group of potential users. They indicate that the threshold to the use of LCA will be lowered in the next 3 to 5 years due to the following developments with regard to LCA databases and software:
  - Development of ‘easy to use LCA tools’;
  - ‘Common alphabet for interpretation of LCA outcomes’;
- Being able to perform simple LCAs with ‘fast track’ tools.

  - Extended use
    In correspondence with providers, promoters/supporters expect an increase in the usability of LCA and in the information an LCA delivers. Compared to providers, promoters/supporters have higher expectations about these developments. The expectations about the changes expressed, are comparable with those of providers. Promoters/supporters foresee that in the coming years also social, economic (cost) and safety aspects are included, and that the assessment of the environmental impact will be more complete.

  - Legislation
    Part of the promoters/supporters expect in the relative short term (3 to 5 years) legislation with regard to the use of LCA. They indicate that IPP plays an important role in this development. One promoter/supporter fears too much legislation. When the use of LCA is made obligatory, this will lead to an enormous administration and therefore higher costs.

  - Increased popularity
    In spite of the fact that promoters/supporters add a lot of conditions to the three (positive) developments, they remain positive about the future of LCA and expect a wider and increased use of LCA.

When asked about the expectations about the availability of LCA databases and software in the next 3 to 5 years, promoters/supporters are positive. Most promoters/supporters of LCT expect an increase in the availability of LCA databases and software.

When asked about the long-term expectations (5 to 15 years) with respect to LCA, they indicate that the increased use of LCA continues. In the longer term the demand from customers will play an increasingly big role in this development. This demand originates from a growing awareness with regard to LCA and the environmental impact of products and services.

Regarding the developments in LCA in the next 3 to 5 years, more than half (56%) of all promoters/supporters expect that new LCA tools will have been developed. When asked about their expectations with regard to the development of new LCA databases and software (over 3 to 5 years) they have a great variety in expectations. These vary from expectations about the set up of new software with enhanced user friendliness, to expectations about the necessity to develop consistent LCA databases.

A complete overview of all expectations expressed by providers and promoters/supporters can be found in appendix 3, including the report of the market survey.
3.4 Developments in the affordability of LCA tools and services

3.4.1 Affordability of LCA tools in the last ten years

A quick scan review\(^1\) to the average affordability trend for four LCA software packages was made. The result is shown in Figure 3.10.

![Figure 3.10 Average price (€) of four of the main LCA software packages during the period 1991-2004.](image)

Figure 3.10 shows an increase of the price level of software packages over the last decade. On the one hand this is due to market demand and supply relations (commercialisation), on the other hand more and more other aspects are integrated in the prices such as a database and services and development costs for more user-friendly and customised software tools have significantly increased.

For handbooks, the following trend could be determined, see Figure 3.11.

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\(^1\) Four main suppliers of LCA software packages provided the information on the condition that they would remain anonymous and data are averaged.
More detailed information of the current prices of databases and software was gathered with the market survey among providers.

During the market survey providers have been asked to indicate the average prices of databases and software they market. Also prices for an update / subscription, tariffs for extra support and discount versions were discussed.

The average price providers ask for a LCA database license is € 1.285\textsuperscript{1}. The most expensive database license is sold for € 3.000\textsuperscript{2}. A number of providers offers free database licenses. These are not discount versions, but databases that are free available for interested parties.

The average price a provider asks for an LCA software package is € 1.313\textsuperscript{3} per license. The most expensive license for LCA software is € 4.650. Also for software packages, some licenses are for free. This does not concern discounted versions, but packages freely available for interested parties.

In practice a number of providers offer integrated packages. They offer software packages with the price of the database included. A listing of these integrated LCA products is given as well in Table 3.3. The average price providers ask for integrated LCA packages is € 4.293. The most expensive integrated package is

\begin{figure}
\centering
\includegraphics[width=\textwidth]{figure3_11.png}
\caption{Average price (€) of LCA Handbooks during the period 1991-2004.}
\end{figure}

\textsuperscript{1} The average price for databases, not counting free databases, is € 2.249.

\textsuperscript{2} Providers have been asked to indicate the average price of their LCA databases. When we speak of the most expensive database, we mean the highest price mentioned by the provider.

\textsuperscript{3} The average price for LCA databases, not counting free LCA software, is € 1.750.
marketed for € 8,000. The least expensive version, not concerning a discounted version, costs € 370

The question about the price for an update of the software could not be answered as users typically buy a new license when a new LCA software package becomes available. The tariffs for updates of LCA software are therefore similar with those of new versions. The average price for an LCA database update is € 977. The most expensive database update costs € 2,500. The cheapest update is offered for free. The tariffs for extra support cannot be expressed as an average tariff. Sixty percent of the providers indicate that extra support, like a helpdesk, is for free. In one case an extra annual € 2,300 must be paid for a helpdesk function.

Costs for support on-location, for instance in the form of training are charged against an hourly tariff. These tariffs vary from € 800 per day to € 1,000 per day.

Most providers of LCA databases and software (88%) appear to offer discount versions (including free versions). Such versions are provided for the following types of organizations:

- Educational institutions: Most providers provide free LCA databases and software for universities and colleges. Students and faculty do not have to buy a license, but are asked to give feedback with respect to the results of life-cycle assessments performed with those products.
- Industrial organizations and non-commercial users of LCA: Discounted versions are provided for free by a number of providers. One provider answered: “Our targets are Small and Medium Enterprises who want to demonstrate LCA. Our goal is to create word-of-mouth and free publicity for LCA in general and our products through these channels.”

Discount versions are offered on average at a discount of 73%. Thirty-nine percent of the providers offers the discounted version for free. The smallest discount was 25%.

Of the questioned promoters/supporters in the market survey 21% indicates that the government provides subsidies for the purchase of LCA databases and software. While 58% indicates that their country does not award any subsidies for the purchase of LCA databases and software. One fifth of the surveyed promoters/supporters (21%) indicate that they were not aware of any subsidies for purchasing LCA databases and software.

The answers to the question in case these subsidies are awarded, show that it mostly concerns indirect subsidies through research & development. These

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1 The average price for an LCA database update, not counting free LCA database updates, is € 1,085.
2 For example a helpdesk which can be contacted by phone, fax or e-mail and which answers questions about the LCA software.
subsidies are indirectly awarded through: Research (USA), in financing research (Portugal), integrated in public R&D financing (The Netherlands), by subsidizing the development of databases and software (The Netherlands).

3.4.2 Prospects on affordability of LCA tools

The majority of providers indicate that they foresee no changes regarding the prices of LCA databases and software in the next 3 to 5 years. Those providers that do expect a lower price, base their expectations on expected ‘economies of scale’ and the simplification of LCA packages. This is however not in line with Figure 3-10, in which at the best a stabilisation of the price can be seen.

The majority of promoters and supporters also indicate that they expect the prices to decrease. This expectation is based on the expected increased competition and simplification of packages. However, other promoters/supporters in the survey indicate to expect prices to increase. Due to expected regulation the incentive for LCA providers to develop new (cost efficient) products may disappear; they also expect less competition, leading to increased prices.

3.5 Summarizing conclusions

The results of “the use” analyses (section 3.2) illustrate that the application of LCA tools by the target groups is limited. Inquiries made at some of the main suppliers indicate that the target groups hardly buy software tools themselves.

The main and most likely reasons for not applying LCA tools are:
− There is a lack of positive experiences and demonstrable results with LCA studies.
− There is a lack of resources (human and financial) to buy, learn and apply LCA tools.
− Current LCA tools are complex.
− Target groups perceive a limited control over the life-cycle and are therefore not inclined towards using LCA tools themselves.

The use of LCA tools and for what reasons is indicated by the total number of LCA software tools that has been released to the market in different economic blocks during the period 1989 – 2003; Figures 3-4 and 3-5 show the differences between the economic blocks. Figure 3-7 shows the different number of downloaders of CMLCA, regarding the different blocks.

With respect to the use of LCA tools the analysis is mainly supported by the contents of the Frankl & Rubic book, focussing on European Companies [11]. For other economic blocks there is not such a book available. The preparation of such a
book is beyond the scope of this study. Similar information sources are not available.

Only some of the large retailers use LCA tools and SMEs and consumer organisations do not hardly use tools. When small firms are active it is recognised that they are mostly involved in LCAs by large companies and that they mostly hire consultants. This conclusion is supported by the personal reactions of the consulted organisations (by means of the questionnaires, see appendix 6). Because of the low level of use it is not realistic to split between European countries, other economic blocks and industrial sectors.

*The internalisation of LCA tools by the target groups in their operations is therefore limited. The developed tools are more general and for that reason no remarkable, specific differences between industrial sectors are observed. When LCA tools are used, it is probable that managers in SMEs or retail initiate this use.*

The market survey could not reveal any information, because among others the commercial software suppliers are not intended to give commercially sensitive information.

Regarding the developments in the availability of LCA tools (section 3.3), it can be concluded that the booming period for LCA software was 1994 to 1997. Most LCA software tools come from Europe and within Europe most tools originate from Germany, The Netherlands and Switzerland. Also the buyers, so users of LCA tools are mostly coming from Europe (see among others figure 3.4). The software tools marked are generic tools and not linked to specific industrial sectors. From the general users information known, it can be concluded that some software tools (e.g. KCL of the pulp and paper sector, Gabi for the automotive sector) are used in specific industrial sectors, although their use is not principally limited to these sectors and also not in practice.

Also the expected developments for the future are not in an industrial sector specific direction.

With respect to the developments in LCA products and services, both providers of LCA products and services and promoters/supporters of life-cycle thinking expect that the product assortment will get an advanced and deeper character due to the developments of new tools. The quality will be improved and for instance economic and social issues will be integrated. These tools will have a better user-friendliness and less time and knowledge is needed to execute an LCA. There will also be more customised solutions. The effect of this broadening and deepening is that it will lower the threshold for the use of LCA and will enlarge the market for LCA applications.

A review of the average affordability has shown an increase of the price level of software packages over the last decade. On the one hand this is due to market demand and supply relations (commercialisation), on the other hand more and more other aspects are integrated in the prices such as a database and services and
development costs for more user-friendly and customised software tools have significantly increased. For the future there is no clear picture what will occur with those prices, but no big changes are expected.

By far most of the tools and services are sold from Europe and information from four main suppliers (Europe) has been shown in Figure 3-10, so information on the affordability with respect to Europe is presented. In general this information is hard to get, but approximate prices for the different tools are included in the Tables 3-3 and 3-4. As explained before the tools are not industrial sector specific and because of confidentiality the four interviewed tool suppliers were not willing to provide additional information about the sectors to which these tools are sold.
4. Main promoters of life-cycle thinking and their strategies

4.1 Introduction

The analyses of the level of awareness regarding life-cycle thinking in the three target groups, resulted in the conclusion that in general the awareness is rather poor and that improvements are needed (see section 2.5). The analyses of the use of LCA tools (see section 3.2) support this conclusion. Nevertheless differences in the awareness of the target groups can be observed depending on the position in the product chain, product category, industrial sector and European country.

Starting from the observed levels of awareness, it can be expected that promotion and related activities, with the aim to raise the awareness, are related to these aspects. For example: regarding sectors it was found that sector organisations can play a very important role in facilitating the increase of awareness of SMEs; regarding countries the promoting role of authorities or related bodies was found to be very important for the awareness. Therefore these aspects are considered in the identification of main promoters, presented in this chapter. A distinction is made between promotion by:
- target groups (i.e. single SMEs and SME or sector organisations, retailers (retailer organisations), consumer organisations); see section 4.2,
- providers of LCA tools and services; see section 4.3, and
- public administrations and governments; see section 4.4.

This chapter is finalised by section 4.5 including the summarizing conclusions. This section will give an indication of the way and intensity regarding promotion by the several stakeholders involved. In section 4.2.4 dedicated conclusions, among others who promote within the target groups, are described. The same is presented in section 4.4.3, among others who are the promoting stakeholders outside the target groups.

4.2 Target groups

4.2.1 SMEs

In analysing the promoting role of small firms a distinction is made between promotion by single firms, promotion with respect to industrial districts and promotion by associations, representing SMEs or specific sectors. These three forms of promotion are successively discussed hereafter.
**Single firms**

Regarding the position of the person promoting life-cycle thinking within the company, it can be expected that in particular the function groups in management (board), environmental management, production management and product design are involved. These were the groups targeted by the promoters and supporters of life-cycle thinking (see appendix 3).

Just as the awareness regarding life-cycle thinking (section 2.2.1), the promoting role of SMEs depends on their position in the product chain. In case SMEs are in the supply chain of large companies, their promoting role is fairly limited. The large companies are usually the main promoters of life-cycle thinking within the product chain. In this situation, SMEs mostly react to the needs of large companies in terms of business-to-business communication. This situation mostly occurs in the automotive sector, electronic and electrical consumer goods sector, and partly in the building and packaging sector.

The automobile manufacturers, for instance, are characterised by intensive supplier relations. With regard to purchasing, the provisions of many vehicle manufacturers already include details on the environmental and social standards to be met by their suppliers. For example, the existence of an environmental management system or similar instruments may be one of the criteria used by companies to select their suppliers. But social criteria, such as the banning of child labour or kickbacks, are also included.[38]

On the other hand, in some sectors and countries, SMEs selling final products on the markets are important promoters of life-cycle thinking in the product chain. This holds for the textiles and food sector, for paper and wooden products, where SMEs are very active promoters with respect to eco-labels and other environmental product information schemes (like FSC and PEFC for wooden products). For example, at mid-June 2004, 30% of companies awarded with the EU-Flower belong to the textile sector (see also Fig 2-3)\(^1\).

Some examples of promoting SMEs are given hereafter:

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\(^1\) It is estimated that over all product groups 80% of the companies holding the EU-Flower are SMEs.
**Novamont** is an Italian medium-sized company (over one hundred employees) and world leader in the production of bio-plastic products. In the development of the new generation of products derived from renewable raw materials of agricultural origin, Novamont strategically chooses to adopt the very latest testing procedures and certifications, such as LCA and EPD.

The objective of the project “Living Chemistry for Quality of Life” is to achieve genuine environmental benefits. Novamont (today with a turnover of €30 million) has invested €75 million in this project and has reached the break-even point. [120] The decision to strategically apply LCA for R&D and product design came in the mid 90’s directly from the CEO, who immediately involved the Commercial Director. External consultants were commissioned to carry out the LCA studies. In the year 2000, Novamont decided to use LCA also for external communication (participating in the Italian EPD pilot-project). At present, Novamont is going to present an EPD of a biodegradable thermoplastic granulate within the EU-LIFE project INTEND. Since 2004, Novamont has a long-term agreement with an Italian LCA consulting company, but has also created an internal function for LCA. All LCA results are systematically presented at the monthly technical-commercial meetings, which involve all main functions (marketing, R&D, product development, process control). LCT and LCA are therefore fully institutionalised in the company, i.e. belong to the every-day management. [121]

The German **YTONG**, a former RMC company, is the world leader in the production of autoclaved aerated concrete. This special form of concrete has a number of important environmental features including high thermal efficiency and light weight that typifies the concept of “dematerialisation”.

From 1993 until 2002, YTONG has been one of the leading companies in the construction sector using LCA to assess and improve the environmental performance of its product range. In 1996, it was the first company in Germany to conduct an LCA study using the International Standard (draft at that time) ISO 14040. Its sister company in The Netherlands followed in 1998 with the encouragement of the Ministry of VROM. This collective experience was later transferred to YTONG production plants in over 20 countries. The initial promoter of LCA within YTONG was the head of marketing and sales department. After the completion of the first LCA studies, the R&D department took over this role. In fact, as of 1994-1996, the company management realised that it could not use LCA results for marketing, but that the instrument was very useful for R&D and environmental product innovation. [11] [122] Today, Ytong belongs to the group Xella – Neues Bauen [123]
In 1995, when the Italian CARTIERA FAVINI (today Favini Group) started its LCA activities, it was a medium-sized company (c. 200 employees). Its copying paper products are in the top-range of quality, innovation and environmental image on the market. For example, Cartiera Favini was one of the first companies worldwide using agricultural residues as raw material source.

The initiator and promoter of LCT and LCA within Cartiera Favini was directly the top management. External consultants were used to carry out the studies under the supervision of the internal environmental group, with several functions involved [11]. After the first study, the LCA activities have been abandoned for a while, also because of internal management changes. They were restarted in 2002, on occasion of the 10th anniversary of Cartiera Favini’s environmental (and later sustainability) report. In 2003, Favini joined the LIFE-Project INTEND and collaborated to the establishment of a PCR for copying paper products (still under discussion at internal level). The company envisages to carry out several EPDs in the near-medium future, as it recognizes this as an appropriate tool to communicate the environmental excellence of its products. Today, the Favini Group has done several acquisitions and cannot be classified as SME any longer. LCA and EPD activities are under the responsibility of the Environmental Department. [124]

Concluding, the promoting role of SMEs is related to the position in the product chain and the product group involved. In addition, as with the awareness regarding life-cycle thinking, the promotion varies from country to country. The existing national legislative and incentive framework, as well as the level of environmental awareness of consumers, influence the promoting role of SMEs.

Obviously, the promoting role of SMEs varies from country to country, depending on a series of factors, including:
- Position in the product chain
- Product group involved
- Industry structure and relative market share of SMEs vs. large companies (sector and country-dependent)
- Level of awareness and commitment of consumers with respect to environmental issues
- Legislative framework and level of policy support

Industrial districts

The role of SMEs in promoting life-cycle thinking is also emerging and increasing with respect to industrial districts, in various countries. For instance, a recent survey carried out by Ambiente Italia in 2003 [105] refers to the environmental product innovation in 50 Italian industrial districts, mostly related to the wood/furniture, metal mechanic, footwear and textile sector. Some of these experiences are clearly directly LCT-oriented.
In the industrial district of Poggibonsi (Tuscany, Italy), an ISO-type I-like label for furniture, called ‘Green Home’, has recently been developed. The label is based on a full LCA study using the Ecoindicator 99 method. The label is awarded to products with a number of ecopoints below a threshold, which is determined by a third-party independent Scientific Committee. The goal of the label is to promote the local furniture products of Tuscany, which have been suffering of heavy competition in recent years. So far, around a dozen of products have obtained the label, which is advertised and promoted by the local industry association within and outside Europe. [106]

More specifically, the holder of the label Green Home as well its main promoter is Casa Toscana (CT), a public-private no-profit company. The Centro Sperimentale del Mobile (CSM) is the operative office of the CT for the wood and furniture sector. 1

In other industrial districts, life-cycle thinking is promoted in a more indirect way, as initiatives are not necessarily focused on the life-cycle of a single product but of several ones. This is for instance the case when by-products and/or production waste streams of one product chain become secondary raw materials for a second product chain. An example is presented hereafter.

In Kalundborg (DK) a number of companies and the Kalundborg Municipality mutually exploit each others residual or by-products. Six companies are involved, two of which are medium-sized enterprises (Gyproc A/S for plasterboard production and A/S Biotenknisk Jordrens Soilrem for soil remediation). In this case the SMEs profit from the promotion of the Kalundborg Municipality and of the larger companies involved (e.g. EnergiE2 and Statoil) and participate in the Kalundborg Centre for Industrial Symbiosis. The exchange of resources between industrial companies have demonstrated to provide a number of advantages, i.e.:

− Recycling of by-products. The by-product of one company becomes an important resource for another company
− Reduced consumption of resources, e.g. water, coal, oil, gypsum, fertilisers, etc.
− Reduced CO₂ and SO₂ emissions, discharges of wastewater and pollution of watercourses

1 CT/CSM have carried out a LIFE Project in 2000-02 (ref: LIFE00 ENV/IT/00034 ECOFUTURE) and are currently applying for a new LIFE/ENV project for the development of “Integrated systems for the reduction of life-cycle environmental impacts of products and services in furniture SMEs. From screening tools for environmental design to communication targeted to stakeholders”. A very interesting aspect of this proposal is that it envisages to produce different communication tools for different recipient target groups (e.g. ISO-type III for Business to Business, ISO-type I like label for consumers and a specific communication tool highlighting the environmental improvement with respect to older products) starting from the same LCA data.
Improved utilisation of energy resources. Waste gases are used in energy production.

[125]

In the UK, interest is growing about the question whether business clusters could be used as a delivery mechanism for sustainable development. This was the subject of the third Regional Futures learning event “Discover the lustre in sustainable clusters”, held on Dec., 4th in Birmingham [126]. From the workshop it emerged clearly that in many cases organisations/businesses are facing similar challenges and clusters are a huge opportunity to build networks and have a greater understanding of issues between a variety of organisations. In particular, SME can potentially widely profit from a common business network on:

- Waste management (e.g. central collection services, use of recycled materials)
- Energy purchasing (e.g. joint purchasing of renewable energy)
- Transport (e.g. combination of common transport solutions, car-pooling/sharing)
- Training and skills (e.g. Biotec firms in Cambridge have worked together on good recruitment and human resource practices suitable for SMEs and their sector)
- Supply chain management (joint purchasing power, local businesses supply cluster)
- Joint environmental and social issues (e.g. landscaping, joint facilities and childcare).

While it is clear that a systematic evolution of sustainable business clusters is still at a very embryonic level, good examples of best practice - localised sustainable clusters - are emerging, for example:

- ‘ReMade’, a waste reduction/recycling initiative in Essex;
- ‘CRed’, a Carbon Reduction project in Norfolk;
- ‘Renewable East’, an initiative focusing on renewable energy in Norfolk/Suffolk;
- Jaguar Cars have encouraged many of its (SME) suppliers to locate on the same business park “Jaguar village”.

Concluding, industrial districts are emerging as an effective driver for environmental product innovation involving SMEs in several countries.
Associations

With regard to industrial sectors, sector organisations can take a very active part in informing their members about life-cycle issues, e.g. ACEA for the automotive sector and CEPI for the paper industry. Also national sector associations can be very active in the promotion of LCT, for example The Bundesverband der Deutschen Industrie (BDI) or the Dutch association FME-CWM.

Some examples of initiatives from sector/SME associations in the field of the promotion of life-cycle thinking are presented hereafter:

The Association FME-CWM in The Netherlands, in cooperation with the Texel Academie, organises a course “Applied Eco-design for the Metal-electro Enterprises” to learn companies to take into account the environmental impacts of their products throughout the product chain. The first (pilot) course started in autumn 2004. The course is strongly practically-oriented and is presided over by a professor in Industrial Design Engineering of the Delft University of Technology.

The FME-CWM Association brings together more than 3,000 companies in the metal, plastics, electronics and electrotechnical industry and related sectors and is the largest industrial employers and business organisation in The Netherlands. In the Association FME-CWM 160 industry organizations and secretariats are united.

The Danish consultancy firm PlanMiljø in agreement with the Environmental Committee in UEAPME (European Association of Craft, Small and Medium-sized Enterprises) produced a web-page about Energy Management [127] The aim is to disseminate Danish experience and tools within the field of Integrated Product Policy (IPP) to other European enterprises via UEAPME.

The web-page is an extract of an interactive cd-rom-tool for Energy Management in small and medium sized enterprises (SME), which was produced in 2001 by PlanMiljø in cooperation with the Danish Federation of SMEs. The work has been financed by the Danish EPA.

At a European level, the UEAPME has largely contributed to the last, more SME friendly, revision of the EU-Flower scheme and collaborated with the Commission in the drafting of the EMAS (Environmental Management and Audit Scheme) guidelines, in particular the one on the verification of SMEs. Raising awareness about EMAS among SMEs, is one of the priorities of the organisation. In this framework, UEAPME won the tender for the organisation of two awareness-raising conferences aimed at SME local points. The first conference was organised in February 2004 in Rome in collaboration with Confartigianato.
The second conference took place in Manchester on 12 November 2004 and was organised jointly with the Forum of Private Business (FPB). [107]

4.2.2 Retailers

Barriers for promotion

Regarding durable products, the DEEP report [41] concludes that, although retailers could have a high potential information and educational role, in practice their influence is very limited with respect to informing and influencing consumers due to:

− insufficient knowledge of requirements/meanings of eco-labels (or labels in general),
− insufficient competences of sales personnel,
− perception of information search of consumers as oriented towards brand feature with regard to white goods, and
− a general overload of retailers and their sales personnel.

Recently a study [25] was executed of how retailers promote sustainable consumption to their customers. In order to get a picture of the awareness-raising campaigns adopted by retailers, a selection of retailers was interviewed with a proven commitment in this particular field. The study shows that retailers encounter several interrelated problems:

− lack of explicit consumer demand,
− wariness of media and NGO ¹,
− lack of a robust business case ² and
− unconvinced senior management.

Practical barriers mentioned include:

− the product’s ‘sacrifice’ ³,
− reliability of supply (concerns about the capacity of the supply chain to provide the greener product),
− lack of clear consensus about the environmental performance and
− lack of resources (in terms of staff time).

These problems and barriers reflect the complexity of issues facing retailers, and shows the difficulties that even the leaders in the field must overcome in order to offer and promote greener products. [25]

¹ There is sometimes wariness about being seen to take positive action on one front, because of the risk of ‘knocking’ publicity on others.
² Often arising from conflicting business priorities between procurement, marketing and environment teams within the company.
³ The greener product may sacrifice price, quality or appearance for an improved environmental performance.
Activities promoters

In principle, retailers can play a major role in promoting life-cycle thinking as they are the intermediary between producers and consumers. They are able to specify standards of environmental performance with a greater degree of expertise and market clout than individual consumers who have relatively little scope for collective action [25]. The promotion towards their suppliers can be done by placing requirements, e.g. determining product specifications, guidelines, checklists. On the one hand they can feed back to producers on consumer’s preferences and influence them towards environmental product innovation. On the other hand, they can also inform consumers on (life-cycle) environmental features of products and try to influence buyer decision processes.

Quite obviously, just large retailers have the economic bargaining power to pressure producers and also have the human resources to adequately inform customers.
For example Coop in Switzerland in general is very demanding towards suppliers. The demands made involve especially the use of specific eco-labels. Besides, Coop sets specific targets regarding the share of eco-labelled products in the product assortment. Long-term partnerships with suppliers are preferred for mutual benefit. Also Carrefour and IKEA indicate to make demands upon producers/suppliers regarding the environmental performance of their products. Checklists and specifications are used for this purpose. [115]

The SMEs do not have the capacity of influencing suppliers. Therefore they will not take action in the supply chain. Nevertheless the SMEs take a part in selling eco-labelled products. [115]

Some examples of European retailers with a proven commitment in the promotion of sustainable consumption are [25]: Kesko (the largest retailer in Finland); Groupe Casino (the 4th largest retailer in France); the Kingfisher Group in the UK (operating on 2 continents and in 9 countries); Marks & Spencer (UK stores and franchise operators in over 30 countries); Coop (2nd largest retailer in Switzerland and market leader for SC); Sonae (one of the leading retailers in Portugal, also operating in Brazil); Delhaize in Belgium (representing about 2,500 stores all over the world); Ahold (largest food provider in The Netherlands and one of the largest in the US).
Some of the initiatives by retailers, clearly showing the high potential information and educational role of retailers, are [25]:

**Coop** is currently probably one of the most effective and committed sustainable retailer chains throughout the world. In Switzerland, where sustainable consumption (SC) is viewed as an integrated part of consumption behaviour, Coop has established itself as the market leader in this area. Communication regarding sustainable products is an integrated part of Coop’s marketing strategies.

However Coop still has only around 13 percent of its total sale generated with sustainable products. To increase this market share it is necessary to focus on the costs/benefits of sustainable products. Most customers, even in a rich country like Switzerland, are very reluctant to pay extra for sustainable products, as they do not necessarily see any direct benefits. For that reason communication regarding sustainable products needs, in contrast to less rich countries, to focus less on awareness and more on the positive outcome of buying sustainable.

**Groupe Casino** implemented **training programmes** to make sure employees understand the range of sustainable / environmental / organic products available.

Through **product-labelling, leaflets and in-store demonstrations** B&Q in the UK (‘home improvement’ segment) is telling customers about the benefits of energy saving materials.

**Product group differences**

Promotion also depends on product group. In some sectors, e.g. food, paper, packaging and detergents retailers play a crucial promoting role.

In the packaging sector for example, retailers have been playing a relevant LCT promoting role with specific respect to waste management, recovery and recycling. As far as paper and detergents are concerned, the recent revision of the EU eco-labelling regulation, which now allows retailers to directly apply for the label, has further increased their crucial role. As a matter of fact retailers have obtained the EU-Flower for several product groups, e.g. tissue-paper (for which they are dominant), detergents, and textiles. Retailers also play a crucial role through the sale and promotion of bio-food and non-food brands.

More specifically, retailers have been playing a major promoting role of ISO-type I labels for paper products in several countries. Thousands of paper products are awarded with the White Swan, hundreds with the Blue Angel and dozens with the EU-Flower. As far as the latter is concerned, retailers have been playing a crucial promoting role in several countries, both raising the awareness of consumers and increasingly putting pressure on producers. For instance, in Italy in 2002, half of the labels awarded on paper products were given directly to large retailers [41].
Paper is an example of a consumable product. It is relatively easy to communicate environmental impacts of paper products to consumers, raise their awareness and influence their decisions. Moreover, as for other on-the-shelf products, the quality/price ratio matters. Eco-labelled products at the same quality and almost the same price of non-labelled products will be more attractive to consumers.

Industry and market structure

Another key influencing factor is the national industry and market structure. For example, in Italy, a few large paper retailers have a significant influencing power on producers, which are practically all SMEs. However, in the Nordic countries the market is dominated by large companies (CEPI, 2001). Still, retailers have participated from the very beginning in the establishment phase of the criteria of the White Swan on paper products, in a clear multi-stakeholder approach together with industry, forest owners, public authorities and environmental and consumer associations. To this extent, they have therefore also played a promoting role of LCT for this particular product group.

The promoting role of retailers in other sectors, e.g. white goods, is mainly limited to energy-efficiency labels. A reason for this is the high industry concentration in the white goods sector. As a consequence, retailers only have a restricted bargaining power to influence producers. In fact, this depends on the market structure, which is diverse among different countries. For instance, in Norway retailers possess a considerable power because two large chains dominate the market [41], while their influence is very limited in Italy, where only 9% of white goods are sold through large chains and 61% are sold in (small) specialised shops [42]. Germany is somewhere in-between, as several distribution channels are of importance for white goods, i.e. mail order companies (21%), small “traditional” shops (30%), large scale specialists (17%) and furniture stores (19%) [43] p. 31.

Regarding the differences in promotion between countries in Europe, the questionnaire [115] several times provided the response that differences in promotion correspond with differences in awareness. With regard to the awareness it was found that especially the large companies in the northern part of Europe are often far ahead and well informed about the life-cycle approach [115].

4.2.3 Consumer associations

Role associations

Key element in the promotion of life-cycle thinking is providing information to consumers about the environmental impacts of products. In principle, consumer organisations (and environmental NGOs) could play a major role in promoting life-cycle thinking, e.g. in the definition phase, selection of
product groups and monitoring of eco-labelling. For instance, the recent consumer survey carried out within the EU-project DEEP [41] refers that they are first-ranked in consumer trust as source of environmental product information as well as administrators and/or guarantee bodies for eco-labels (Table 4.1).

**Table 4.1** Trust in an eco-label administered and guaranteed by these institutions ranked by the sum of the two strongest degrees of trust on a scale from 1 (trust a great deal) to 5 (do not trust at all) in percent of those who answered [41]

<table>
<thead>
<tr>
<th>Activity Promoters</th>
<th>Germany (N=1021) %</th>
<th>Norway (N=1000) %</th>
<th>Italy (N=1000) %</th>
<th>Spain (N=556-605) %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between 50 and 60%</td>
<td>Independent body</td>
<td>55</td>
<td>Consumer and environmental organisations 53</td>
<td>Independent body 52</td>
</tr>
<tr>
<td>More than 60%</td>
<td>Consumer and environmental organisations 78</td>
<td>Consumer and environmental organisations 73</td>
<td>Independent body 63</td>
<td>Consumer and environmental organisations 67</td>
</tr>
<tr>
<td>Below 20%</td>
<td>Retailers 12</td>
<td>Retailers 18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between 20 and 30%</td>
<td>European Commission 28</td>
<td>European Commission 27</td>
<td>Government Retailers 28</td>
<td>Government Retailers 29</td>
</tr>
<tr>
<td>Between 40 and 50%</td>
<td>Government 53</td>
<td>European Commission 44</td>
<td>European Commission 41</td>
<td></td>
</tr>
<tr>
<td>Between 30 and 40%</td>
<td>Independent body 36</td>
<td>Producers 33</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Consumer and environmental organisations are ranked first and retailers last in all four countries studied. All countries seem to agree upon the relatively low ranking of retailers.

Though their 1st rank in consumer trust, the actual concrete promoting role of consumer organisations is limited so far, mainly due to lack of financial resources and still insufficient involvement in research and promotion initiatives. Moreover it was indicated by the Belgian Test-Achats that tests of environmental criteria are rather expensive.

**Activities promoters**

A survey on consumer organisations [108] focused on comparative product testing of selected electrical home appliances and on test reports in consumer interest magazines.

Most organizations provide their information to consumers through local newspapers; some also report the use of radio broadcasts and TV. Among the well
established organizations the regular publication of newsletters and magazines and
guidebooks is the preferred way of disseminating consumer interest information to
members and the general public. Some organizations have started to make use of
electronic media to disseminate their information.

Household energy consumption related information is provided to consumers in
essentially two complementary ways:

- hints and recommendations on energy conscious appliance and equipment use,
to make consumers aware of energy conservation potentials in their homes;
- reports on results of comparative product quality tests for energy-using home
appliances, intending to give consumers market overview and information on
visible and non-visible aspects of product quality.

Some consumer interest magazines feature articles educating readers regarding the
connection between household energy consumption and emission of greenhouse
gases.

Comparison testing and the publication of consumer interest magazines is mainly a
domain for consumer organizations supported by governments. However, some
consumer organizations have been able to develop independent product
information services into non-profit but self-financing services. [108]

Apart from product testing, some consumer organisations also promote life-cycle
thinking in other ways. The Verbraucherzentrale Bundesverband (VZBV) for
example, educates teachers as part of adult education regarding life-cycle thinking
(cradle to grave approach) and eco-labelling. The VZBV is also involved in
yomag.net, the European online magazine (www.yomag.net) by and for young
people from all over Europe. Recently a Yomag Seminar about sustainable
consumption and development was organised. [117]

Some other initiatives of consumer organisations are given hereafter:

| The Swedish Consumer Agency has initiated a number of measures to increase green consumption, including: consumer campaigns, consumer information, and the inclusion of environmental data in product testing. [28] |

| In December 1996 the consumer organisation Euro Coop prepared a memorandum on sustainable consumption, including Euro Coop’s views on how consumer organisations could contribute. Examples mentioned are information campaigns, educational initiatives and the introduction of environmental assessments of products and services in comparative tests and consumer surveys, together with information on performances. Today, Euro Coop's activities mainly focus on the consumer issues food policy, environment policy and sustainable consumption, consumer information and education. [109] |
Regarding differences between countries in Europe, the BEUC indicated that there is a group of frontrunners (a.o. the Scandinavian countries, Germany and The Netherlands), a middle group with less promotion activities, followed by a group of countries such as Portugal and Greece, and the group of new EC members with the lowest level of promotion activities. [117]

Other organisations promoting life-cycle thinking to consumers are for example NGOs and environmental organisations. These environmental NGOs are considered the main promoters by some of the respondents in the questionnaire.

Some initiatives of the environmental organisation WWF are given hereafter:

The environmental organisation **WWF Switzerland** informs consumers about indirect effects of their (purchasing) behaviour on the depletion of natural resources and quality of life. In the area of ‘consumption and lifestyles’ members of WWF are informed on the consequences of consumer decisions. This is done by four major ways:

1. **Information published in the WWF magazines and guide books**
   Includes the whole spectra from information on nutrition, housing, appliances, mobility, flowers, paper, electricity, textiles but also green investments (see www.wwf.ch - Konsum).

2. **Lifestyle tests**
   Since 1992 lifestyle tests have been provided to members to allow them to check with which behaviour they cause major environmental impacts. Initial versions focused on energy use and CO₂-emissions. Then, a version included also potential savings in monetary terms. The most recent version uses the ecological footprint method (see [www.footprint.ch](http://www.footprint.ch))

3. **Development and promotion of product labels**
   WWF has been instrumental in developing and supporting initiatives to establish product labels that fulfil high environmental standards and can become a market force. Usually, this is done together with industry and/or other interested parties. Examples include the FSC label for sustainable wood products (www.wwfwoodgroup.ch/html/), the label Naturemade Star for least polluting and renewable electricity (www.naturemade.ch ), the label Natureplus for environmentally preferable building products (www.natureplus.org) and as an extension of product labels most recently a label for restaurants that provide a selection of organic dishes and fulfil other environmental criteria (www.goutmieux.ch).

4. **Careful selection of products that are sold in WWF’s Panda shop.**
   The WWF-owned Panda shop is not just a fund raiser but also pays attention to ecological and social criteria, prefers labelled products, aims at highest quality and was in the past successful in stimulating producers to design new products (www.pandashop.ch/). [110]

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1 Other consumer tests are for example [www.voetenbank.nl](http://www.voetenbank.nl) (Dutch), [www.globalfootprints.org](http://www.globalfootprints.org) (childrens quiz), [www.earthday.net/footprint/index.asp](http://www.earthday.net/footprint/index.asp)
On a European level, the European Consumers’ Organisation BEUC has sustainable consumption as one of its key priority campaigning issues.

**Campaign for a reform of the CAP**

BEUC supports a radical reform of the current Common Agricultural Policy (CAP). They feel that the current CAP is not sustainable from an environmental, financial, social and economic point of view. European consumers are very much concerned about the food they eat, and more particularly about food safety, quality, nutrition, information and choice.

### 4.2.4 Evaluating conclusions

Hereafter an overview is given with respect to who are the main promoters as part of the target groups. The examples, described in 4.2, illustrate their activities. The main promoters are:

- **SMEs**
  - Large companies who are supporting SMEs in the supply chain
  - SMEs who are selling products with an eco-label
  - Active LCT oriented SMEs who give information about their demonstration activities
  - Active SMEs in business clusters
  - Active regional, national and European sector and branch organisations
- **Retail**
  - Large retailers, influencing their suppliers
  - Large retailers active in selling eco-labelled products
  - Active district organisations of retailers from different branches
  - Active national and European branch organisations
- **Consumer organisations**
  - National consumer organisations
  - European consumer organisation
  - Environmental NGOs

The comparison of the European situation to this of other economic blocks and differences between European countries and different industrial sectors can be coupled to the level of awareness. There is a strong relation and intense promotion increases the level of awareness (analysed and described in chapter 2). So the actual state of awareness is mainly realised by active promoters as aforementioned. Especially branch, sector and consumer organisations have an important role regarding promotion. For the retail large retailers and the district organisations are relevant promoting stakeholders.

The promotion activities in Europe are more intensive than in other economic blocks. In northern Europe the promotion activities are more structural and illustrative, compared with the rest of Europe.
4.3 Providers of LCA tools and services (marketing strategies)

This section describing the market strategies of providers of LCA tools and services is based on the market survey mentioned earlier (see appendix 3).

The main activity regarding the product strategy of providers in the survey is the provision of LCA software (95% indicates that they offer LCA software). Besides software LCA products and services offered are databases, consultancy, LCA related studies/research, education, training and seminars, publications and books.

The different elements of the marketing strategies of LCA providers are successively described.

The market of LCA products and services is characterised by a relatively small number of (potential) buyers, a relatively high price level, an extensive need for information from the (potential) customers, an extensive purchase process and a large number of people involved in the purchase decision.

These market features require a specific market approach. The information need from potential customers requires a sales format for which personal contact and information transfer are key issues.

Product availability

Providers offer a wide range of LCA products in order to realize a full service level. The full service character of the offered product assures a high level of service and typical a free helpdesk and free support by the providers. Both providers and other LCT promoters/supporters expect that the product assortment will get an advanced and deeper character due to the development of new tools. Such tools will have better user friendliness, and need less time and knowledge to execute an LCA. There will also be more customized solutions. The effect of this broadening and deepening is that it will lower the threshold for the use of LCA and enlarge the market for LCA products.

Pricing strategy

Due to the weaker economy, prices have become more important within the marketing mix strategies of LCA products providers. The increased importance of pricing also follows from increased notice of competition by non-commercial providers of LCA. Commercial providers of LCA products indicate that “universities and other non-commercial providers of LCA products exert pressure on prices as these non-commercial providers offer their LCA products mostly for free”.

It must be noted, however, that the goals of and services provided by commercial and non-commercial providers are quite different and not really comparable (user-friendly software with helpdesk versus basic software without any further support).
Some providers indicate the following trend: “Interest decreases because of economic reasons. Management cuts back on environmental investments. LCA will become more popular again when the economy rises again. LCA always is one of the first victims of cutbacks”. This trend and the price competition due to free or budget versions have negative effects on R&D of LCA software.

**Distribution strategy**

Typically for industrial products, distribution channels are short. These markets concern a relatively small number of potential buyers of LCA products and the salesperson needs a lot of technical know-how in order to sell LCA products. Therefore it can be expected that providers sell their products through personal sales from their own sales department. However, an inventory of distribution channels used by providers shows that personal sales is not the main instrument. Almost unanimously providers use their website to distribute LCA databases and software. Providers indicate that customers can order databases and software without any personal interaction. This distribution through a website has a reactive character, aimed at already convinced interested parties and users. Direct sales is being used by half of the providers, also partners/resellers are used in the distribution of their products. These two sales channels, distribution through the website and through the sales department, are the main sales channels of providers.

**Promotion strategy of providers**

Classical promotion generally has the purpose to enhance turnover. By enhancing the value of the product or the service, or by lowering the price, the attractiveness of a product is temporarily enhanced. This form of promotion however does not affect the attitude of (potential) customers with respect to (LCA) products. Classical promotion in the form of communicating action prices or discounts does not correspond with the objectives of LCA providers and so does not happen. In practice the providers enhance the knowledge of (potential) customers. Remarkably this form of promotion has a reactive character. The reactive character of the promotion can also be derived by their most important media types: Internet campaigns and (company) website.

The websites are entirely directed to (potential) customers who look for information. This is also true for the other media used, such as direct mail / brochures / fairs and congresses. Providers use to approach existing customers and relations but not potential customers, to realise new turnover. In other words, providers direct their promotion at the maintenance of existing contacts. Thus the

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1 For example the Products & Processes Road Show 2004 initiated by Umberto, SimaPro, ProdTect and EcoInvent ‘Softwareunterstützung und Datengrundlage für zukunftsfähige Produkte und Prozesse’
providers and the industry in general do not use the opportunity to convince new customers of the value of LCA and so increase the LCA market. The present strategy of providers can be characterised as a penetration strategy: growth in the past years and expected future are realized from a growing market. It concerns growth by selling more products in an existing growing market. In addition to this present growth strategy, there is a growth potential among potential users with a low current awareness level. The creation of awareness in this group of new users is essential for the further use of LCA. Providers of LCA products do not contribute to the creation of awareness as can be derived from their marketing communication / message.

**Conclusions**

The promotion activities of the providers are of course business oriented; price/quality ratio and the offer of exclusive tools and services play an important role. Their promotion activities are not target group specific, not for specific areas (parts of the world) and not for specific industrial sectors. Their marketing strategy is more general with the help of internet (websites), brochures, direct mail, advertisement in general papers, congresses and with the help of personal contacts they show their promotional activities. Because almost all providers are settled in Europe these strategies are generally spoken directed from Europe to the rest of the world. Moreover the providers see their marketing strategy as a confidential issue and are not much informative about it.

4.4 **Authorities and joint initiatives**

While providers of LCA products almost completely focus on convincing (potential) buyers based on product features and the creation of brand preference, the market survey shows that promoters and supporters of LCT from governments (and industry organisations) aim at creating awareness. In their promotional activities the creation of awareness is a main objective, which is done by actively communicating the ultimate advantages and objectives of LCT and LCA to SMEs, consumers and other end-users. The market survey reveals that, promoters and supporters from governments and industry say that, in future, they will use more of a pull strategy coming from consumers. Promotional activities are aimed at creating awareness among consumers and other end users. The increased awareness will lead to a demand for LCT/LCA information by end-users. In order not to lose any customers, organizations are then forced to perform an LCA and to make the LCA results available to consumers.

The LCA market therefore needs to transform from a product oriented market into a customer driven market. Legislation plays an important role in the stimulation
and motivation to (1) making LCA databases publicly available, (2) maintaining databases and (3) developing a ‘common alphabet’ for the interpretation of the results of LCA. These developments will widen and deepen the LCA market.

Public promotion and support can be realized by active authorities or related administrative bodies. These activities can be directed to operational opportunities of the target group actors.

Regarding the promoting role of administrations towards small firms, literature reference [12] identifies three clusters of countries, for which the level of support to SMEs largely differs:
- Countries with a divers system of specific support structures aiming to assist SMEs in applying eco-design: The Netherlands, Sweden, Germany, Denmark, Austria and United Kingdom;
- Countries with an effective SME support structure aimed at environmental issues in general but without specific consideration of eco-design: France, (United Kingdom) Belgium, Luxembourg and Italy;
- Countries with a rather limited support structure aimed at environmental issues: (Italy) Greece, Spain, Ireland, and Portugal.

With the exception of two countries (Italy and the UK), in which the situation has improved in the meantime, this classification in country clusters according to the level of policy support is still valid. The study also suggests that the dissemination of eco-design is to a large extent dependent on the initiative from the government and financial support. Moreover, it also applies to other types of policy support for LCT, e.g. green public procurement.

The observation that promoters of life-cycle thinking can be found in particular in Northern Europe was also found in the retail and consumer organisations’ responses to the questionnaires. In the new member countries any support structures, if present at all, are lagging behind that of the group of ‘countries with a rather limited support structure’. [115] [117]

### 4.4.1 Public administrations and governments

The Ecotec report ‘SMEs and the Environment’ (2000) [111] indicates that there are many initiatives across the EU aimed at supporting manufacturing companies in making the shift from ‘business as usual’ to more sustainable practices. Many are specifically tailored to meet the needs of SMEs, especially small and micro firms, or at least are applicable to such firms in terms of the type of support provided (e.g. funding, subsidised consultancy, training etc.). The initiatives cover many topic areas from EMS, eco-efficiency and eco-design through to more fundamentally challenging approaches to truly ‘sustainable manufacturing’ based on renewable resources. Many support initiatives have been successful.
Though this report is from the year 2000, it is not expected that this general view regarding SME support has changed.

The UNEP/CI review ‘Tracking progress: implementing sustainable consumption policies’ [30] shows that approximately 87% of governments\(^1\) support initiatives that in some way encouraged the design, development and use of safe and energy- and resource-efficient products and services. According to the study a large number of governments have raised consumer awareness about sustainable consumption issues. Eight in ten governments have promoted such practices in recent years and many others have devised campaigns for the future. Awareness and information campaigns have been carried out in the full range of media, including TV, magazines, newspapers and the Internet.

National consumer organisations or NGOs often manage the campaigns.

Dalhammer and Mont [28] mention a growing interest in sustainable consumption from governments. This growing interest is not only reflected in policy documents, but there are examples of a more formalised cooperation with consumer agencies. For instance, the Swedish Environmental Protection Agency (EPA), has started up a formal dialogue with the Swedish Consumer Agency within their work with IPP, and thereby assures that consumer concerns are integrated.

On the practical level, the environmental departments of most Swedish municipalities give information to consumers on how they should make more environmentally sound purchases and so do most environmental NGOs.

**National initiatives**

Especially in the Northern European countries supporting initiatives are planned or already implemented, for example:

In 2003 the **Danish Environmental Protection Agency published ‘An introduction to Life-Cycle Thinking and Management’**.

This booklet is part of a ‘mini series’ about life-cycle thinking and life-cycle assessment published by the Danish EPA in its series ‘Miljønyt’ (Environmental News). Together, the publications are to support enterprises, authorities, etc. who want to deal with environmental conditions based on a life-cycle approach.

The booklet describes how enterprises can begin to develop cleaner products based on a life-cycle perspective. It focuses on a simple approach to preventive environmental initiatives, where enterprises can begin at a level that matches their ambitions and their preconditions. The report is aimed at enterprises that, regardless of their sector or size, which are interested in reducing their environmental impact of their products.

\(^1\) The global governmental survey includes 53 countries (20 OECD and 33 non-OECD countries).
A recent initiative is ‘Framtida Handel’, where the Swedish government has an agreement with a number of actors, including retailers, to green the production systems, through e.g. greener transports and the development of more environmentally friendly products. See www.framtidahandel.se [28]

**Envirowise** is a government-funded programme in the UK that aims to help make businesses more competitive and profitable, and ensure compliance with environmental legislation. Envirowise offers businesses in the United Kingdom free, independent, confidential advice and support on practical ways to increase profits, minimise waste and reduce environmental impact.

The Envirowise webpages include both industry related information (e.g. electronics, engineering, paper and board, retail) and topic information (e.g. cleaner design, legislation, water, waste minimisation, cleaner technology). The retail webpages of Envirowise distinguish between small retailers, large retailers (reducing waste through supply chain partnerships) and managers involved in shopping centre management, thus providing the most suitable option for the company involved.

(www.envirowise.gov.uk/envirowisev3.nsf/key/Home)

The **UK Environment Agency** provides a website designed to help businesses to understand the complex regulations affecting their environmental obligations. It is designed particularly for small businesses, and contains both mandatory measures required by the law, and good practice measures to help businesses look after the environment. (source: http://www.environment-agency.gov.uk/netregs/?lang=_e)

The website provides basic information of LCT, LCA and Environmental Management Systems and for more information to other useful links, such as the Envirowise website. (www.environment-agency.gov.uk/netregs/275207/663774/?version=1&lang=_e)

Furthermore life-cycle thinking is promoted by the establishment of national competence centres, for example:

**LCA Center Denmark** (www.lca-center.dk)

**Official Danish Center for Life Cycle Assessment and Life Cycle Approaches**

LCA Center Denmark is a knowledge centre for LCA and the life-cycle approach. The centre promotes product-orientated environmental strategies in private and public companies by assisting them in implementing life-cycle thinking. LCA Center Denmark is partly funded by the Danish Environmental Protection Agency and is managed by IPU, COWI and FORCE Technology - division for Energy & Environment (former dk-Teknik Energy & Environment).

The objectives of the LCA Center Denmark are:
- To assist companies that have a need for environmental assessment of products in a life-cycle perspective.
To secure that the development of tools and methods for the life-cycle approach in Denmark will be based on a solid and scientific basis.
- To promote product-orientated environmental work in companies (LCAs and POEMS).
- To maintain the existing cooperation between Danish LCA stakeholders.

National Competence Center for Life Cycle Assessment LCA (Ecoinvent)
A joint initiative of the ETH (Swiss Federal Institute of Technology, Zurich and Lausanne) and Swiss federal agencies.

- To make available harmonized life-cycle inventory data in high quality and in a high standard format
- To make quantitative and semi-quantitative life-cycle considerations and adequate valuations by broadly accepted and well designed methods
- Basis to calculate e.g. product LCA, gray energy, external costs
- Creation of confidence in life-cycle considerations by high quality and high transparency
- Promotion of life-cycle thinking and its implementation in industry, science and policy
- Development of methodology, education, research related to LCA

(www.ioew.de/governance/english/veranstaltungen/Summer_Academies/SuA2Rentsch.pdf)

CPM is the Swedish national competence center at Chalmers University of Technology. CPM, a Competence Centre for Environmental Assessment of Product and Material Systems, is jointly funded by Industry, VINNOVA, the Swedish Agency for Innovation Systems and Chalmers.
- To prevent and decrease environmental impact associated with products.
- To gather and reinforce the Swedish competence within sustainable product development at a high international level.
- To provide industry and society with relevant methods and support for implementation of environmental aspects in decisions regarding products and materials.

(www.cpm.chalmers.se)

Some of the initiatives mentioned before offer free services, for example the Danish EPA and the LCA Center Denmark provide a newsletter that can be downloaded for free. Envirowise provides various services that are free of charge, such as events (e.g. ‘WEEE Explained’ in February 2005, an event explaining the WEEE Directive), an ‘Environment and Energy Helpline’ (offering assistance through two hours of free consulting over the telephone, free half-day site visits for companies with under 250 employees to solve particular operational issues or a ‘Fast Track visit’ for one day free on-site assessment of the operations) and a range of publications that can be ordered free of charge from the website.
Also new competence centres are being established, for example in the Netherlands the establishment of an ‘LCA Knowledge Centre’ is co-ordinated by RIVM. The Centre will function as an information and help desk to help when LCA related questions are announced by different actors.

**European initiatives**

On a European level, the European Commission promotes LCT by various initiatives. Some of the initiatives are mentioned hereafter, for example:

**About 300 Euro Info Centres** (EICs) have been created by the European Commission to support Small and Medium-sized Enterprises (SMEs). The EIC network, which was established in 1987, is active in 42 countries. Environment & Sustainable Development is one of the EIC’s core expertise areas: Information about: environmental legislation and standards; EMAS certification; Ecolabels and where to find assistance for environmental improvements can all be provided by the local EIC.


**The eLCA project**, funded by the eContent European Programme

The eLCA project was initiated to provide a one-stop shop website to address the difficulties that SMEs are likely to face when adopting IPP. The planned website (www.ecosmes.net) will provide information, tools and services to enable SMEs to develop and market “green products”. It also intends to promote accompanying measures, through the development of co-operation and agreements with public authorities and other key stakeholders. [112]

**Introduction and Promotion of the ECO-LABEL to the greek textile industry** (**ECO-TEXTILE**). The project is funded by the European Commission’s LIFE Environment program. Project duration: October 2003 - October 2006. The overall objective is the introduction, promotion and implementation of the EU's Integrated Product Policy, especially sustainable production and consumption in the Hellenic fashion industry, which includes key market actors and potential end-users (consumers, retailers, traders). The project entails the wide promotion and introduction of the Green Product concept and Eco-label scheme into the Hellenic textile industry, via the establishment of the necessary partnerships, marketing network, and technical infrastructure. Key objectives of the project are:

- Public awareness of quality environmentally friendly products
- Motivation of textile enterprises to identify eco-labelling as a market-based instrument
- Provision of technical assistance to textile SMEs for assessing the requirements and evaluating the potential of Eco-label implementation in their products.

Compilation of support material to facilitate Eco-label implementation by SMEs.

**“Promoting eco-design activities in the SMEs** of the electrical/electronics sector is a project financed by the European Commission, DG Enterprise. The aims of the project are: to increase awareness of SMEs about EU policy orientations and best practices in eco-design; to identify appropriate and targeted types of assistance for helping SMEs in implementing eco-design, in reaping financial and other business benefits from this process and in complying with current and forthcoming related EU legislation. Eco-design is meant here as the systematic incorporation of environmental considerations into product design with the aim to reduce the environmental impact of products throughout the whole product life cycle. [146]

In the *Emerging Users Demands for Sustainable Solutions* (EMUDE) project cases are seen as effective tools to communicate and to facilitate the growth and spread of good practices. The programme final results are conceived to communicate to different interlocutors, experts and non-experts. In fact:

- Trends and roadmaps offer the policy makers and the companies a picture of some possible, positive evolutions of social demands. And, therefore, on social behaviours that policy makers could facilitate, on lines of research that research institutions could activate and, finally, on new products and services that companies could conceive, develop and deliver to the market.
- Collections of examples and scenarios communicate to a very wide and general audience, showing examples of good practices and indicating actions that, given certain conditions, everybody can perform.

EMUDE is financed by the 6th Framework Programme of the European Commission. It is promoted and developed by a Consortium of European universities and research centres. One of the consortium partners is Consumers International (UK).

**FESCOLA (Feasibility and Scope of Life-Cycle Approaches to Sustainable Consumption)** is a EU-financed study which aims to lay out how life-cycle assessment (LCA) and related approaches (such as environmental input-output analysis) can be used. This implies both research to identify areas and courses of action, and practical information or tools to implement sustainable consumption policy. It will describe, classify and critically evaluate different options for using life-cycle approaches.

(www.indecol.ntnu.no/indecolwebnew/research/sustconsumpt.htm)

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1. NICE-Mail, News and Information about Consumer Education, July 2004 No. 21
**The FLIPP program** aims at developing knowledge and understanding of the dynamics, mechanisms and interactions in complex product chains necessary to underpin life cycle based decision support systems. The knowledge generated from its multidisciplinary applied research approach aims to support policymakers in decisions on how and when to intervene in product chains and when to facilitate processes already set in motion by market actors. It will also support the actors in the product chains, in their strategic and operational chain-related decisions, such as procurement, product design, production and marketing. (http://www.naturvardsverket.se/dokument/omverket/forskn/aktuell/utlys/flipp.pdf)

**The Sustainable Consumption Net** is a network uniting European scientific expertise from a diverse set of research traditions and disciplines. The network’s aim is to provide for and disseminate to citizens and policy makers the knowledge necessary to realize sustainable consumption patterns. It will further ensure the application of the research through a number of cases in which a) sustainable consumption is studied in practice and b) policy measures are tested in cooperation with policy makers from the local to the international levels, also NGOs. Intended users of the results of the study include consumers, Corporate and public purchasing departments, Politicians and decision makers at local, national and EU levels, researchers and NGOs. (www.sustainable-consumption.net)

**The INTEND project** concerns the “Definition of an Environmental Product Declaration system that can be applied at international level and its implementation in two pilot countries (Sweden and Italy)”. The project is funded by the European Commission’s LIFE Environment 2003 program. The project will end in September 2005. Some of the objectives are:
- To define an Environmental Product Declaration (EPD) system, according to ISO TR 14025. The EPD international scheme framework will be defined by identification of coordination and harmonisation rules among national schemes.
- To diffuse the knowledge of type III Environmental Claims and to educate technicians on them.
- To increase people’s knowledge and sensitiveness on products (goods and services) environmental aspects.
Global initiatives

The global initiatives of UNEP also supports life-cycle thinking in Europe. For example UNEP’s Sustainable Consumption Programme, which started in 1998 and has the objective to explore underlying needs of consumption patterns and to use these as sources of innovation for business, governments and NGOs.

In Japan the Japanese government is an important promoter of life-cycle thinking. ‘The Basic Environment Law’ promotes the use of products that reduce environmental impact and one of the objectives of the ‘Law on Promoting Green Purchasing’ (see also section 2.4.2) is to establish the necessary provisions a) to encourage the State, independent administrative institutions and local governments to procure eco-friendly goods, b) to provide information on eco-friendly goods and c) to encourage a shift in demand towards eco-friendly goods.

The Asian Productivity Organisation (APO)\(^1\) promotes the life-cycle thinking principle with the Green Productivity (GP) Program:

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The **Green Productivity Promotion Mission** (GPPM) is one of the key activities that the APO undertakes to support the acceptance of *Green Productivity* as a strategic and high-level management goal. Deputized experts spread awareness among top-level government officials, business executives, and other environmental stakeholders of member economies on the importance of Green Productivity. One of the focus areas of the GP program is ‘Greening the Supply Chain’, entailing that the big corporations should share their expertise and know-how with their suppliers and help them to produce more environmentally friendly components. Such partnerships will be beneficial to the partners as well as for the region in the long term. For this, the APO will identify projects that could help achieve the goal of greening supply chains in this region.

[74]

*Green Productivity (GP) is defined as a strategy for enhancing productivity and environmental performance simultaneously for overall socio-economic development.*

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In the US the US Environmental Protection Agency (EPA) is an important promoter of life-cycle thinking. Various programs and initiatives in the field of ‘green products’ are administered by EPA, for example a Design for the Environment Program and product stewardship programs (e.g. National Electronics Product Stewardship Initiative (NEPSI)). The EPA also presents a website on life-

\(^1\) The APO was established by Convention on 11 May 1961 as a regional intergovernmental organisation. Its mission is to contribute to the socioeconomic development of Asia and the Pacific through enhancing productivity.
cycle assessment. Some of the programs and initiatives are briefly described hereafter.

The **DfE Program** (Design for the Environment) of the US EPA is a voluntary partnership program that works directly with industry to integrate health and environmental considerations into business decisions. The program promotes pollution prevention and other risk reduction activities in industrial sectors. To accomplish this mission DfE 1) forms partnerships with industry and other interested parties to develop information on environmental and human health impacts, performance, and cost of cleaner technologies and approaches, and 2) disseminates information to help businesses design and redesign cost-effective products and processes that are cleaner and safer for workers and the public.

EPA's **Environmentally Preferable Purchasing (EPP) Program** is a federal initiative that encourages and assists Executive agencies in the purchasing of environmentally preferable products and services. The goal of the EPP Program is to help increase the availability of products and services that are environmentally preferable, protect human health, save money, and improve the overall quality of government purchases. Such purchases are required by several Executive Orders, including Executive Order 13101.

**The Consumer Labeling Initiative** examines ways to provide better environmental information on products to consumers. EPA, the specialty pesticide industry, environmental groups, and state and local governments started the Consumer Labeling Initiative to make household pesticide and cleaning product labels easier to read and understand. As part of the Consumer Labeling Initiative, EPA and its partners performed research with consumers to learn how to make labels better. [85]

Another important promoter in the US is the American Center for Life Cycle Assessment (ALCA), a non-profit membership organization formed in 2001 under the aegis of the Institute for Environmental Research and Education. The mission of the center is to promote the use of LCA in America.

### 4.4.2 Joint initiatives

In the Global Status report on Cleaner production (2002) [113] it was concluded that cleaner production (CP) is best promoted in partnerships. A commonly established partnership in this field has been between government-donor agencies and businesses. These partnerships, or joint initiatives, can be found in the field of LCT promotion as well. Apart from the national competence centres, mentioned in section 4.4.1, some other joint initiatives can be mentioned.

Today, the European Eco-label Licence has been awarded to over 150 companies. The number of licences is growing, and the European Union Eco-labelling Board
(EUEB) is planning to increase the number of labelled products considerably during the next few years. The European marketing campaign on the European Eco-label is described hereafter:

A European marketing campaign on the European Eco-label was started in order to provide European consumers with qualified knowledge on the Eco-label and thereby motivate them to buy eco-labelled products. The double objective of the project is to increase the number of eco-labelled products and to encourage consumers to buy environmentally friendly products. In phase one, the purpose is to motivate more manufacturers to apply the Eco-label and more retailers to distribute eco-labelled products. The purpose of phase two is to increase consumer knowledge of the Eco-label. Phase one took place up until September 2004 and created a foundation for phase two, by building partnerships between industrial federations, manufacturers, retailers and NGOs as well as furthering communication through networks. Phase two was a consumer campaign in the participating Member States, within the framework of a European Flower Week in October 2004 (18-24 October), where several activities took place in all the participating countries. The idea is that, with several simultaneous activities, it will be able to obtain the best results. Activities will take place in schools and stores, supported by advertising and PR. A set of campaign materials with complementary messages will be prepared, and the partners and networks, in terms of NGO’s, industrial federations, licence holders and retailers, will be encouraged to campaign in the same week.

The campaign is financed through support from each participating country and organisation as well as through support from the LIFE Environment Programme. Managed by the Danish EPA in partnership with national authorities, producers, retail organisations and consumer's organisations, the project aims at raising awareness of the Flower through campaigns carried out in 9 Member States.1

[http://europa.eu.int/comm/environment/ecolabel/marketing/flower_week_en.htm](http://europa.eu.int/comm/environment/ecolabel/marketing/flower_week_en.htm)

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1 France, Italy, The Netherlands, UK, Ireland, Belgium, Austria, Sweden and Denmark.
Some other relevant initiatives are described hereafter:

The **UNEP/SETAC Life-cycle Initiative** aims to foster life-cycle thinking around the world through the development of an international life-cycle management framework, project specific activities and databases of best available life cycle assessment methods and data. The Initiative aims to further cleaner production and sustainable consumption, from a strategic and practical perspective, through life cycle thinking about products, services, etc. Informed decisions for product development, policies and management strategies, aimed at changing consumption patterns, need to consider life cycle management, product service systems and integrated product policy. UNEP sees life cycle approaches as a way to help orient consumption in a more sustainable direction. [114] See also section 6.4.1. (www.uneptie.org/pc/cp7/papers/lci.htm)

The United Nations Environment Programme’s Division of Technology, Industry and Environment (UNEP DTIE) and the Eco-Efficiency and Sustainable Enterprise team at the Wuppertal Institute in Germany have jointly developed the **Efficient Entrepreneur Calendar for small and medium-sized enterprises** (SMEs). This calendar guides businesses through a programme that simultaneously saves money, increases efficiency, and reduces environmental impacts. In combination with an additional booklet (The Efficient Entrepreneur Assistant), the Calendar provides assistance and guidance on how to measure and improve environmental performance and stakeholder relations in seven areas. On the basis of “You can’t manage what you can’t measure” it introduces performance measures that are easy to assess and evaluate. The calendar charts a “month-by-month” programme that ends with a simple Efficient Entrepreneur report. (www.efficient-entrepreneur.net)

The **Sirii (Swedish Industrial Research Institutes’ Initiative) Environmental Data Network (Sirii ED Network)** cooperates on several different issues within the field of environmental management, amongst others environmental communication. In Sweden an official Type III environmental declaration programme called the EPD system, based on ISO/TR 14025, has been established. The EPD system is applicable worldwide for all interested companies and organisations. In order to meet the needs of SMEs that may have well founded ambitions to work with environmental issues, but not the financial resources, the Sirii institutes have gathered their competence to work out simplified guidelines for environmental declarations with a life-cycle perspective. The intent is that this concept shall make the work with environmental declarations easier, more cost-effective and more attractive. [22]
The Business Leaders Initiative on Climate Change (BLICC) is an international programme for industry leaders committed to reducing the impact of business-related Greenhouse Gas (GHG) emissions. The BLICC programme brings together key stakeholders – including local and national government, business, employees, civil society organisations, and the European Union – in order to:

- generate dialogue between industry peers and stakeholders;
- increase transparency through better emissions monitoring and reporting; and
- share best practice in the areas related to customer activism, renewable energy and transportation.

The BLICC programme was launched in 2000 and is the first initiative in a series of Business Leader Initiative programmes sponsored by Respect, a European-based consultancy. The first BLICC report, establishing a baseline of emissions reporting, was published in Spring 2002. The second report was released in June 2003 at Green Week in Brussels and at the Environmental Protection Agency’s annual conference in Washington DC.

Companies participating in the programme are The Body Shop, DHL Express Nordic, Ikea, Interface, Nuon and Stora Enso. [128]

4.4.3 Evaluating conclusions

Promotion can be more country, product and industry specific, but can also be related to more specific issues for more target and stakeholder groups. So the National, European and Global surveys are not directed to a more general analysis, but more based on “what can we learn from other initiatives?” In that case examples are more illustrative. Moreover literature resources do not provide enough data/figures to get the results of a quantitative analysis.

The examples characterize the kind of promotion activities and also show that a lot of them are not target group specific, but directed to the improvement of a broader awareness of all target groups. There is no indication that retailers are specifically supported. The reason for this is that specifically the large retailers are rather active regarding sustainable consumption. The activities are more directed to the less active groups, such as SMEs.

Hereafter on overview is given for who are the main promoters regarding LCT of the target groups. The main promoters outside the target groups are:

- Regional authorities
- National authorities among others with the help of legislation
- Related administrative bodies
- National, regional LCT expertise or competence centres
- European project groups and co-operation structures supported by the EU
Joint initiatives strengthen the promotion. In that case mostly governmental, industrial and non-governmental organisations work together.

4.5 Summarizing conclusions

Regarding the potential role of SMEs a comparable conclusion as for awareness can be drawn; the promotion of LCT depends on a combination of related factors: Position in the product chain, product group category, industrial structure of the sector and country. The promoting opportunities for individual SMEs are very limited, if they are positioned in the supply chain of large companies, such as in the automotive and electronic sector. In some sectors and some countries, when the SMEs produce final products (e.g. paper products) to be delivered to the retail, they can become important promoters of LCT in the product chain. With respect to industrial districts the promoting role of LCT by SMEs is also emerging and increasing in various countries (e.g. Italy).

Especially branch/sector organisations or associations can play a very important role in the promotion of LCT. Regarding the country differences in Europe especially the Northern European countries are very active considering LCT supporting activities directed to industrial stakeholders.

The behaviour and actual LCT promoting role of retailers strongly varies from country to country and depends on considered product group categories. In some countries retailers have played a crucial role for the diffusion and promotion of eco-labels, mostly for short-life consumable and food products. With respect to the potential to inform/influence consumers, retailers can have a powerful position, especially for durable products retailers can inform and educate consumers during their decision to buy. In practice their influence is limited, but some large retailers try to build up a specific image by offering a reasonable amount of greener products in their stores/shops.

In principle consumer organisations can play a major role in the promotion of LCT. Their actual possibilities are limited however, mainly due to less financial resources and limited human capacities to be involved in research and promotion activities. With the help of the distribution of the results of product tests they can increase the LCT awareness of consumers. An increase in the number of tests and a dedicated distribution of the results can help to raise the consumers awareness.

The marketing strategy of the providers of LCA products will be based on:

− A client oriented availability of LCA products
− A pricing strategy dependent on economic circumstances and on competitor analyses
A distribution strategy not based on personal contacts, but on information distribution by internet.

A promotion strategy with the help of electronic media, e.g. internet campaigns and (company) website.

The present strategy of providers is a penetration strategy: Growth by selling more products in an existing growing market. However additional growth would be possible when LCT awareness should be created in a group of new potential LCA users.

The authorities (through research programmes and public activities) are currently the main promoters of LCT in the target groups. Public promotion and support can be realized by active authorities or related administrative bodies. These activities can be directed to operational opportunities of the target group actors.

The observed activities are:
- National; for instance the establishment of so-called competence centres in Denmark, Switzerland, Sweden and The Netherlands
- European; promotion by the EU with the help of campaigns and research programmes
- Global; UNEP supports several initiatives, also in Europe.

Promotion activities will be stronger when different stakeholders collaborate. Illustrative examples are:
- EU Flower campaign
- UNEP/SETAC Life-cycle Initiative
- UNEP/Wuppertal Institute in Germany, Calendar for SMEs
5. Needs for intensified communication and exchange of information

5.1 Introduction

After all, it can be stated that the awareness of life-cycle thinking in the target groups is rather poor (chapter 2). The results of the analyses of the ‘use of LCA tools’ by the target groups (chapter 3) illustrate that the use of LCA tools is still limited, which supports the aforementioned statement. Thus the potential to raise awareness is considerable. The activities to promote life-cycle thinking will have to start from this low level of awareness. Authorities and administrative bodies recognise the need for an extension of promotion activities (chapter 4). From the political point of view they try to enlarge the IPP support and will stimulate the acceptance and implementation of various LCT issues.

But as described in the former chapters the level of awareness and the related promotion of LCT depends strongly on different aspects. Defining the needs for intensified communication, exchange of information and promotion activities regarding LCT within the European countries a distinction will have to be made between the target groups. Their function and position in the product chain is very important, because it determines with which stakeholders communication takes place and what kind of information is needed regarding LCT. Apart from a target group perspective a sector perspective is needed. Both, the awareness and the use of LCA tools as well as the promotion of LCT differ to a large extent for the various (industrial) sectors and also differ for the several product categories.

A third and last level of distinction for defining the needs of the target groups is the country/region (or economic block) involved, as reasonable differences in awareness and promotion exist between countries/regions. For instance regarding eco-design, studies have shown that a group of frontrunner countries exists in which the awareness is on a substantial higher level.

How to deal with the recognised differences is described in the following sections. In section 5.2 a description is given how communication processes on LCT take place in general. Especially attention is paid to the kind of stakeholders, which are involved, and how communication will be. The translation of the observed differences to the general information needs of the specific target groups is formulated in section 5.3. Their specific information and communication needs and the communication roles of the indicated stakeholders are argued in section 5.4. Two examples are presented.

Summarizing conclusions are presented in section 5.5.
5.2 How communication and exchange of information takes place

The communication and information exchange on life-cycle thinking takes place through a limited number of main channels. Figure 5.1 shows the different stakeholders in the communication and exchange of information at different (geographic) levels.

![Diagram of communication and information exchange channels.]

The target groups of small firms and retailers in particular communicate with the organisations that are closely associated with them, i.e. the national sector organisation (e.g. the Dutch FME-CWM, an association in the metal and electro sector organising eco-design courses for members) and the national organisation representing the specific interests of the target group (e.g. the Austrian Wirtschaftskammern which explains the IPP Green Paper on their website) [129]. These national organisations know the specific problems of the sector and/or target group involved and sometimes also keep in close touch with small firms and retailers themselves. For that reason they are and will have to be the most obvious organisations for exchange of information and communication with the target groups.

Furthermore the target groups of small firms and retailers communicate and exchange information with their governments, or administrative bodies established by these governments. Examples of these bodies are the LCA Center Denmark which has among others the aim to promote product-orientated environmental work in companies [130], the Dutch Novem which is an agency of the Ministry of Economy [131] and the EnviroWise programme in the UK [132].

For the target group of consumer organisations the situation is different as these organisations already operate on a national level. For the consumer organisations communication and exchange of information takes place in particular with the national governments or related bodies, and the European consumers’ organisations.

For example, the national consumer organisations communicate with the European consumer organisations on issues such as life-cycle thinking.
As seen in Figure 5.1 the communication with and information exchange to the target groups takes place in particular with those organisations in the closest upper level, i.e. the national, or even regional, level.

The national organisations for their part communicate and exchange information with the European (as well as sometimes the international) sector and target group organisations. Regarding life-cycle thinking we see several initiatives of European organisations supporting their members from various countries. The European organisations and the national governments/government bodies thereupon are in contact with the EC.

In the dissemination of life-cycle thinking to the target groups a Community Platform should therefore build on and support existing local and national initiatives, which was also clearly expressed during the workshop for this study (see appendix 4). The need for a ‘think globally, act locally’ approach was recognised during the workshop and it was strongly recommended to use local initiatives, contacts and neighbours. Regarding SMEs, it was underlined it is very important to stay in contact with those already in contact with SMEs.

The European Commission can be seen as the supporter of the member states and European branch organisations.

5.3 Definition of needs for intensified communication, exchange of information and promotion activities

In this section the needs of the three target groups are described. These needs are derived from the results as presented in chapters 2, 3 and 4.

5.3.1 Small firms

Small firms have three basic needs:
- The need to raise the knowledge on the concept of life-cycle thinking;
- The need to know how life-cycle thinking can benefit their company
- The need for targeted knowledge, training and tools on how to implement life-cycle thinking in their business activities

**Knowledge on the concept of life-cycle thinking**

First of all small firms need **simple information about the concept of life-cycle thinking**. After all, life-cycle thinking is a difficult concept and there is a need for facilitation in the communication. The information needs to be understandable by
non-experts in the field and needs to be targeted to small firms and their specific problems. Furthermore the information needs to be available in the own language.

Related concepts, such as eco-design, cleaner production, sustainable consumption as well as tools such as LCA, EPDs and eco-labelling, need to be introduced and interrelated in the context of life-cycle thinking.

The national government, in cooperation with a national SME organisation, can play an important role in the development of this information. The distribution can be done in cooperation with national sector organisations, e.g. to members.

Communication of the benefits of life-cycle thinking from a business perspective

Once made aware of the concept of life-cycle thinking, small firms need to be informed of the real benefits of life-cycle thinking from a business perspective. These benefits can be made clear by presenting examples, business cases, describing the benefits for the company in the form of an increased market share or revenues.

The observatory report of European SMEs [61] distinguishes between internal and external benefits for SMEs derived from the involvement in environmentally responsible activities.

Internal benefits are organisational benefits (e.g. improvements in the quality of management), financial benefits (e.g. cost savings) and benefits on the internal employees (e.g. a better company image among employees).

External benefits can be commercial benefits (new customer/business opportunities), environmental benefits (e.g. improved environmental performance) and communication benefits (e.g. positive enterprise’s public image).

Business cases presented should be geared to the experiences of small firms and targeted to the specific sector. Depending on the sector involved the business cases, can be related to eco-design, cleaner production, the application of eco-labelling etc.

Regarding the development of Environmental Product Declarations there is a need for a harmonization at EU level and supporting measures/procedures for SMEs.

The impression from the Tukker study [17] is that a main driver to apply eco-design in practice is the conviction of firms that eco-design will bring benefits from a business perspective. Expectations are that this obvious impression also holds for the application of the concept of life-cycle thinking.

The national governments and national sector organisations are the obvious organisations for the selection and development of the business cases, and for the
communication of the cases to the target group of small firms. In this way a country and sector targeted approach can be ensured.

**Knowledge, training and tools targeted to their needs**

Small firms lack the knowledge and expertise, as well as the tools to actually implement life-cycle thinking in their business activities. They need simple information, training and tools, understandable by non-experts and targeted to their specific problems and sector.

Environmental initiatives in SMEs are often inhibited by a general lack of financial and human resources. Apart from the technical assistance there is a need for financial assistance, which can be given in the form of reduced fees for the participation in a training, reduced costs for the purchase of LCT tools (e.g. manuals, books, software tools) or for expert consultancy.

Regarding (simplified) LCA the availability of commonly accepted LCI (life-cycle inventory) and LCA data or methods is conditional.

The national sector organisations can play an important role in the development of a sector specific training. They can provide business cases, suggest specific issues to be addressed (e.g. legislation) and ensure speaking the right ‘business language’. Universities, research organisations or consultants can play a role in providing the content of the training. They can also play an important role in the development, or the selection, of simplified tools, e.g. checklists and simplified LCA software tools. Through their membership list the national sector organisation can play an important role in contacting the firms and inviting them to participate in the training.

With respect to LCA method development in particular universities can play a role, while LCI data can be made available with the assistance of national/European sector associations. The confidentiality of information and data, mentioned by industry associations and individual companies, needs to be acknowledged and adequately treated.

Based on a study of 150 SMEs in five countries the eLCA project [112] has defined the conditions necessary for the adoption of IPP. In addition to knowledge, training and tools which are adapted to their needs, also the two following conditions are mentioned: 1) environmental and technological improvements should be initiated simultaneously, changes should be low in cost and introduced gradually and 2) LCA data must be available, pre-elaborated and provided with customised services.
5.3.2 Retail

The retail sector has three basic needs:
- An increase of the knowledge on life-cycle thinking and an exchange of this knowledge from the top management level to the shop assistant in the shops;
- A higher awareness of life-cycle thinking by consumers to an increasing demand of products with a lower environmental impact;
- A greater visibility of eco-labels, including the EU Flower.

Knowledge on life-cycle thinking

In general retailers have little knowledge about the life cycle impacts of the products they sell. In a recent Danish study issued by the EPA [45] it was shown that they knew very little about electronic products having a less adverse impact and over 50% were unaware of any environmental aspect other than energy consumption.

Increasing the knowledge of the shop assistants is highly important as they provide the information on which the consumer makes his buying decision. This particularly holds for durable products. For electronic products the shop assistant is one of the main sources of LCT information for consumers [45].

To increase the knowledge of the assistant in the shop the retail sector will have to play the main role. The large firms and large retail chains can take up this role themselves and be assisted by specialists from their national and international branch organisations. The small firms among the retailers cannot act themselves, for them the contribution must mainly come from the national branch organisations.

The national governments and related bodies can assist and support the retailers and the national branches in fulfilling their roles. The international branch organisations can stimulate and assist the national branch organisations and also the large internationally operating retailers in increasing the LCT awareness and knowledge of retailers. In their turn the international branches must be supported and assisted by the EU.

Consumer awareness and demand

Though some consumers are even willing to pay more for a product with a lower environmental impact, the consumer’s lack of knowledge on the environmental performance of products prevents them from translating their willingness into actual action when they purchase.

As retailers are important sources of product information for consumers they can play an important role in increasing the awareness of the consumer of the benefits of eco-labelled products. For this the shop assistants must have sufficient
knowledge of the life cycle aspects of the products sold. In the purchase process consumers must have environmental information sufficiently available and be able to make their own criteria clear of what aspects are most important to them. After evaluating all important criteria like price, life cycle aspects and product quality the consumer will make an evaluation and does the actual buying. Influences from the environment of the consumer include information sources like magazines, newspapers and other media; these can influence the weight an individual consumer gives to his environmental criteria.

_A greater visibility of eco-labels, including the EU Flower_

The retailers have indicated that a greater _visibility of eco-labels_ including the EU Flower is necessary. One of the key messages of EuroCommerce is to obtain an increase in visibility of the EU Eco-label by raising the number of products groups for which criteria have been established and by promoting the scheme through marketing campaigns targeting both retailers and consumers.

As the large retailers can put demands on their suppliers for the products they deliver, they can stimulate suppliers to increase the number of products and product groups provided with an eco-label. The retailers can also demand more environmental product information from their suppliers. Retailers can thus have a crucial role in increasing the visibility of eco-labels themselves. The large retailers will have less demand for assistance than the smaller ones. For these the national branch organisations can provide them with information and guidance. For specific sectors with a high international orientation, e.g. electronics, the international branch organisation could be the main actor.

**5.3.3 Consumer organisations**

Of course not only the retailers should play an important role. The national consumer organisations will also be a main actor. To increase their role in the dissemination of environmental information of products the national governments could support them.

Regarding the needs of consumers organisations it can be said that they basically need more funding and more human resources [117]. Furthermore it was also expressed to need more easy-to-use information and tools that can help them to compare products in an easy and cheap way.

The basic needs of the consumer are:
- Comparable and reliable environmental product information that they can use in purchasing situations (e.g. eco-labels, information from shop assistants);
- Information about where to buy products with a lower environmental impact;
- A greater visibility of eco-labels, including the EU Flower.
Comparable and reliable environmental product information

Environmental information to consumers must consist of several building blocks [45]:

- Development and dissemination of eco-labelling on products. Information that consumers typically use in purchasing situations.
- Environmental information from shop assistants in purchasing situations. Environmental matters should be included on a par with other purchasing criteria. Thus, shop assistants must have knowledge on environmental aspects at a level similar to other aspects of the product.
- General consumer information on environmental impacts of products through other sources, e.g. newspapers, product tests and the internet. Information that consumers pick up before they purchase and that may help to put the environment on consumers’ agendas.

BEUC, representing consumer organisations in Europe, would like to see the use of one single ecological label that would inform all European consumers. However, consumers will have to be better informed about the European Eco-label and the information will have to be targeted more to the needs of individual consumers.

Some consumers would like to see more detailed environmental information than the yes/no statement communicated in an eco-label. Consumers responded positively to the concept of a simple environmental declaration, which communicates a few selected environmental parameters to consumers. However, consumers have no confidence in environmental information supplied from producers without being verified. If environmental declarations cannot be verified, consumers prefer the official eco-labels [45].

Information consumers find in shops is pivotal. However, the study on electronic products [45] shows that eco-labels and environmental information of the actual product represent only one channel of information to consumers. Other sources consumers use to find environmental product information are newspapers, advertisements, the internet, special interest magazines and consumer magazines. As consumer organisations are ranked 1st in consumer trust, there is a need for comparable environmental product information from consumer organisations. The Belgian Test-Achats emphasises that consumers need practical information, information which can help to answer ‘what product is the best?’ and ‘how to recognise/choose a good product?’ [117].

Regarding product tests, consumer organisations are the main actor. An important point is that the number of product tests including LCT aspects is still limited. The existing tests have often the disadvantage that they are only available to a relatively small group of consumers, the subscribers of the consumer test magazines. To fulfil the need of the consumer for environmental product information, the test results
should become available to all consumers. The national governments could play a role in this.

*Information on where to buy*

Consumers like to know where they can buy eco-labelled products. Also information should be provided on where to buy these products. These information can be provided by all kinds of media. Not only the consumer magazines, but also the newspapers, TV programs and advertisements are opportunities.

*Visibility of eco-labels*

The consumer needs information that can be used in purchasing decisions. The retailer is the main actor in providing this kind of information. Consumer organisations can press claims from consumers by asking retailers and suppliers to provide this information. The international organisations can assist the national ones and also be the actor for contacting the large international firms.

A need shared by consumers and retailers is the increased visibility of the EU-flower. The European Commission, together with Danish Forbrugerrådet (Consumer Council), BEUC and private organisations like retailers, launched the ‘European Flower Week’ for this purpose. The actual week took place from 18 to 24 October 2004 in seven European countries. In this campaign both the EU, retailers and consumer organisation act as main actors.

The BEUC expresses that further awareness campaigns are needed, that the EU Eco-label scheme should be increasingly promoted, and that awareness should be created regarding the chemicals policy. [117]

### 5.4 Specific needs and potential roles stakeholders

The needs for intensified communication and exchange of information are dependent on the country, sector and product group involved. Therefore the needs cannot be described in general terms, but will have to be considered for a specific case, involving target groups of a certain sector/product category (operating in a considered country). This approach was widely supported by the participants of the workshop.

The description of two cases (as examples), a long lived product (car) and a short lived product (paper packaging, newsprint, tissue), support this hypothesis.
5.4.1 Automotive

Future challenge for the automotive industry is to further enhance the ecological efficiency of vehicles throughout the entire life-cycle. This includes efforts to further streamline the production process, refine and disseminate new propulsion technologies using alternative fuels and develop and apply new concepts for providing sustainable mobility. These challenges require new forms of partnership and co-operation. From the standpoint of the automotive industry, one of the most promising solutions consists of intensive cooperation with governments, institutions and private companies in the form of public-private or private-private partnerships. [38]

Regarding the results of executed LCAs it is obvious that the use phase, as part of the whole life cycle, plays a dominant role with respect to the environmental impact. From this perspective, a further reduction of CO₂ and harmful emissions, and in the long-term explore alternatives to conventional fuels, is considered one of the major ecological tasks for the automobile manufacturers.

Regarding CO₂ emissions from passenger cars, the EU’s aim is to reach (by 2010 at the latest) an average CO₂ emission figure of 120 g/km for all new passenger cars marketed in the Union. This objective is to be achieved by three instruments: 1) Agreements committing the automobile manufacturers to reduce CO₂ emissions from passenger cars mainly by means of improved vehicle technology; 2) Market-orientated measures to influence motorists’ choice towards more fuel-efficient cars and 3) Improvements of consumer information on the fuel-economy of cars. [134]

In order to enable consumers to make an informed choice the ‘Directive relating to the availability of consumer information on fuel economy and CO₂ emissions in respect of the marketing of new passenger cars’ aims at ensuring that information related to the fuel economy of new passenger cars offered for sale or lease in the Community is made available to consumers. The information must be provided to the consumers as follows:

- A fuel economy label for all new cars to be displayed at the point of sale.
- A poster (or a display) showing the official fuel consumption and CO₂ emission data of all new passenger car models displayed or offered for sale or lease at or through the respective point of sale.
- A guide on fuel economy and CO₂ emissions.
- All promotional literature must contain the official fuel consumption and specific CO₂ emission data for the passenger car model to which it refers.

A number of organisations in EU-Member States maintain internet sites which display the official fuel consumption and CO₂ emissions of new passenger car models offered on the market. [135]

The availability of fuel economy and emission information is a requirement for consumers to make an informed choice. However, merely the availability of
information may not have the desired effect, consumers also need to be educated. If the car salesmen refers to the label/information and uses it in the sale situation, the chance of a truly informed decision by the customer is much larger. Therefore a training in the use of the label (respectively fuel economy guide and poster) for showroom or sales staff should be provided. Information on fuel economy can only fit into a salesman’s strategy when he knows about the advantages of fuel efficient cars for the dealers, such as a new clientele attracted by efficient cars and innovative measures like a label. [136]

Apart from the design (and features) of the car, also the driver’s behaviour contributes significantly to fuel consumption and related emissions. Here the need for educational measures can be seen as well.

Education of the consumer is of course not the sole responsibility of the sales staff. Consumer organisations have a part to play here as well. In addition to the communication and promotion of the fuel economy label and CO₂ emissions of the car (product tests) to the consumer, the driver’s behaviour and the effect on fuel consumption is an important issue for promotion too.

The automobile manufacturers are characterised by intensive supplier relations. With regard to purchasing, the provisions of many automobile manufacturers already include details on the environmental standards to be met by their suppliers. In this way the automobile manufacturers are promoting life-cycle thinking to the small suppliers in the supply chain. The need for full, extensive LCA tools for these small suppliers is limited. Checklists and eco-design tools for SMEs are more relevant here.

Concluding, the large automobile manufacturers are the main promoters of LCT within the product chain. Furthermore the EU directives are an important incentive to LCT. There is a need for reliable information from producers and consumer organisations, and for a communication of this information to the final consumer. For retailers and consumer organisations there is a potential educational role towards individual consumers. Consumer organisations could increase their efforts in promoting the exchange of information to the consumers (e.g. fuel economy labels). Furthermore, the education of sales staff regarding the use of the fuel economy label and emission information is necessary.

5.4.2 Paper products

The paper and board industry is a large industrial sector including four main product categories, i.e. packaging, newsprint, graphic and copying paper, and tissue paper (sanitary and household). In this section the focus is mainly on the paper product categories covered by the EU¹ and other ISO-type I national eco-labelling

¹ The EU-Flower criteria for the product group printing paper are still in preparation.
schemes, and by ISO-type III declaration programmes, i.e. copying paper and tissue paper products. These product categories account for respectively 38% (graphic paper) and 6% (sanitary and household paper) of the paper and board production in the CEPI countries\(^1\) for the year 2000.

The main environmental challenges are related to the production phase. The main differences depend on whether production is integrated (pulp & paper) or not, and on whether it is based on the use of virgin or recycled fibres. More specifically, the main environmental impacts of paper production can be divided into a number of elements over the life-cycle: \textit{production of fibres} (virgin: unsustainable forestry, consumption of natural resources; recycled: energy consumption and water during recovery), \textit{production of pulp and paper} (input of chemicals, emissions to water, energy consumption and CO\(_2\) emissions), \textit{transport} throughout the life-cycle and \textit{waste processing} in wood production / industry / among consumers. The impacts during the end-of-life phase (e.g. methane emissions from landfill) are currently not fully reflected in eco-labels and have important implications with respect to the enhanced need for communication.

\textit{Small firms}

In order to further specify the three basic needs of small firms (section 5.3.1) for the paper sector in Europe, first a distinction between countries and/or country groups has to be made (see also section 2.3.7). In Nordic countries the market is dominated by large multinational groups and the role of SMEs is limited. On the contrary, in Germany the level of knowledge of LCT in SME paper companies is fairly high. The market is characterised by competition between a large number of SMEs, and eco-labels are a tool to differentiate themselves on the market. Also in other countries paper producing SMEs play an important leading and promoting role for LCT and the use of eco-labels for marketing purposes, although the level of diffusion of these tools is at a much lower level. In all these countries, there is a strong need for enhanced communication and exchange of information for SMEs, related to the awareness and knowledge of the LCT concept, LCT tools and its potential benefits.

To meet the specific needs of SMEs in the paper sector it is suggested to extend the approach followed and the communication tool given, by the eLCA project (see section 6.4.1) \(^{[112]}\) to the paper sector. The website www.ecosmes.net, developed in the eLCA project, provides on-line green tools and services for SMEs. One kind of service provided is ‘technical guidelines for specific product chains’. These guidelines could provide information, training and tools specific for SMEs in the paper sector and in particular about:

\(^1\) The Confederation of European Paper Industries (CEPI) is a non-profit-making organisation, representing 18 member countries (13 European Union Member States plus Norway and Switzerland with three Associate Members, Hungary, the Czech and Slovak Republics. Greece and Luxembourg are not represented).
− Economic trends affecting the sector at national and European level
− Processes and technologies adopted within the sector and key environmental issues
− Examples and opportunities for using Best Available Techniques (BAT) and cleaner technologies
− Integrated Product Policies (IPP): advantages and examples
− Legislation relevant to the sector
− Guidance on carrying out an LCA on paper products
− Guidance on designing greener products
− Guidance on how to manage environmental data

Furthermore, basic information and training modules are given on the following concepts & instruments embedded in the larger context of LCT: IPP, LCA, eco-design, certified eco-labels, product self-declarations, EPD, EMS, environmental reporting, environmental benchmarking, financial support for SMEs.

The national governments, in cooperation with a national SME and sector organisation, can play an important role in the development of this information. The distribution can be done in cooperation with national sector organisations, e.g. to members.

Also the associations at European level can contribute to meet the SMEs’ information needs. For example, the Environment Tools Brochure entitled Paper & Environment – A commitment to High Environmental Standards and Continuous Improvement. It is a joint initiative of CEPIPRINT (Association of European Publication Paper Producers), CEPIFINE (European Association of Fine Paper Manufacturers) and EUGROPA (European Paper Merchants Association).

The brochure provides information on Sustainable Fibre Resources, Product related information (life cycle impacts of paper products), Environmental management systems, Common responsibility [141].

Retailers

In the paper sector retailers have played a major positive role for the promotion and diffusion of eco-labelled products in several countries (see also section 2.3.7). Of course, the role of retailers also depends on their relative economic importance in the product supply chain and once again a distinction has to be made among different countries.

To enlarge the number of retailers active in the diffusion/promotion of the EU Flower or other national ISO-type I eco-labels, quite similar information to the one described for SMEs is requested. This is particularly true with respect to the communication/awareness of potential benefits of LCT (in this case in terms of sales and revenues of eco-labelled products, better image, etc.).

In the case that the knowledge of LCT is good and the promotional role of large retailers is evident, it is also clear that small retailers are largely excluded from this information and have played a negligible role so far. Therefore, a specific effort on
intensified communication has to be done to include them. Furthermore a full vertical exchange of information from top management to shop assistants is often missing, also in those large retailer chains, which have played a leading role so far. Regarding the life-cycle impacts of paper products, retailers may play a bigger role with respect to guidance to consumers for best use in the end-of-life phase of recoverable paper products (see next section on consumer associations).

Secondly, retailers need to find effective ways to foster a higher awareness of LCT among consumers leading to an increasing demand of products with a lower environmental impact.

A greater visibility of eco-labels, including the EU-Flower, is needed as well. For the EU-Flower, the situation has certainly improved in the past years, because of its larger diffusion and the start of marketing campaigns. Moreover, first significant steps towards the elaboration of new communication strategies for EPIS have been set up with the establishment of the Marketing Management Group within the European Community Eco-label.

The strong differences in the knowledge of eco-labels observed among countries ask for clearly different actions to be taken. This is illustrated by the promotion of the eco-label in Denmark and Norway. In Denmark, the promotion of the European eco-label resulted in a dramatic increase in recognition and correct explanation among stakeholders. The measures taken mainly consisted of general communication and information campaigns about the label and the product group criteria to different stakeholders. In Norway on the other hand, the lesson was rather the opposite. Campaigns were only effective for increasing consumer knowledge when they were linked to specific labelled products in the market. Thus, in order to start promoting EPIS, the presence of labelled/certified products on the shelves is necessary. Several comprehensive marketing activities were carried out, in particular during 2004. However, specific marketing materials/campaigns related to the paper sector are missing so far. [142]

Finally, in some specific cases, large retailers might encounter a problem of overlap of labels, i.e. the need to communicate to consumers the differences and/or similarities of different labels (e.g. EU-Flower, White Swan and Blue Angel) on the same type of products (see next section).

**Consumer organizations**

The basic consumer need for comparable and reliable information is very relevant for the paper sector. Due to overlap of eco-labels and product groups quite some confusion might be created among consumers. Therefore there is a strong need for harmonization and exchange of information on these issues. This process has to take into account all relevant stakeholders, including of course consumer organizations.

For instance, the EU-Flower covers two product groups so far and the White Swan covers six product groups and one service group (printed matter -service). More
importantly, criteria are similar but sometimes with significant differences for the same product groups. For instance, the Blue Angel just includes products from recycled paper, while both the EU-Flower and the White Swan also include products from virgin fibres. How do consumer associations explain these differences to consumers? Clearly, in this industry sector there is a specific need of further work on harmonization issues of available information. This work has started within the recent policy of coordination and collaboration between the EU-Flower and several European national ISO-type I labels (Nordic countries, Germany, Holland, Spain, Catalunya, France, Switzerland, Czech Republic, Hungary, and Poland).

The second basic need for consumer organizations is to provide consumers with information about where to buy products with a lower environmental impact. While this is relatively easy with respect to large distribution chains, the issue becomes much more problematic with small suppliers and retailers (as the latter absorb a significant part of the market in various countries).

The third basic need is connected to a greater visibility of eco-labels. The same country- and sector specific considerations, explained before for retailers, are valid for consumer organizations.

Finally, consumer organizations may play an important educational role with respect to the use and end-of-life phase of paper products. In fact, while all eco-labels and ISO-type III declarations cover the production phase, other relevant impacts depend on the behaviour of consumers. For instance, if post-consumption paper waste is landfilled, methane emissions might be the largest contributor to the total life-cycle greenhouse gas emissions.

The EU-Flower foresees that some information with respect to “green behaviour” is included in the product packaging. However, consumer information might want to provide more detailed and extensive information on this aspect to consumers.

Concluding, retailers are important promoters of LCT within the product chain. To further increase their role, retailers as well as SMEs need to be informed of the benefits of LCT and the use of LCT tools. The educational and promotional role of retailers towards consumers is essential and needs to be supported both by retail and sector associations and authorities. An increased visibility of eco-labels and (in case of several eco-labels:) clarity about the differences between eco-labels is a point of particular interest in this sector. Specific marketing campaigns supported by consumer organisations and large retailers/retail organisations are recommended to achieve an increase in the awareness of consumers.
5.5 Summarizing conclusions

The target groups, especially small firms and retailers, communicate with the organisations that are closely associated with them, i.e. national sector organisations and national target group organisations. These organisations know the specific problems of the sector and/or target group involved and sometimes also keep in close touch with the small firms and retailers themselves. For that reason they are and will have to be the most obvious organisations for exchange of information and communication with the target groups. Furthermore the target group organisations of small firms and retailers communicate and exchange information with their governments or administrative bodies, established by these governments. The national organisations communicate with the European organisations.

For the target group of consumer organisations the situation is different as these organisations already operate at a national level. For the consumer organisations communication and exchange of information takes place in particular with the national governments, or related bodies, and the European consumer organisations.

With respect to the described communication patterns and with the aim to fulfil the needs for intensified communication and exchange of information it is recommendable to support existing local and national initiatives. A Community Platform can support these initiatives and can learn from or can co-operate with the UNEP/SETAC Life Cycle Initiative how to work together with industrial branch and sector organisations (see section 4.4.2). This will realise mutual benefits. Examples are the organisation of common workshops for sector organisations or by supporting these workshops with the help of funding. With the help of specific support actions basic needs can be fulfilled.

The basic needs of small firms are:
- To raise the knowledge on the concept of life-cycle thinking
- To know how life-cycle thinking can benefit their company
- The availability of targeted knowledge, training and tools on how to implement life-cycle thinking in their business activities

The basic needs of the retail are:
- An increase of the knowledge on life-cycle thinking and an exchange of this knowledge from the top management level to the shop assistant in the shops
- A higher awareness of life-cycle thinking by consumers to an increasing demand of products with a lower environmental impact
- A greater visibility of eco-labels, including the EU Flower

The basic needs of the consumer (organisations) are:
- Comparable and reliable environmental product information that they can use in purchasing situations (e.g. eco-labels; information from the shop-assistants)
- Information about where to buy products with a low environmental impact
- A greater visibility of eco-labels, including the EU Flower.
6. Proposed approach to raise awareness

6.1 Introduction

In chapter 5 the general and specific information and communication needs of the target groups are explained and the typical roles and interactions of several stakeholders are indicated. How to fulfil these needs by several means is described in this chapter.

Fulfilling the specific needs and regarding the additional initiatives to be taken on a Community level, the proposed activities will follow the stages of the AIDA model: Attention, Interest, Desire and Action. In section 6.2 the stages of the AIDA model will be explained and also the base elements and means for filling in these stages are described.

In section 6.3 is indicated which activities a Community Platform can perform. Especially its role in the information exchange and communication processes is described. This role can contain pro-active actions as well as supporting actions. This is among others dependent on its location and function in the mentioned processes. Also the filling in of that role and possibilities for priority setting regarding the expected activities are considered in this section.

The possibilities for implementation of a Community Platform are described in section 6.4. The establishment of a network of national (or regional) LCT expertise centres is chosen as the basis for an information exchange and communication approach. The suggested elements of an information exchange and communication scenario are explained. For the selection of these base elements the existence and functioning of concurrent initiatives have been analysed. At the end of this section the set up of dissemination scenarios and its boundary conditions/selection criteria are described.

In section 6.5 three scenarios for intensified communication and information exchange are described. The differences of these scenarios are based on differences in efforts (this may be translated to rapidity in the increase of LCT awareness) to raise awareness. Predictions for the needed budgets for these activities are presented.

The objective of the Community support is to raise awareness of LCT. From that point of view the EU like to know if their support is successful. In the chapters 2, 3 and 4 suggestions are given for LCT aspects, which are able to be monitored. A selection is argued in section 6.6; the criteria are defined and explained.
6.2 **AIDA model and base means for information exchange and communication**

A platform with the objective to raise the awareness of life-cycle thinking among the target groups will have to include elements of the following successive stages of the AIDA-model: Attention, Interest, Desire and Action (AIDA). These are the stages an individual passes through before coming to a decision or an action; in this case: before putting life-cycle thinking into practice. A rough outline of the phases is given:

**Attention**
Clarification of the concept of life-cycle thinking, thus creating awareness: simple information about the concept of life-cycle thinking, understandable by non-experts in the field and targeted to the target groups and their specific problems.

**Interest**
Communication of the advantages (and importance) of life-cycle thinking for the target groups, creating an active interest in the concept of life-cycle thinking.

**Desire**
Providing more in-depth and working-knowledge of the concept of life-cycle thinking and of the use of LCT tools in the own company or organisation, that results in an active participation of the target group and initiatives for a follow-up.

**Action**
Promotion of the continuation of life-cycle thinking and the introduction in the company or organisation. For example, by providing user-friendly, simplified tools that are tailor-made with regard to the environmental bottlenecks related to specific product groups and/or industrial sectors, and that can easily be applied by inexperienced (eco)designers, firms with limited resources (SMEs), retailers, organisations.

Because of the current level of awareness in the target groups the first two steps will dominate, but also partly step three, in the AIDA-model will be emphasized in the scenario for a Community Platform. Even so these first stages will have to be followed by the final stage ‘action’ in order to actually implement life-cycle thinking.

There is not one best communication medium; therefore a platform with the objective to raise the awareness of life-cycle thinking among the target groups is suggested to use a combination of communication media, using both electronic and written media as well as personal communication. The choice of an adequate combination of media depends on the target and the objective of the communication.
Table 6.1 presents several possible communication media for the information and communication need by the target groups:

**Table 6.1 AIDA and communication media**

<table>
<thead>
<tr>
<th>Information need</th>
<th>Attention and Interest</th>
<th>Communication need</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic information and data of the concept of LCT and market opportunities</td>
<td>E.g. press release, article, website, newsletter, brochure, campaign, course.</td>
<td>E.g. training/workshop, conference, meeting, internet discussion forum, helpdesk, website, newsletter.</td>
</tr>
<tr>
<td>Working knowledge and first steps towards LCT</td>
<td>Desire and Action</td>
<td></td>
</tr>
</tbody>
</table>

In table 6.1 a distinction is made between creating attention and interest on the one hand, and desire and action on the other hand. This distinction is made because in the stages of attention and interest the emphasis is more based on informing (‘What is LCT?’ and ‘Why it is attractive?’), while in the stages of creating a desire and inciting to action actual communication is emphasized (‘How to do it?’).

As shown in the third column of Table 6.1 and following the AIDA sequence several basic means are available to fulfil the recognised needs. Examples of such basic means are described hereafter.

*Newsletters, brochures, etc.*

For instance a first step could be the distribution of a free LCT newsletter/brochure in paper. The newsletter will include LCT and LCT related information. The newsletter can be national, or even regional, and will have to be in the own language.

It is recognised that little time may be available to read such a newsletter/brochure. Therefore it is suggested to receive an optimum of attention, e.g. by announcing the newsletter beforehand in specialist journals. An introduction into the concept of LCT will have to be combined with a simultaneous communication of the advantages of the concept. Furthermore the layout and content of the newsletter/brochure will have to be appealing to the reader:

- Attractive business cases can be presented clearly illustrating the specific business and consumer benefits of the LCT approach.
- Awards (e.g. eco-design awards) can be announced, awarded products can be shown and companies can be interviewed.
- Interviews can be included regarding first experiences with LCT and LCT tools.
Articles will have any depth, without being too specific and detailed. For any further, more detailed information the reader can be referred to a website.

Other subjects of an LCT newsletter can be:
- Information on the concept of life-cycle thinking and related subjects
- Relevant initiatives/developments (local/national/European)
- Announcement of upcoming courses, congresses etc.
- Information, news and developments regarding user-friendly tools
- Experiences with user-friendly tools
- Promotion of the EU website (see hereafter); the newsletter will gradually conduct the target group to the website
- Promotion of the EU Eco-label
- News regarding upcoming legislation (local/national/European)

A newsletter will keep people informed on further developments and will continue to pay attention to life-cycle thinking. Based on the responses such a newsletter may gradually develop to an electronic e-newsletter.

**Internet platform**

In addition to the information distributed in a newsletter a website will give more background and detail information about LCT and LCT related subjects. The website will have various language versions and can include both general and sector/target group specific information.

The website will grow to be the EU information source regarding LCT and LCT related subjects. Information which can be provided:
- LCT manuals, both general and sector/target group specific
- Extensive information on typical aspects of LCT and LCT related subjects such as LCA, eco-design, eco-labelling.
- Information on user-friendly LCT/LCA tools
- Various case studies presenting the market opportunities for ‘green’ products
- Information on where to find LCT/LCA expertise, services and networks.

Not necessarily all information will have to be developed on own account. The website can also provide information by referring to other ongoing initiatives, sources of information, websites, books, national expertise centres or helpdesks etc.

Besides providing information the website can act as an LCT platform facilitating communication and exchange of experience. With the help of a discussion platform experiences can be shared. A digital helpdesk can support in the execution of LCT/LCA projects. A website can also promote life-cycle thinking by putting up awards for green products, newly developed user-friendly tools, local/national initiatives or promotion campaigns.
The website can be expanded to a virtual expertise centre, providing LCT and LCA expertise and services to the target groups. This European expertise centre can be established in cooperation with the relevant stakeholders and sector organisations.

*Workshops, training, courses, etc.*

A newsletter/brochure and internet facilities will provide information and a possibility to communicate and exchange experience. However the step from awareness and interest to desire and action (AIDA model) is not easily made. To provide an opportunity to learn by doing workshops/courses are suggested, covering learning moments and practical cases, creating awareness and acquiring working-knowledge. In cooperation with sector/stakeholder organisations workshops / training modules can be developed and provided on a national/regional level, tailored to the needs of the target group and adapted to the size of the firm. The workshops will have to be prepared for and dedicated to the various target groups, sectors and countries with local participation that focuses on local demand/need.

The following subjects can be addressed:
- Learning the basics of LCT
- Introduction to LCT methods/tools
- Presentation of sector specific cases
- Practising the use of LCT methods/tools

A large amount of workshop/course leaders, well informed regarding the subject, will be needed for these workshops. In order to disseminate a single message, vision and ambition an LCT coaching congress can be organised for those charged with organising workshops/courses.

### 6.3 Proposed activities for a Community Platform

The objective of a Community Platform is to facilitate LCT communication and exchange of experience for the target groups in the different countries, and thereby achieve an increased awareness level regarding life-cycle thinking. In this section an outline of the potential actions of a Community Platform is given.

#### 6.3.1 EC role

Throughout the study it is underlined that SMEs, retailers and consumers (organisations) each form a (very) heterogeneous group. Promotion activities directed to the target groups should therefore take account of this heterogeneity.
The obvious organisations for developing a diversified and targeted approach towards the target groups are those organisations that are closely associated with the target groups and are well informed of the specific difficulties the target groups are facing with regard to life-cycle thinking, i.e. the national or regional sector or target group organisations.

The AIDA model covers the stages from attention to action. It is obvious that educational and awareness raising activities are best undertaken closest to the citizen, i.e. on a national and regional level. With regard to practical dissemination, the study ‘Eco-design: European state of the art’ [17] has as one of its key messages that practical dissemination activities are best organised at national or even regional/local level, and that it should be ensured that business organisations are involved and that hands-on support is given.

In the workshop for this study (see appendix 4) it was clearly expressed by the participants that a Community Platform should build on and support the local and national initiatives in the dissemination of life-cycle thinking to the target groups. The need for a ‘think globally, act locally’ approach was recognised and it was also strongly recommended to ‘use’ local contacts and neighbours (especially for SMEs, it was underlined it is very important to stay in contact with those already in contact with the SMEs).

Therefore a EC Community platform could play two roles:

The first role could be to support the fulfilling of the generic needs for information and communication of the target groups. This is in particular an informing and facilitating role towards the national authorities and the European associations. The exchange of information and experiences should be supported and stimulated by such a Community Platform in order to actually learn from each other. This exchange of knowledge and experiences will take place between:

- Countries
  - National governments (front-runners, starters)
  - National target group associations
  - National sector associations
- Sectors
  - European sector associations

Obviously the European sector associations and the European target group associations will have to be actively involved in the organisation of activities for their (national) member organisations.

A Community Platform could urge these activities and support them financially. For instance, knowledge available in the front-runner countries should be made available for countries just starting the dissemination of LCT activities. In this way the ‘starters’ can benefit from the acquired knowledge and experiences from the front-runners. The bottlenecks here appear to be cultural and language problems.
For instance, most manuals are in English, German, Danish, Swedish or Dutch and there also seems to be a need to readapt the material to the new context [17]. The Community Platform could play a role in removing these barriers by supporting the development or adaptation of topical LCT material in various languages.

The second role of a EC Community Platform could be to stimulate and facilitate the national/local authorities and sector/target group associations in taking national, and local LCT initiatives.
For small firms and retailers the national, or even local, SME or retailer associations and sector associations should be involved in the development of this targeted approach towards life-cycle thinking.
European and national funding programmes and/or initiatives can be developed aimed at supporting the target groups to start the necessary initiatives.
For instance in an European funding programme projects or European sector networks could be promoted with the objective of the gathering of best practices and the diffusion of ‘lessons learnt’.

Summarizing the roles of the EC might be (see also the communication scheme in figure 5.1):
1. A pro-active, initiating role with respect to solve the generic needs considering LCT information exchange and communication. Direct communication with national authorities and European, sometimes national, sector and target group organisations will take place.
2. A supporting role with respect to the specific needs considering LCT information exchange and communication. For instance national or regional LCT activities can be supported with the help of funding.

6.3.2 Filling in EC roles

Regarding the pro-active role with the aim to solve the generic needs it is reasonable that the EC itself organises the means to exchange information and to improve communication. Already mentioned means (see 6.3.1) are among others a newsletter, website and workshops. Proposals for the organisation of pragmatic combinations of suggested means (scenarios) are described in 6.4.

Regarding the supporting role with the aim to solve the specific needs it is reasonable that the EC finances selected national and regional LCT activities. The funding can be organised at an European level, for instance “a programme” or “a thematic network”, as part of the 7th Framework RTD Program, initiated by the EU. It is also possible that national programmes in selected countries will be supported financially. In 6.4 the opportunities are described in more detail.
6.3.3 Priority setting EC

It is reasonable that the EC roles will be filled with a step by step approach. From that point of view it is recommendable that a selection for sectors and countries will be made. Of course this selection has to result in successes with a large illustrative LCT improvement. This criterion is also emphasized by literature source [17]:

“Best practice elements include a clear identification of priority firms or sectors, planning of an overall dissemination strategy, performing activities that lead to implementation rather than demonstration, active hands-on support rather than just financial support, awareness campaigns and easy information supply”.

With regard to the sectors it is recommended to select these ones for which a reasonable improvement for the environmental impact can be realized with planned efforts in a relatively short period.

Among the most environmentally significant SME dominated manufacturing subsectors are metals; textiles, leather and clothing; plastics; timber, woodworking and furniture; printing; electronics; specialist chemicals such as dyes, paints and varnishes; as well as food, drink and tobacco. [16]

With regard to the countries it is advisable to select these starting ones, which have planned a strong policy for environmental issues, such as green or sustainable consumption. Such countries will direct their focus on learning aspects, best practices, success stories, etc. and will communicate with frontrunner countries automatically.

6.4 Implementation of a Community platform

Based on the concurrent initiatives (section 6.4.1) the main elements, or communication means, are described of a Community platform with the objective to raise the awareness regarding LCT in the target groups (see section 6.4.2). The Community Platform should furthermore facilitate communication and exchange of information between stakeholders.

Considering that in concurrent initiatives the establishing of national/local centres has proven to be successful in the transfer of knowledge and experience, the establishment of national (or regional) LCT expertise centres is chosen as the basis for communication and exchange of information.
6.4.1 Concurrent initiatives

The EC Community Platform can tune their promoting and educating activities to concurrent initiatives in the same area. Some relevant activities are described hereafter.

Innovation Relay Centres Network (IRCs network)

[137]

The mission of the IRCs is to support innovation and transnational technological co-operation in Europe with a range of specialised business support services. IRC services are primarily aimed at technology-oriented small and medium-sized enterprises, but also available to large companies, research institutes, universities, technology centres and innovation agencies.

The first Innovation Relay Centres were established in 1995 with the support of the European Commission. The aim was to create a pan-European platform to stimulate transnational technology transfer and promote innovation services. A similar approach can be seen for a network of national/regional LCT expertise centres, which support LCT oriented production and products and transnational information transfer can stimulate this in the European area. The services of these expertise centres, including help desks, can also be directed to SMEs and other stakeholders, such as large companies, retail, NGOs and research organisations. The European Commission can stimulate the building of such a network.

Today 68 IRCs cover the European area. Their success in stimulating transnational technology transfer, based on brand recognition, close links with enterprises and universities and the effectiveness of the tools and procedures, developed by the network, is unique.

IRC services include:

- Assistance with technology acquisition and technology marketing
- Support in identifying suitable partners for technology co-operation
- Partner matching and technology brokerage events
- Technology audit and technology watch
- Help in negotiating technology partnership agreements
- Access to the results of EU, Eureka and other research projects
- Access to EU innovation financing and intellectual property rights support services

When instead of technology transfer ICT experience transfer is meant and some dedicating adjustments are carried out the described services can be compared with those of an LCT experience centre (see the description of the Danish centre hereafter).

Most IRCs are operated by a consortium of regional organisations with established reputations in local research and industrial communities. These include innovation agencies, Chambers of Commerce, regional development agencies and university technology centres. Those consortium formations could be examples how to build up LCT expertise centres.
Hosted by the CORDIS service, part of OPOCE (the publication office), the public IRC website is a readily available source of general information about the network for potential clients, policy-makers and others. In the same way the Directorate-General for Environment can facilitate a public website for the potential network of the LCT expertise centres. When more than one IRC have a shared interest in a particular sector, they can form thematic groups. These are platforms for targeted joint activities, which can streamline the progress of technology transfer projects within the sector concerned. Examples are agrofood, automotive, textiles, wood. Bringing together IRCs with shared technical expertise, the thematic groups help to build bridges between European regions which are active in common or complementary industrial sectors. The same approaches can be activated by several LCT expertise centres to specific industrial sectors, regarding specific chains of products.

Danish Environmental Protection Agency

[138]

Important elements in the Danish efforts regarding IPP are dialogue and cooperation with all relevant stakeholders, development of appropriate tools, methods, and schemes to support Danish business in acquiring knowledge, methods and tools related to environmental management, life-cycle assessment, product development and waste management. As regards households, targeted efforts are made to increase public awareness of the interrelation between lifestyle and environmental impact.

The Danish EPA has worked with LCA since the early 1990’s and, during this period, has funded several different projects. The biggest LCA project so far is the development of the Environmental Design of Industrial Products (EDIP) method. The EDIP method describes how to incorporate environmental, health and resource assessments in product development. Danish representatives have also been active contributors in LCA work at the international arena. The Danish LCA Centre was established in September 2002, and opened officially in January 2003. The Centre is an open centre, working in a 4-year period to disseminate the idea underlying the life-cycle approach and life-cycle assessment to Danish industry and other interested parties. The Centre gives access to knowledge, tools and experience within LCA work.

The LCA Centre budget is approx. DKK 11 million or Euro 1,466 million, of which the public authorities contribute Euro 1.2 million, targeted towards development and knowledge transfer. Activities relating to the running of the centre, courses, user support etc., must be financed by the users. Among others the activities of the Centre are dissemination of knowledge on LCA, establishment of courses, publication of newsletters (e.g. Environmental News No 68 2003 ‘An introduction to Life-Cycle Thinking and Management’), homepage, organisation of thematic meetings, preparation of articles, development of PC tools
based on the EDIP method (life-cycle assessment method developed in Denmark),
host for the EDIP database (data for use in life-cycle assessments) establishment
and servicing of LCA network, and participation in and transfer of knowledge of
LCA work, including international consensus building.
The key target group is the Danish industry. Attention is directed both towards
manufacturing plants specifically, and indirectly towards the consultants and
advisers who service Danish industry in matters relating to LCA. Other target
groups are educational establishments, regional networks, branch organisations etc.

UNEP
[139] [140]

A 10-year framework of programmes to promote sustainable consumption and
production patterns was requested at the World Summit on Sustainable
Development (WSSD) in Johannesburg (2002). The UNEP/SETAC Life Cycle
Thinking initiative contributes to this framework (for the description of this
initiative, regarding information exchange and communication activities, see
hereafter).

Another contribution is the UNEP’s Cleaner Production Activities.

UNEP’s Cleaner Production Activities started in 1989 and from the beginning
UNEP encouraged partnerships to promote the concept of Cleaner Production on a
worldwide scale.

Today there is a clear recognition of the importance of preventing strategies. The
concept of Cleaner Production is cost-effective and a “win-win” approach to
sustainable development.

The objectives are:

− Increase worldwide consensus on a Cleaner Production vision
− Catalyse implementation of policies and strategies, environmental management
  systems, environmental sound technologies, products and the establishment of
  National Cleaner Production Centres.
− Support the growing network of organisations dedicated to promoting Cleaning
  Production activities
− Help enhance capabilities through training and education
− Encourage demonstration projects and provide technical assistance

The information exchange and communication contributions of UNEP are:

− Providing and exchanging information
  − Publications
  − The International Cleaner Production Information Clearinghouse
  − Cleaner Production working groups
− Capacity enhancement and technical assistance
  − National Cleaner Production Centres
  − Education and training activities
  − Financing Cleaner Production
- Promotion of Cleaner Production strategy
  - Partnering with other organisations
  - International High-Level seminars on Cleaner Production
  - Providing foras
  - International Declaration on Cleaner Production

It is obvious that starting with the assumption that an European network of LCT expertise centres will be set up several elements of the UNEP Cleaner Production promotion can be applied for the EU promotion of LCT (see also 6.4.1).

**UNEP/SETAC Life Cycle Initiative**

[143]

The UNEP-SETAC Life Cycle Initiative contributes to UNEP’s 10-year framework programmes on sustainable consumption and production, as requested at the World Summit in Johannesburg (2002). The mission of the initiative is to develop and disseminate practical tools for evaluating opportunities, risks, and trade-offs associated with products and services over their whole life cycle. The initiative comprises three programmes: Life Cycle Management (LCM), Life Cycle Inventory (LCI) and Life Cycle Impact Assessment (LCIA). In these programmes in total 12 Task Forces are active. The total work structure includes input from about 120 people, largely on a voluntary basis. Participants from about 30 countries are involved. The main background of the participants are European countries, North America, Japan, Korea and Australia. A specific aim of the initiative, like of other UNEP activities, concerns an outreach to developing countries. Although these are as yet underrepresented in the Task Forces the number of participants is continuously increasing. Since its launch in 2002 main support for the initiative has been coming from several national and regional governments (Canada, Japan, Germany, Netherlands, Quebec, Switzerland, Victoria), and a number of industry associations/large companies (automotive industry, chemical industry, metals industry, packaging industry,).

Up to now a working structure has been developed, consisting of the International Life Cycle Panel, the board, a secretariat in Paris, an executive committee, the above mentioned work programmes with working groups and Task Forces. Together with industry sectors, more specific activities are being implemented. Firstly, this holds true for the global mining and metals sector. A next sector that may aim to go for a joint programme with the initiative concerns the building sector. Regarding the inclusion of developing countries, regional networks are being created, one for South-East Asia, one for South America, and one for Sub-Saharan Africa. These networks aim at the provision of information and capacity building, for instance by means of printed information, computer software, and courses. Contacts are ongoing to set up a network for Eastern Europe.
Regarding the results and ongoing activities of the initiative, much progress has been made with a global cross-analysis and consistent further development of Life Cycle Inventory (LCI) databases. Amongst others, this is of particular value for the comparability of Environmental Product Declarations (EPDs), which largely build on LCA results. A database registry is expected to go online in 2005. In the field of Life Cycle Impact Assessment (LCIA) a start has been made with establishing recommended practice for quantification of the contribution of substances to various impact categories, such as eutrophication, acidification, and human and eco-toxicity. For the latter, there has been a close co-operation with the European OMNIITOX project. For transboundary impacts like global warming and acidification, it is foreseen that recommended current practice indicators and factors will be established in 2005. In the LCM programme, activities with workshops and preparation of best practice and state of the art documents are ongoing in the areas of life cycle based product development, communication of life cycle information and management and stakeholder engagement along the life cycle.

An awareness-raising booklet ‘Why take a life cycle approach?’ is ready for printing in English, French and Spanish versions. Based on the definition studies of the Life Cycle Initiative (available on the Initiative website http://www.unep-tie.org/sustain/lcinitiative), which laid out the roadmap for the Initiative to go ahead, a UNEP report: “Life Cycle Approaches, the Road from Analysis to Practice” is about to be published. Further, a document: “UNEP guideline to Life Cycle Management – A bridge towards sustainable products” is now available on the website, a booklet based on it is expected to be printed in 2005. A further general supporting activity concerns training material and the building of a case studies library, including information about application of different types of life cycle approaches. This library is to include both generalized results of life cycle studies (like studies on ecological performance of different type of materials and products), and observed potentials and bottlenecks for the implementation of such studies.

In general, it can be said that since its launch the Initiative has successfully organized a continuous flow of experts meetings and workshops. They have brought together life cycle experts from all parts of the world and from different stakeholders establishing by this forums for sharing best practice and facilitating the exchange of views among experts in a systematic way to foster the use of life cycle approaches. However, it must be said that the established working programme is quite ambitious and the work of most experts is voluntary or at least paid below tariff. Therefore, expected deliverables are delayed and the fulfilment of important task takes more time than desirable.

There are also some other challenges for the further work of the initiative. Particularly, it is important to increase the contribution from SMEs and partners from developing countries. In comparison with large companies, the environmental
departments of SMEs are less developed. For these companies the focus should therefore be to engage them at the branch level. Regarding the participation of stakeholders in developing countries, the focus of the initiative is on capacity building and provision of information of different life cycle approaches, including LCA. In general, the aim of life cycle approaches is to stimulate a modernization of the industry of these countries. More specifically the initiative can also help to identify barriers for companies in developing countries to participate in environmental labelling or certification schemes.

*eLCA Project and ecosmes.net*

[112] [144]

eLCA2 is a demonstration project ended in August 2004 and financed under the eContent Program with the objective to address the difficulties that SMEs are likely to face when adopting Life Cycle Management and IPP, i.e. developing and marketing “green” products. Partners of eLCA2 came from five countries (Germany, Greece, Italy, Spain, UK).

The project had the following main goals:
- to develop the awareness among SMEs of the opportunities offered by green products
- to promote the development of a green services market
- to be the starting point for co-operation projects between stakeholders of various industrial sectors (public bodies, business associations, firms, consultants and service centres, etc.)

The principal outcome of the project is the website www.ecosmes.net, developed to help SMEs to implement IPP. By exploiting Information and Communication Technology and web’s potentialities it facilitates the integration of different kinds of innovation, the information exchange among chain stakeholders and the fast and continuous transfer of R&D results to enterprises. ecoSMEs.net is completely dedicated to the promotion of IPP in SMEs. It has been conceived in order to drastically reduce the entry costs of the enterprises, in particular in the take-off phase when it is fundamental to raise knowledge and awareness among firms. The website is available in five languages; Its principal characteristics are:
- Multi-lingual content (English, German, Greek, Italian, Spanish)
- Simplified and understandable by non-experts
- Concise information targeted to SMEs from a number of countries, including relevant links and tools
- On-line solutions and access to expert consultants

More specifically, it provides five kinds of services:
- **Basic information**
  Comprising an introduction to IPP and specialised tools for SMEs to enable the development of “green products” and improve access to the “green market”. Tools include analysis and design methods, e.g. LCA, eco-design and
environmental benchmarking and market tools such as eco-labels, eco-taxes, environmental management systems and accompanying measures.

- **Training**
  Online training packages for introductory courses about IPP tools and downloadable support material for training courses.

- **Specialised software tools and databases**
  Simplified LCA software tool (eVerdEE), life-cycle inventory databases and an eco-design tool.

- **Technical guidelines for specific product chains**
  Guidance on significant environmental processes with suggested solutions, best practices, case studies, etc.

- **General services**
  Including online and offline advice, news, periodical newsletters, links and an eco-products gallery.

The website contents input and management is done by a set of tools that allow:

- A flexible updating of all contents and data based on procedures and data collection templates

- The Life Cycle Inventory data input, quality control, impact indicators calculation by the specific on-line tool (DIM).

- A scientific quality control of new contents based on an extended community of authors with different levels of access and authorisation (Author, translator, validator, publisher and administrator).

The sectors currently covered by ecosmes.net are wood products, metal products, textiles, electrical and electronic equipment, office equipment, urban furniture and hotels. Extension to additional product chains is planned.

The development of [www.ecoSMEs.net](http://www.ecoSMEs.net) has been completed and is already available on-line as experimentation phase. From January 1st, 2005 it is completely in operation with direct and free access for the firms. The eLCA partners are seeking additional resources finalised to integrate dissemination, accompanying measures and extension of ecosmes.net scope (training of local operators on IPP and ecosmes.net services, additional country/language adaptations, additional product chains, additional tools and databases, creation of a GPP section concerning products supplied by SMEs as textile, wood, plastics, etc.). An important priority is to produce a French version of the website.

In perspective, the development of a market of “green services” can guarantee the financial sustainability by a partial payment (from SMEs) of some of the higher value added services supplied by ecoSMEs.net. However, in the start-up phase of IPP, a strong public support would be needed, in order to exploit all its potentialities. With this respect, a possible involvement of the EC is highly welcome.
The use of ecoSMEs.net by the EC implies the examination of two aspects:

a. The acquisition of the property right of the web site,
b. The management and further development of the site.

On our request, the project co-ordinator has declared the availability to define an agreement with the EC on the following basis:

Regarding item **a**: transfer the property rights to the EC at no cost, taking into account the already received funds from the EC.

Regarding item **b**. two hypotheses have been proposed:

1. **Management of the web site directly or by a body appointed by the EC.** In this case, taking into account the complexity of ecosmes.net and its tools/utilities, it will be necessary to:
   i. **Buy the hardware.** The related direct costs would be (server farm plus server set up): 33,000 €/server/year. Costs for software modifications (as, for example, on graphic design: 5000 €) are to be added.
   ii. **Transfer all the documentation regarding the web site.**
   iii. **Train the personnel for the website management.** The overall cost for know-how transfer and training: about 100,000 € (to be better defined). The costs for the further development of the web site have to be defined following a defined plan.

2. **Management, on appointment by the EC, by a specific structure created by the eLCA consortium.** The costs in this second case would be:
   i. **Management fixed costs**, including servers hosting, software maintenance, application management, help desk: 150,000 €/year.
   ii. **Costs for the further development of the web site**, defining a program of demonstrative projects/sector studies funded by the EC, (to be realised using the methodology and supports already available on the website) whose results would be used for the upgrading of databases and guidelines. The costs for a demonstrative project (application of ecoSMEs’ tools for the environmental innovation of a specific product) can range from 10,000 € to 20,000 €, according to the complexity of the product system and to the country where the study has to be performed. The costs for a sector study (with development of database and guideline for some product chains of a specific sector) will range from 75,000 € to 150,000 € depending on the specific characteristics of the sector/product chains.

Among the different analysed initiatives, ecoSMEs.net presents an approach of great interest to answer the needs of SMEs, in particular in this start-up phase of IPP.
Its greatest limitation is its demonstrative character with a limited number of product chains. Another important limit is the lack of the French version. The extension costs to other sectors are however limited, thanks to the procedures, tools and know-how developed in eLCA project, especially if the results of studies and projects financed by the EC will be made available. EcoSMEs.net can therefore supply a relevant contribution to the implementation of the European platform and of the dissemination scenario (upgrading of the internet platform, synergies with newsletter, creation of a network of national/regional LCT expertise centres, basis for training sessions, exploitation of the research projects results). Furthermore ecoSMEs.net has the undoubted advantage to be immediately available with very limited costs (few percent) respect to the overall investment required for the whole dissemination scenario.

Though the provision of web-based services to firms offers great advantages in terms of fast and efficient dissemination, it is recognised that on line provision alone cannot overcome the typical barriers of SMEs towards environmental issues and innovative solutions as proposed by IPP.

The eLCA partners are working to establish a network of “mediators” to create “expertise centres”, and agreements with Public Bodies to develop direct actions and accompanying measures to stimulate and support all interested parties.

### 6.4.2 Elements in the scenarios

The following elements in a scenario can be selected:

- LCT newsletter
- LCT Brochure
- LCT Internet platform: website and discussion forum
- LCT congress
- LCT workshop/training
- LCT funds
- LCT RTD

**LCT Newsletter**

Referring to the first role of the EC (section 6.3.1) - an informing and facilitating role towards the national authorities and the European associations - the EC could develop and distribute an LCT newsletter.

This newsletter could be sent to European sector and target group associations and national authorities on a bi-monthly basis, thereby continuously drawing attention to the concept of life-cycle thinking. In the case of associations, the newsletter should be addressed to the key persons responsible for promotion/communication of the concept of life-cycle thinking to the national members. In the case of national authorities, the newsletter should be addressed to the key persons responsible for promotion/communication of the concept of life-cycle thinking to the regional/local authorities and intermediaries closest to the target groups.
The newsletter should provide at least the following information:
- General LCT information, new LCT related policies
- Business cases illustrating the benefits of life-cycle thinking for industry, retailers and consumers
- Best practices in communication/promotion of the concept of life-cycle thinking and its benefits

Furthermore the newsletter includes news and information that the European associations can communicate with their national/regional members. For example, the announcement (and application information) of awards for LCT related initiatives by small firms, retailers and consumer organisations or success stories from the target groups. The national/regional organisations in their turn can communicate the information to the target groups. In this way the information arrives at the target groups through their own current and proven communication channels (which can be meetings, newsletters, periodicals, visits).

As repeatedly mentioned a sector approach is essential in trying to raise the awareness of small firms, retailers and consumer organisations. Therefore the European sector associations are an important actor in encouraging enterprises to develop products with a lower environmental impact. On the other hand the target group associations can give additional attention in their promotion to the specific position in the product chain and the corresponding function with responsibilities.

Summarizing the newsletter has in particular an attention function. After the first year a questionnaire can be distributed discussing the content, news value, information transfer, frequency, format (paper or electronic version) of the newsletter. The results of the questionnaire can be used in the evaluation and further development of the newsletter.

Suggestions for the contents are described hereafter

<table>
<thead>
<tr>
<th>LCT Newsletter</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Bi-monthly distribution to European sector and target group associations and national authorities</td>
</tr>
<tr>
<td>- Basic LCT information (definitions, developments, etc.)</td>
</tr>
<tr>
<td>- Business cases presenting the market opportunities for “green” products (product examples and company interviews)</td>
</tr>
<tr>
<td>- Promotion of eco-labelling (market opportunities)</td>
</tr>
<tr>
<td>- Information and news about LCT/LCA tools</td>
</tr>
<tr>
<td>- Company interviews regarding (beginner’s) experiences with LCT/LCA tools</td>
</tr>
<tr>
<td>- Announcement of LCT product awards</td>
</tr>
<tr>
<td>- Best practices in communication/promotion of the concept of LCT and its benefits</td>
</tr>
<tr>
<td>- Announcement of conferences, workshops and training</td>
</tr>
<tr>
<td>- Reference to the EC LCT internet website</td>
</tr>
</tbody>
</table>
LCT Brochure

Apart from a newsletter, it is suggested to develop and distribute the following general brochures (in the different EU languages):
- ‘An introduction to life-cycle thinking’; a good example of an introduction to life-cycle thinking for enterprises is the newsletter as published by the Danish EPA in 2003 [6]. This newsletter describes how enterprises can begin to develop cleaner products based on a life-cycle perspective. It focuses on a simple approach to preventive environmental initiatives, where enterprises can begin at a level that matches their ambitions and their preconditions. The report is aimed at enterprises, regardless of their sector or size, which are interested in reducing the environmental impact of their products.
- ‘How to promote life-cycle thinking’ with a focus on communication to small firms and retailers.

LCT Internet platform

It is suggested to use also the internet as a medium to disseminate information, as it is a powerful medium and appeals to an increasing public. A broad distribution of information can be realised on a relatively easy and relatively cheap way. With the help of this medium the advantages of LCT can be illustrated attractively, e.g. in illustrated business cases.

The development, maintenance and content management of the internet platform can be managed, or outsourced, by the EC. All EU members, both businesses and consumers, will have the opportunity to visit the LCT internet website; therefore the medium has to be multilingual. Apart from general information on life-cycle thinking and related subjects, specific web pages will be developed for the target groups and selected sectors. The content of these web pages will be based on relevant developments in EU policy, sector and country. The website will also provide a comprehensive amount of links to other information sources, e.g. national websites, helpdesks and expertise centres.

<table>
<thead>
<tr>
<th>LCT internet website</th>
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<tbody>
<tr>
<td>Electronic version of the paper newsletter</td>
</tr>
<tr>
<td>Background information regarding the concept of life-cycle thinking</td>
</tr>
<tr>
<td>Information and news about available tools (e.g. checklists, LCA, eco-label)</td>
</tr>
<tr>
<td>Ample business cases (communication of the advantages of LCT)</td>
</tr>
<tr>
<td>Best practices, ‘lessons learnt’, illustrative examples</td>
</tr>
<tr>
<td>Announcement of conferences, workshops and training</td>
</tr>
<tr>
<td>References to other sources of information (networks of LCT expertise, services and centres; websites; publications; consultants etc.)</td>
</tr>
<tr>
<td>Information on national/local initiatives</td>
</tr>
</tbody>
</table>
Apart from a merely informing role the internet platform can provide a discussion forum as well. The discussion forum will make it possible to exchange knowledge and experience between countries and sectors. Subjects for discussion can be the experiences with LCT tools. The EC can also put forward a proposition and provide a possibility to respond, thereby receiving a direct feedback information.

Suggestions for the contents of the discussion forum are described hereafter:

<table>
<thead>
<tr>
<th>LCT discussion forum</th>
</tr>
</thead>
<tbody>
<tr>
<td>- EC propositions on draft directives</td>
</tr>
<tr>
<td>- Experiences with LCT/LCA tools</td>
</tr>
<tr>
<td>- Experience with eco-label procedures</td>
</tr>
<tr>
<td>- Opinion about promotion campaigns</td>
</tr>
</tbody>
</table>

LCT congress

The LCT congresses have the function to facilitate a direct exchange of information and experiences with LCT promotion activities. By organising a congress for a specific target group or sector the information exchange can be more specific and thereby more relevant to the participants. National differences in the LCT awareness and promotion can be discussed here; thus providing the basis for learning from each other’s experiences. While the countries with a low LCT awareness may bring up their needs for information and knowledge transfer (as well as the barriers in promoting LCT); the frontrunner countries can present their approach and experiences. In this way a knowledge transfer can be initiated and cooperation can be stimulated.

The following three congresses are suggested:

- LCT target group congress, e.g. ‘Think big: LCT for small firms’. LCT congress for the European target group association and its national members (UEAPME and its members; EuroCommerce and members; BEUC and members); providing specific information regarding their position/function in the product chain and a possibility for an exchange of knowledge and experiences within the target group.

- LCT sector congress. Targeted at the European sector association and its national members; providing sector specific information and a possibility for an exchange of knowledge and experiences. For instance CEPI and its members for the paper industry; EuPC and its members for the plastic products manufacturing industry; Eurometaux and its members for the metal industry

- ‘Establishing a national/(regional) LCT expertise centre’. Targeted at national/regional member state governments; providing them with support for the establishment of a national/regional LCT expertise centre.
Suggestions for the contents of the LCT congress are described hereafter:

<table>
<thead>
<tr>
<th>LCT congress</th>
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</thead>
<tbody>
<tr>
<td>- Introduction of the concept of LCT</td>
</tr>
<tr>
<td>- Business cases, advantages of LCT (target group/sector specific successes)</td>
</tr>
<tr>
<td>- Successes of national expertise centres</td>
</tr>
<tr>
<td>- Best practices/lessons learnt (establishment of an LCT expertise centre / use of LCT tools)</td>
</tr>
<tr>
<td>- Promotion of the application of eco-labels</td>
</tr>
</tbody>
</table>

**LCT workshop/training**

The success of a national LCT expertise centre depends largely on the promotion of its activities to various stakeholders. It is important that these centres and their activities are widely known.

To introduce a wider public to the concept of LCT and the activities of the centre workshops can be organised. Personal communication is very important here and offers the opportunity to explain the importance and the advantages of LCT approaches in a direct and enthusiastic way.

A workshop for provincial/regional governments is suggested, providing basic LCT information and informing them about the (establishment of an) LCT expertise centre, its objectives, target groups and activities.

<table>
<thead>
<tr>
<th>LCT workshop/training – promotion expertise centres</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Learning the basics of LCT</td>
</tr>
<tr>
<td>- National expertise centres / helpdesks: target groups, objectives, activities</td>
</tr>
<tr>
<td>- Presentation of business cases</td>
</tr>
<tr>
<td>- Need of broad application of eco-labels</td>
</tr>
</tbody>
</table>

The development of an LCT training targeted at small firms would have to be sector and country specific. Involvement of the national sector association is essential in the development of the content of the training and for attracting potential participants. Experiences are that the interest in participating in a training may be low, even when such a training is jointly organised with the national sector association. The relevance and benefits of the LCT approach appear not to be obvious. The organisation of the training should therefore be preceded by ample information from the sector organisation to the intended target group aimed at passing through the first two stages of the AIDA model (Attention and Interest).

*The organisation of 25-30 workshops is planned for the project “Promoting Eco-design Activities in the SMEs of the Electrical/Electronics Sector” (see also section 4.4.1 - European initiatives). The workshops are aimed at awareness raising and the identification of problems/needs among SMEs for applying eco-design. These*
workshops will have a fair geographical coverage among all countries participating in the Multi-annual Programme (i.e. EU Member States at 1 May 2004, the EFTA-EEA States and EU candidate countries Bulgaria, Romania and Turkey).

**LCT workshop/training ‘Thinking big for small firms’**
- LCT/LCA tools
- Learning to use LCT/LCA tools
- Implementation of LCT in the company

To increase the knowledge of shop assistants regarding the environmental performance of the products they sell, a workshop or training can be developed and organised by a national retail association. The involvement of a national retail and sector organisation in the development of the training is recommended. As a result the content of the training will differ widely depending on the product group involved, e.g. the training for the shop assistants in the supermarket will differ widely from the training as offered to the shop assistant in the consumer electronics store.

The workshop should give an introduction to the concept of life-cycle thinking (creating awareness), information about the main life-cycle impacts of products involved, and preparation for the main questions asked by consumers.

**LCT workshop for retailers**
- Learning the basics of LCT
- Knowledge about the main life-cycle impacts of products
- Knowledge of eco-labels
- Knowledge of how to deal with LCT related questions of consumers

**LCT Funds**

By funding the EC can directly support national sector and target group initiatives. By selecting priority countries and sectors, life-cycle thinking can be promoted with very specific measures. Initiatives which can be supported are for example:
- Establishment of national/regional expertise centres
- LCT workshop/training for SMEs in specific sectors
- LCT workshop/training for education of shop assistants
- Product testing by consumer organisations

National member state governments (for instance new member states) can be financially supported by the EC for the establishment of national/(regional) LCT expertise centres. The centre will not be commercially viable from the start and therefore also financial support is needed in the first years of its existence.
These national expertise centres can promote LCT and provide support to beginners (e.g. regarding the use of tools, implementing the life-cycle approach within the company). A helpdesk can provide practical support in the case of any problems or questions with LCT related subjects. Especially this support and helpdesk function of the centre is important as beginners can be overwhelmed with the complexity of LCT. The need for unambiguous and understandable LCT information is to be met by professional and experienced employees of the centre. The centre may also play a role in stimulating the development of simple LCT tools.

Hereafter a short description of potential activities of such a centre is given:

<table>
<thead>
<tr>
<th>National LCT expertise centre/helpdesk</th>
</tr>
</thead>
<tbody>
<tr>
<td>− Promotion of LCT activities (priority sectors and target groups)</td>
</tr>
<tr>
<td>− LCT support and helpdesk</td>
</tr>
<tr>
<td>− Evaluation and development of tools</td>
</tr>
<tr>
<td>− Development and publication of national LCI data</td>
</tr>
<tr>
<td>− (e.g. material and substances data, process data, transport and energy data, sector specific data)</td>
</tr>
</tbody>
</table>

Funds can also be applied for developing and organising LCT workshops or training for the small firms in specific sectors, or for the education of managers/shop assistants involving specific product groups. These two examples were described in more detail earlier in this section.

In order to increase the amount of product tests -including environmental life-cycle aspects- additional funding for consumer organisations is needed, as these organisations in general are short of staff and means. Product tests however can vary widely in terms of scope, from including a single issue (e.g. energy consumption) towards a complete environmental assessment (e.g. based on LCA) and product category. Therefore an average cost estimate cannot be given: the costs for a product analysis regarding a single chemical substance can be for example €10000, while the costs for a more complete environmental test can be in the order of €50000 to €100000. Further research and consultation among stakeholders will be needed for the definition of an ‘LCT-related product test’ (see the next section on RTD).

The results of these test should be made public. In allowing funds priorities can be established in product groups and countries.
LCT RTD

The EU Community Platform can also support sector and target group initiatives in the EU 7th Framework RTD Program. Theme initiatives can be, for example:

- Development of user-friendly tools for specific target groups
- Development of eco-label procedures/standards for specific sectors
- Development of procedures for product tests within specific product categories

The availability of user-friendly tools is a determining factor in the increased use of LCT tools. Some of the current tools are too complex to be used by non-experts in the field. Especially for small firms this is an important barrier as they do not have the knowledge or means to (learn to) use these specialised tools. (For instance the eLCA/ecosmes.net project, see 6.4.2)

Development of eco-label procedures/standards for specific priority sectors. It is obvious that marketing of greener products (with an eco-label) within specific product group categories can decrease the environmental impact significantly and will promote the LCT approach.

Development of procedures for environmental product tests within specific product categories and education of employees of (consumer) organisations performing these product tests. Especially tests for products with a relatively large environmental impact are recommended. For benchmarking purposes it is suggested to develop the criteria, or procedures, for an environmental product test, qualified as an ‘LCT related product test’ in consultation with the BEUC and national consumer organisations. If standardization turns out to be desired, a route towards standardization can be started in cooperation with an European standards body.

6.4.3 Dissemination scenarios

The set up of a Community Platform and the organization and implementation of its activities will not happen suddenly, but will follow a step by step approach. The introduction rate of its activities will depend on among others:

- The policy priority of the EU regarding this issue and the translation to reasonable funding sources.
- The possibility and the preparedness to translate EU policy to national and regional policies and implementing actions.
- The co-operation of European, national and regional sector and target group organizations.
- The preparedness of sector and target group organizations to learn from each other.
Information exchange and communication scenarios can be built up by several selected means directed to specific target groups (or members from it). So specific criteria can be selected to form scenarios.

Criteria for the scenario development can be:

- Selection of specific (national/regional) target groups
- Kind of LCT messages, which are preferred
- Preferable means of communication
- Intensity of information exchange/communication (frequency, period)
- Level of EC involvement
- Costs

In section 6.5 suggested scenarios are described and related costs estimates are also added.

### 6.4.4 Summarizing conclusions

Regarding Figure 5-1 the main communication and information exchange patterns, regarding the Community Platform, will be between the European target organisations (UEAPME, EuroCommerce, BEUC), European sector organisations (such as CEPI, PlasticsEurope, Eurometeaux) and the national expertise centres. The European target and sector organisations will activate the national organisations or will co-operate with/learn from the active national organisations. The described examples in 6.4.1 support this approach. The Innovation Relay Centres Network proves that a successful European network has to be based on a network of national and regional expertise centres. The example of the Danish Environmental Protection Agency shows what a national Expertise Centre can do and how it can be supported, regarding the selection and application of communication means. The UNEP example and the UNEP?SETAC Life Cycle Initiative illustrate what kind of information exchange/communication means can be used and how successful networking can take place. Some of these elements are used for the set-up of the dissemination scenarios. The results and the recommendations of the eLCA project are also helpful for the set-up of the dissemination scenarios and show what kind of electronic facilities can be applied by a national/regional expertise centre.

The Community Platform has to be set up by the EU itself, because the co-operation with the target groups is rather poor and these target groups are also not so active, regarding the running example initiatives. The Community Platform can learn from or can co-operate with the UNEP/SETAC Life Cycle Initiative how to work together with industrial branch or sector organisations.
6.5 Proposed scenarios and cost estimates

Raising the LCT awareness as quick as possible will be a key issue for the EC. Another item will be that this awareness increase needs to be implemented for the whole product chain, so all (necessary) target groups have to be involved in this increase. As a consequence the three target groups need comparable attention. Also different information exchange and communication means are suggested to reach as much stakeholders as possible; this is a boundary condition for a broad distribution of LCT messages.

From that point of view the following three scenarios are proposed. The scenarios have a period of 4 years and the sequence from 1 to 3 is related to increasing costs, so increasing quickness of raising LCT awareness. Every scenario has two versions: an ‘average’-version and a ‘low cost’-version (administration costs are excluded). The cost estimates were made based on own experiences with the organisation of congresses, the distribution of newsletters and so on.

The differences between the average and low costs option in the hereafter presented scenarios are given in table 6.2.

Table 6.2 Differences between the average and low costs option

<table>
<thead>
<tr>
<th>Means to raise LCT-awareness</th>
<th>Average costs</th>
<th>Low costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet platform, without or with discussion fora</td>
<td>More information exchange</td>
<td>Sober set-up</td>
</tr>
<tr>
<td></td>
<td>More illustrative set-up</td>
<td></td>
</tr>
<tr>
<td>Newsletter/brochure</td>
<td>More information exchange</td>
<td>Sober set-up</td>
</tr>
<tr>
<td></td>
<td>Colourful, illustrative set-up</td>
<td></td>
</tr>
<tr>
<td>Congresses</td>
<td>Translation in the main EU languages</td>
<td>Translation only in English</td>
</tr>
<tr>
<td>Workshops/training sessions</td>
<td>More workshops / sessions</td>
<td>Less workshops / sessions</td>
</tr>
<tr>
<td>Supporting actions (for expertise centres, for product tests, for training courses)</td>
<td>Extra support to be sure to be successful</td>
<td>Real support</td>
</tr>
<tr>
<td>RTD program</td>
<td>More support for enlarged projects</td>
<td>Real support for meaningful projects</td>
</tr>
</tbody>
</table>

The scenarios presented hereafter are all based on a strong financial support of the EU to realise a significant increase in awareness. The choice of which (parts of the) scenario to implement obviously is the responsibility of the EU.
Scenario 1

<table>
<thead>
<tr>
<th><strong>Internet platform; only website</strong></th>
<th>Average (k€)</th>
<th>Low cost (k€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Providing information to consumers and businesses in the EU (Costs aspects: design / set up / maintenance / all EU languages) Costs (fixed costs):</td>
<td>400</td>
<td>250</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Newsletter/brochure</strong></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Targeted to European organisations and national governments (Costs aspects: year 1 by mail; years 2, 3, 4 by e-mail / design / set up / all EU languages / 100 addresses average per EU country via national key-persons or key-organisations) Costs (fixed costs):</td>
<td>500</td>
<td>400</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Congresses</strong></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Three international congresses in 4 years (SMEs, retail, consumer organisations; one for each target group) (Costs aspects: audience, 500-1000 persons / 1 language / no delegate fee / 3 days with parallel sessions) Costs: 3 x 800 k€ (average) / 3 x 600 k€ (low cost, translation to English only)=</td>
<td>2400</td>
<td>1800</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Workshops/training sessions</strong></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Nine/six workshops/training sessions:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Three/two for promotion expertise centres in specific starting or low experience countries;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Three/two for SMEs in selected priority sectors;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Three/two for retail in selected priority sectors (Costs aspects: audience, 50–100 people / simultaneous translation / no delegate fee / daily allowance speakers, trainers / 2 days)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Costs: 9 x 250 k€ (average) / 6 x 250 k€ (low cost)=</td>
<td>2250</td>
<td>1500</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Supporting actions:</strong></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Extra support for 5 starting expertise centres in specific countries; Costs: 5 x 500 k€ (average) / 5 x 300 k€ (low cost)=</td>
<td>2500</td>
<td>1500</td>
</tr>
<tr>
<td>- Extra support for 10 product tests by consumer organisations in several EU countries; Costs: 10 x 100 k€ (average) / 10 x 50 k€ (low cost)=</td>
<td>1000</td>
<td>500</td>
</tr>
<tr>
<td>- Extra support for the organisation of 10 training sessions for the different target groups by the association(s) of specific priority sectors; Costs: 10 x 200 k€ (average) / 10 x 100 k€ (low cost)=</td>
<td>2000</td>
<td>1000</td>
</tr>
</tbody>
</table>

| Total scenario 1 costs: | 11050 | 6950 |
Scenario 2

<table>
<thead>
<tr>
<th>Internet platform; only website</th>
<th>Average (k€)</th>
<th>Low cost (k€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Providing information to consumers and businesses in the EU (Costs aspects: Design/ set up/ maintenance/ all EU languages)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Costs (fixed costs):</td>
<td>400</td>
<td>250</td>
</tr>
</tbody>
</table>

| Newsletter/brochure | |
|---------------------| |
| Targeted to European organisations and national governments (Costs aspects: year 1 by mail; years 2, 3, 4 by e-mail / design / set up / all EU languages/ 100 addresses average per EU country via national key-persons or key-organisations) | |
| Costs (fixed costs): | 500 | 400 |

| Congresses | |
|------------| |
| Six congresses in 4 years (SMEs, retail, consumer organisations; two for each target group) (Costs aspects: Audience 500 – 1000 people/ simultaneous translation in 5 major languages/ no delegate fee/ 3 days with parallel sessions) | |
| Costs: 6 x 800 k€ (average) / 6 x 600 k€ (low cost)= | 4800 | 3600 |

| Workshop training sessions | |
|---------------------------| |
| Eighteen/twelve workshops/training sessions: | |
| - Six/four for promotion expertise centres in specific starting or low experience countries; | |
| - Six/four for SMEs in six selected priority sectors; | |
| - Six/four for retail in selected priority sectors (Costs aspects: audience, 50–100 people/ simultaneous translation/ no delegate fee/ daily allowance speakers, trainers/ 2 days) | |
| Costs: 18 x 250 k€ (average) / 12 x 250 k€ (low cost)= | 4500 | 3000 |

| Supporting actions: | |
|---------------------| |
| - Extra support for 10 starting expertise centres in specific countries; | |
| Costs: 10 x 500 k€ (average)/ 10 x 300 k€ (low cost)= | 5000 | 3000 |
| - Extra support for 20 product tests by consumer organisations in several EU countries; | |
| Costs: 20 x 100 k€ (average)/ 20 x 50 k€ (low cost) = | 2000 | 1000 |
| - Extra support for the organisation of 20 training sessions for the different target groups by the association(s) of specific priority sectors | |
| Costs: 20 x 200 k€ (average) / 20 x 100 k€ (low cost)= | 4000 | 2000 |

| RTD program | |
|-------------| |
| Setting up of an LCT research priority theme in the 7th Framework RTD program to support 5 research projects with regard to the development of simple/user-friendly tools, manuals, eco-label schemes/procedures, etc | |
| Costs: 5 x 200 k€ (average)/ 5x 100 k€ (low cost) = | 1000 | 500 |

Total scenario 2 costs: 22200 13750
Scenario 3

<table>
<thead>
<tr>
<th><strong>Internet platform; website and discussion fora</strong></th>
<th><strong>Average (k€)</strong></th>
<th><strong>Low cost (k€)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Providing information to consumers and businesses in the EU and organisation of opportunities to facilitate communication between different stakeholders with respect to several LCT subjects. (Costs aspects: Design/ set up/ maintenance/ information exchange in all EU languages/ chat room, language only English)</td>
<td></td>
<td>600 400</td>
</tr>
</tbody>
</table>

| **Newsletter/brochure** | | 500 400 |
| Targeted to European organisations and national governments. (Costs aspects: Year 1 by mail; years 2, 3, 4 by e-mail/ design/ set up/ all EU languages/ 100 addresses average per EU country via national key-persons or key-organisations) | | |

| **Conferences** | | |
| Six congresses in 4 years (SMEs, retail, consumer organisations; two for each target group). (Costs aspects: Audience, 500 – 1000 persons/ simultaneous translation in 5 major languages/ no delegate fee/ 3 days with parallel sessions) | | 4800 3600 |

| **Workshop/training sessions** | | |
| Twenty-seven /eighteen workshops/training sessions: | | 6750 4500 |
| - Nine/six for promoting expertise centres in specific starting or low experience countries; | | |
| - nine/six for SMEs in nine selected priority sectors; | | |
| - nine/six for retail in selected priority sectors | | |
| (Costs aspects: Audience, 50 – 100 people/ simultaneous translation/ no delegate fee/ daily allowance speakers, trainers/ 2 days) | | |

| **Supporting actions** | | 7500 4500 |
| Extra support for 15 starting expertise centres in specific countries | | |
| Costs: 15 x 500 k€ (average) / 15 x 300 k€ (low cost) | | |
| Extra support for 30 product tests by consumer organisations in several EU countries | | 3000 1500 |
| Costs: 30 x 100 k€ (average) / 30 x 50 k€ (low cost) | | |
| Extra support for the organisation of 30 training sessions for the different target groups by the association(s) of specific priority sectors | | 6000 3000 |
| Costs: 30 x 200 k€ (average) / 30 x 100 k€(low cost) | | |

| **RTD program** | | 2000 1000 |
| Setting up of an LCT research priority theme in the 7th Framework RTD program to support 10 research projects with regard to the development of simple/user-friendly tools, manuals, eco-label schemes/procedures, etc. | | |
| Costs: 10 x 200 k€ (average)/ 10 x 100 k€ (low cost) | | |

**Total scenario 3 costs:** 31150 18900
6.6 Monitoring LCT progress

As already concluded in the chapters 2,3,4 there is mostly a poor and sometimes a reasonable level of awareness in the target groups. It is also concluded that among others by means of promotion and communication activities this level of awareness has to be improved. But the EU like to know if their supporting activities in future will be successful.

In chapter 2 several options, with regard to the application of LCT tools, for monitoring purposes are described. Summarizing the following clear options are candidates:

- SMEs;
  - The amount of SMEs with a (product-oriented) environmental management system (EMS) according to ISO 14001/EMAS
  - The amount of SMEs producing products with an ISO-type I or ISO type-III eco-label
- Retailers;
  - The amount of products with an ISO-type I eco-label, sold by the retail
  - The amount of products with an environmental product declaration (EPD), sold by retail
- Consumer organisations;
  - The amount of LCT-related product tests
  - The amount of LCT related consumer magazine articles.

It was expected that the volumes of the provided LCA tools and services, sold to the individual target groups, could form a base for benchmarking purposes. But the main providers hesitate and are not prepared to offer sensitive market information. From the other hand it is not always obvious if the tools are directly provided to the target groups or intermediate organisations, such as consultancy bureaus and universities, which advise the target groups. When the provision of LCA tools and services to different target groups continues to be an issue to be monitored more detailed appointments with the main providers have to be made.

Regarding the alternatives described and the opinions of the target groups the following suggestions for monitoring are proposed:

- The amount of SMEs with a (product-oriented) environmental management system (EMS) according to EMAS, possibly in combination with ISO 14001
- The amount of products with an ISO-type I eco-label (such as the EU flower), sold by the retail
- The amount of published, LCT related product tests

When a rather limited amount of monitoring issues is chosen for benchmarking, taking into account current registration and ease and costs of any additionally required registration, it will be preferable to follow the increase/decrease of the amount of EMAS (in combination with ISO 14001) registrations and the amount of ISO-type I eco-labels (EU flower and possibly national eco-labels) registrations.
These registrations are already running and the actual amounts are presented, see sections 2.2.1 and 2.4.1.

The amount of EMAS/ISO 14001 registrations is an indication for the LCT oriented production by SMEs. The amount of products with an ISO-type 1 eco-labels, sold by SMEs to retail and sold by retail to consumers gives an expression of LCT oriented behaviour of the considered stakeholders in the product chain.

In co-operation with the European, national target group and sector associations/organisations a monitoring programme could be developed and introduced. This seems to be needed, because in the different EU countries different (industrial and trade) structures exist and different LCT oriented product policies can be implemented in different EU countries. It is also possible, regarding the measurement of the LCT awareness growth, to involve national expertise centres. In co-operation with the national stakeholder groups they can monitor the acceptance of the LCT approach and the ways of LCT implementation.
7. **Main conclusions and recommendations**

7.1 **Conclusions**

With regard to the main conclusions the sequence of the report chapters is more or less followed.

*Position and function in the product chain*

For assessment of the awareness regarding life-cycle thinking in the target groups and their needs for information and support, the specific position in the product chain and the related current and potential role in promotion and communication processes is very important.

An SME can be a producer or a supplier of either raw materials, semi-finished or final products, but is often active in the supply chain of products, manufactured by large companies setting the demands for product design and production. So with respect to Life Cycle Thinking the SMEs are dependent on the attitudes/activities of these large companies. Retailers as an intermediary between producers and consumers can be very active in marketing greener products and can communicate the environmental qualities of these products to the consumers. With this in mind the consumer organisations can inform and stimulate the consumers to buy products after recognising the environmental impacts of specific products and their alternatives. So the specific function and position in the product chain has a certain influence on the awareness and acceptance of Life Cycle thinking by the target groups.

*Awareness*

The awareness of Life Cycle Thinking in the target groups is rather poor, but can differ per sector and/or target group:

- SMEs activities can be directed to different objectives, according to the different positions in the supply chain. Design, production and marketing are aspects in which SMEs can be involved considering life-cycle aspects. Operational tools for internal use, such as LCA, checklists, eco-design for clean production and the manufacturing of eco-products are possible options. Also marketing with the help of eco-labels is relevant, but will get more attention from the retailers. With respect to the improvement of awareness branch/sector organisations can play an important facilitating role.

- Retailers are an important link between manufacturers and consumers and that is why marketing, communication with consumers is really an important issue. From that point of view eco-labels play a crucial role with respect to get more awareness for LCT. Large retailers and branch organisations play key roles in
the selection process for the kind of labels. Some large retailers, such as COOP Switzerland, are very active in this area.

- Consumer organisations as representative bodies for consumers can stimulate Life Cycle Thinking by consumers. The consumers choice for products with eco-labels can be an illustration for increasing awareness. Consumer organisations compare the functional quality, but also environmental aspects (energy use, application of hazardous substances, etc.) of several types, brands of the same product from different manufacturers with each other (product tests). Publication of the results can influence awareness and is an illustration of the LCT approach.

Regarding the analysis of the different industrial sectors it is obvious that the function, position, attitude and behaviour of the considered target groups is strongly dependent on the kind of products which are produced and also on the industrial structure (which can differ in the different European countries). It means that target groups can play a minor role, but can also be very active in a specific sector. For instance the retail and consumer organisations are clearly active considering the food sector with respect to LCT aspects.

The results of the analysis regarding country differences show that in the EU the Nordic countries are the most proactive countries with respect to LCT and the application of related tools. Analyses of the areas eco-design, environmental management, eco-labels and consumer awareness deliver the arguments. Looking at other economic blocks it appears that Japans activities are comparable with those of the Northern European countries. The general image is that the USA is lacking behind the EU in life-cycle thinking.

**Use of LCA tools**

The application of LCA tools by the target groups is limited; results of the market survey show that they hardly buy software tools themselves. For small firms it was recognised that they are mostly involved by large companies or that they hire consultants; also large companies mostly consult universities or specialised organisations. The internalisation of LCT tools by the target groups is therefore limited. The developed tools are more general and for that reason no remarkable, specific differences between industrial sectors are observed.

The main and most likely reasons for not applying LCA tools are:

- There is a lack of positive experience and demonstrable results with LCA studies.
- There is a lack of resources (human and financial) to buy, learn and apply LCA tools.
- Current LCA tools are complex
- Target groups perceive a limited control over the life-cycle and are therefore not interested in using LCA tools themselves.
It is expected the LCA products and services will get an advanced and deeper character due to the developments of new tools. The quality will be improved and for instance economic and social aspects will be integrated. These tools will have a better user-friendliness and less time and knowledge will be needed to execute an LCA. There will also be more customised solutions. This decrease in the threshold for the use of LCA will be strengthened by the aspect that no big changes in prices are expected.

Promotion strategies and activities

With regard to the promotion of LCT by the different target groups, it depends on a combination of factors, e.g. position in the product chain, product group category, industrial structure of the sector, country. Promoting opportunities are:

- For SMEs the promotion opportunities are limited when they operate in the supply chain of large companies. In some sectors and some countries, when the SMEs produce final products (e.g. paper products) to be delivered to the retail, they can become important promoters of LCT in the product chain. Especially branch/sector organisations can play a very important role in the promotion of LCT. In Europe especially the Northern European countries are very active considering LCT supporting activities directed to industrial stakeholders.

- The promoting role of retailers varies from country to country and depends on considered product group categories. In some countries retailers have played a crucial role for the diffusion and promotion of eco-labels, mostly for short-life consumable and food products. Retailers have a powerful position and especially for durable products retailers can inform and educate consumers during their decision to buy. In practice their influence is limited, but some large retailers try to build up a specific image by offering a reasonable amount of greener products in their stores/shops.

- Also consumer organisations can play a major role in the promotion of LCT. But due to less financial and human resources their actual possibilities are limited. With the help of the publication and distribution of the results of environmentally oriented product tests and results of LCA analyses of products they can help to increase the awareness of consumers.

The authorities (with the help of research programmes and public activities) are currently the main promoters of LCT in the target groups. Public promotion and support, directed to the operational opportunities of the target groups, can be realized by active authorities or related administrative bodies. Examples are among others the establishment of national LCT expertise centres, which support the target groups, and the facilitation in the set up of procedures with criteria for eco-labelling.

Promotion activities will be stronger when different stakeholders collaborate; examples are the EU Flower campaign and the UNEP/SETAC Life Cycle Initiative.
Needs for intensified exchange of information and communication

The potential to raise LCT awareness is considerable and the promotion of LCT depends strongly on different aspects. The needs for intensified communication and exchange of information are more general (more LCT issue related) and more specific (industrial sector or product category dependent).

More general needs of the target groups are for instance:

− For the SMEs:
  1. The need to raise knowledge on the concept of Life Cycle Thinking
  2. The need to know how Life Cycle Thinking can benefit their company
  3. The need for targeted knowledge, training and tools on how to implement Life Cycle Thinking in their business operation

− For the retail:
  1. An increase of the knowledge on Life-Cycle Thinking and on exchange of this knowledge from the top management level to the shop assistant in the shops
  2. A higher awareness of Life-Cycle Thinking by consumers to an increasing demand of products with a lower environmental impact
  3. A greater visibility of eco-labels, including the EU-flower

− For consumers (organisations):
  1. Comparable and reliable environmental product information that they can use in purchasing situations
  2. Information about where to buy products with a lower environmental impact
  3. A greater visibility of eco-labels

The more specific needs and the roles of the different target groups are more sector specific. The automotive and paper case illustrate that these roles and related needs can differ for the considered target groups (from a following attitude to a more proactive attitude).

Fulfilling the considered needs can occur by several communication channels. The EC mostly communicate with members of national authorities or members of European sector and target group associations. The national/regional associations and national/regional authorities mostly communicate with the target groups or representatives of these groups. It means that these organisations play a crucial role in fulfilling the observed needs and are very important intermediates to increase LCT awareness.

Approach for LCT awareness increase

Fulfilling the (specific) needs and regarding the additional initiatives to be taken on a Community level the proposed activities will follow the stages of the AIDA model: Attention ( clarification of the concept of Life Cycle Thinking), Interest (communication of the advantages), Desire (e.g. use of LCT tools) and Action (promotion of LCT and introduction in the company or organisation). The fists two
stages are more based on informing and will dominate in the beginning, because of the low level of awareness in the target groups. Means are press release, article, website, newsletter, brochure, campaign, course. The last two stages are more communicating oriented. Means are training/workshop, conference, meeting, internet discussion forum, helpdesk, website, newsletter. Dependent on the roles the EC wishes to fill in a selection of means will be made. The roles of the EC might be:

- A pro-active, initiating role with respect to solve the general needs considering LCT information exchange and communication. Direct communication with national authorities and European, sometimes national, sector and target group organisations will take place (e.g. with the help of a newsletter, website, workshops).
- A supporting role with respect to the specific needs considering LCT information exchange and communication. For instance national or regional activities can be supported with the help of funding (e.g. as part of the 7th Framework RTD Program initiated by the EU).

It is reasonable that the EC roles will be filled in with a step by step approach. From that point of view it is reasonable that a selection for priority sectors and priority countries/regions will be made. These sectors which can realize a reasonably environmental improvement in a relatively short time can be selected. With regard to the countries it is advisable to select these starting ones, which planned a strong environmentally oriented policy.

**Implementation of a Community platform**

The objective of the Community platform is to raise the LCT awareness and to facilitate information exchange and communication between stakeholders. The establishment of national (or regional) LCT expertise centres is chosen as the basis for information exchange and communication. Concurrent initiatives prove that such an establishment of national/local centres are successful in the transfer of knowledge and experience. These concurrent initiatives also give good indications for means to apply during the information exchange and communication processes. The following means are selected; the advantages are described and the way how to apply them are indicated:

- Newsletter, brochure, internet platform (website and discussion platform), congress, workshops/training, funding, RTD.

The set up of a Community platform and the organisation and implementation of its activities will probably follow a step by step approach. The introduction rate of its activities will depend on among others:

- The policy priority of the EU regarding this issue and the translation to reasonable funding sources.
- The possibility and the preparedness to translate EU policy to national and regional policies and implementing actions.
- The co-operation of European, national and regional sector and target group organisations.
The preparedness of sector and target group organisations to learn from each other.

Three scenarios are elaborated for a period of 4 years and the differences, so also the costs estimates, are based on differences in increasing quickness of raising awareness.

The whole product chain approach is a criterion, so all target groups are involved and will get a comparable attention. All different information exchange and communication means are included to realize a broad distribution of the several LCT messages.

The costs estimates of the average scenarios amount to (low cost – average):
- Scenario 1: 6950 - 11050 k€
- Scenario 2: 13750 - 22200 k€
- Scenario 3: 18900 - 31150 k€

Also low cost-versions of the scenario were estimated. Dependent on policy options and target group preferences a mix or partial extension of the scenarios can be proposed.

**Monitoring LCT progress**

It was expected that the volumes of the provided LCA tools and services could form a base for benchmarking purposes. But the main providers hesitate and are not prepared to offer sensitive market information. From the other hand it is not always obvious if the tools are directly provided to the target groups or intermediate organisations, such as consultancy bureaus or universities, which advise the target groups.

Regarding the alternatives described and the opinions of the target groups the following suggestions for monitoring are proposed:
- The amount of SMEs with a (product-oriented) environmental management system (EMS) according to ISO 14001/EMAS
- The amount of products with an ISO-type I eco-label, sold by the retail
- The amount of published, LCT related product tests

When a limited amount of monitoring issues is preferred it is advisable to follow the increase/decrease of SME EMAS certifications and products with ISO-type I labels, sold by retail and bought by consumers (actual registration figures are presented in the report).

In co-operation with the European, national target group and sector associations/organisations a monitoring programme could be developed.
7.2 Recommendations

**EU Network of LCT expertise centres**

Regarding the successes of the Innovation Relay Centres Network (an European network of 68 IRCs) and the UNEP (a network of Cleaner Production centres), it is advisable to support the establishment of an European network of LCT expertise centres. The Danish, Swedish and Dutch initiatives can explain their services, their lessons learnt, success stories and observed needs of the different target groups/stakeholders; they can form the first co-operation.

Further expansion can strongly be supported by the EU DG Environment.

**Monitoring LCT progress**

There is a strong need in following the increase of LCT awareness and the EU likes to know if their supporting initiatives in future will be successful. Probably it is desirable to monitor the influence of the introduction of a specific information exchange and communication scenario (and its means). It is recommendable to set up a monitoring system in co-operation with the European and national target group/sector associations and organisations. Also the national authorities (or the already established expertise centres) could play a supporting and facilitating role.

**User-friendly LCA tools**

The target groups have explained that they need user-friendly and simple LCA tools. On the other hand the running tools are enlarged with economic and social criteria (from the sustainability point of view) and this could mean an increase in complexity. The EU can stimulate the development of customised tools, sometimes more sector specific. The use of LCT tools will be enlarged by the target groups when their specific needs are honoured.

**Visibility of Eco-labels**

The retail as well as the consumer organisations have expressed that they support the distribution of eco-labelling. In co-operation with independent organisations some procedures/standards could be developed and with support of the European and national sector/target group organisations the implementation can be stimulated.

The retail organisations in co-operation with the consumer organisations can promote the use of eco-labels and the EU could support such co-operations in the different EU member states.
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[136] Raimund W. and S. Fickl, ‘Energy Efficiency of Passenger Cars:
Labelling and its Impacts on Fuel Efficiency and CO2-Reduction’
Energieverwertungsagentur (E.V.A.), Austrian Energy Agency. Internet
reference: www.eva.ac.at/(en)/publ/pdf/carlab_eceee.pdf

reference: http://irc.cordis.lu

[138] Internet reference: www.mst.dk/homepage

[139] Internet references: www.uneptie.org/pc/sustain/about-us/about-us.htm;
www.uneptie.org/pc/sustain/lcinitiative;

[140] Internet reference: www.uneptie.org/pc/cp

[141] Internet reference ‘CEPIPRINT – Environmental issues – Paper &
Environment’ (as retrieved Dec. 2004):
www.cepiprint.ch/environ_issues/paper_environment/index.htm

[142] Internet reference ‘EUROPA – Environment – Ecolabel – Marketing
Activities’ (as retrieved Dec. 2004):
http://europa.eu.int/comm/environment/ecolabel/marketing/marketingstudies_en.htm

[143] Information received from Mr. H.A. Udo de Haes, CML Leiden (date:
27-1-2005).

[144] Personal communication with Paolo Masoni, coordinator of the project
eLCA.
[145] Internet reference ‘ISO 14001 Speedometer’:
www.inem.org/iso/speedo.htm
(The ISO 14001 Speedometer is based on data from Reinhard Peglau of
the Federal Environmental Agency, Berlin, Germany.)

[146] Internet reference ‘Europa – Enterprise – Calls for tenders’:
http://europa.eu.int/comm/enterprise/calls/calls.html

[147] Internet reference ‘Europa – Environment - .. - What is Integrated
Product Policy?’:
http://europa.eu.int/comm/environment/ipp/integratedpp.htm

[148] Number of SMEs per country; Contact EMAS Helpdesk (Mrs.
Zademach); Brussels, August 2005

[149] ISO 14001 certification; UBA Berlin, R. Peglau; Telephone conversation,
August 2005
## 9. Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleaner Production</td>
<td>‘Cleaner Production is the continuous application of an integrated preventive environmental strategy to processes, products, and services to increase overall efficiency, and reduce risks to humans and the environment. Cleaner Production can be applied to the processes used in any industry, to products themselves and to various services provided in society’ (definition adopted by UNEP) (<a href="http://www.uneptie.org/pc/cp/understanding_cp/home.htm#definition">http://www.uneptie.org/pc/cp/understanding_cp/home.htm#definition</a>)</td>
</tr>
<tr>
<td>Durable products</td>
<td>non consumable goods/items; products which are not thrown away after first use, but will have a certain lifetime.</td>
</tr>
<tr>
<td>Eco-label</td>
<td>Label based on environmental criteria and these can be conform ISO Type I, ISO Type II or ISO Type III.</td>
</tr>
<tr>
<td>Eco-innovation</td>
<td>Innovation that leads to progress in eco-efficiency</td>
</tr>
<tr>
<td>Environmental Management System</td>
<td>A means of ensuring effective implementation of an environmental management plan or procedures and compliance with environmental policy objectives and targets. A key feature of any effective environmental management system (EMS) is the preparation of documented system procedures and instructions to ensure effective communication and continuity of implementation. There are certification systems for EMS ISO 14001 and EC’s EMAS scheme (EMAS is now compatible with ISO 14001) which demonstrate that a system is operated to an internationally recognised standard. Alternatively a customised system can be developed addressing the particular needs of the operation. (European Commission. 1999. Integrating environmental concerns into development and economic cooperation. Brussels.)</td>
</tr>
</tbody>
</table>
Environmental Product Declaration

Quantified environmental data for a product with pre-set categories of parameters based on the ISO 14040 series of standards, but not excluding additional environmental information (www.environdec.com/whatisepd/)

Eco-efficiency

Being achieved by the delivery of competitively priced goods and services that satisfy human needs and bring quality of life, while progressively reducing ecological impacts and resource intensity throughout the life cycle, to a level at least in line with the Earth’s estimated carrying capacity. (WBCSD)

Environment-friendly

The term ‘environment-friendly’ can be interpreted as ‘having a relatively low environmental impact’.

Green / greener (products/-production)

The term ‘green’ or ‘greener’ as an adjective to the words ‘products’ or ‘processes’ can be interpreted as ‘having a relatively low/lower environmental impact’.

Integrated Product Policy

Integrated product policy (IPP) is an approach that begins by asking how the environmental performance of products can be improved most cost-effectively. It is founded on the consideration of the impacts of products throughout their life-cycle, from the natural resources from which they come, through their use and marketing to their eventual disposal as waste. It is also a relatively new approach to environmental policy. (European Commission. http://europa.eu.int/comm/environment/ipp/home.htm)

ISO Type I

“Voluntary, multiple criteria-based third party programme that awards a license authorising the use of environmental labels on products. These indicate the overall environmental preferability of a product within a particular product category based on life cycle considerations. These labels provide qualitative environmental information” (ISO 14024, p.1)

ISO Type II

“Self-declared environmental claim made by manufacturers, importers, distributors, retailers, or anyone else likely to benefit from such a claim without independent third-party certification” (ISO 14021, p.3)

ISO Type III

“Quantified environmental data for a product with pre-set categories of parameters based on ISO 14040 series of standards, not excluding additional environmental information provided by a Type III environmental declaration programme” (ISO/TR 14025, p.3)

LCA products

In this study ‘LCA products’ are LCA tools, LCA consultancy and LCA studies.
LCA services
In this study ‘LCA services’ are helpdesk services, training and courses.

LCA tools
LCA tools are understood as method handbooks, databases and software, helping and guiding a user of LCA to perform an LCA-study.

Life-cycle
Consecutive and interlinked stages of a product system, from raw material acquisition or generation of natural resources to the final disposal.

Life-cycle assessment
“Compilation and evaluation of the inputs, outputs and potential environmental impacts of a product system throughout its life cycle”. (ISO International Standard 14040)

Life-cycle thinking
One of the key principles of IPP; life-cycle thinking considers a product’s life-cycle and aims for a reduction of its cumulative environmental impacts - from the “cradle to the grave”.

Life-cycle management
An integrated concept for managing the total life cycle of goods and services towards more sustainable production and consumption.
(http://www.uneptie.org/pc/sustain/lcinitiative/lcm_information.htm)

Monitoring
To watch, keep track of, or check usually for a special purpose

Nordic countries
Term used collectively for five countries in Northern Europe: Denmark, Finland, Iceland, Norway and Sweden.

Product chain
A sequence of coupled processes with the aim to manufacture a product to be sold to the consumers.

Product development chain
The product development chain consists of the stages Strategy definition, R&D and design (eco-design), Procurement and production, and Marketing.

Product-oriented Environmental Management System
An Environmental Management System which is strongly related to the product that will be produced.

Promoters/supporters
Group of actors which promote/support life-cycle thinking, for instance by promoting the use of LCA tools and services.

Providers
Group of organisations which provide LCA tools and services to customers.
Sustainable Consumption

‘The use of services and related products which respond to basic needs and bring a better quality of life while minimizing the use of natural resources and toxic materials as well as the emissions of waste and pollutants over the life-cycle so as not to jeopardize the needs of future generations.’


Sustainable products

Products which will be consumed in a society of sustainable consumption.

Zero-category

Product group for which eco-labelling requirements have been elaborated, but label holders do not exist.
## 10. Abbreviations and acronyms

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACC</td>
<td>Agri Chain Competence Foundation</td>
</tr>
<tr>
<td>AEC</td>
<td>Association of European Consumers</td>
</tr>
<tr>
<td>ASTM</td>
<td>American Society for Testing and Materials</td>
</tr>
<tr>
<td>BEUC</td>
<td>Bureau Européen des Unions de Consommateurs; The European Consumers’ Organisation</td>
</tr>
<tr>
<td>CAP</td>
<td>Common Agricultural Policy</td>
</tr>
<tr>
<td>CECED</td>
<td>European Committee of Domestic Equipment Manufacturers</td>
</tr>
<tr>
<td>CEN</td>
<td>Comité Européen de Normalisation; European Committee for Standardization</td>
</tr>
<tr>
<td>CENELEC</td>
<td>European Committee for Electrotechnical Standardization</td>
</tr>
<tr>
<td>CEPI</td>
<td>Confederation of European Pulp Industries</td>
</tr>
<tr>
<td>CEPMC</td>
<td>Council of European Producers of Materials for Construction</td>
</tr>
<tr>
<td>CML</td>
<td>Institute of Environmental Sciences, Leiden University,</td>
</tr>
<tr>
<td>CIB</td>
<td>Conseil International du Bâtiment; International Council for Building</td>
</tr>
<tr>
<td>CP</td>
<td>Cleaner Production</td>
</tr>
<tr>
<td>CSR</td>
<td>Corporate Social Responsibility</td>
</tr>
<tr>
<td>DEEP</td>
<td>Developing Effective and Efficient Product Information Schemes; project funded by EC/DG XII</td>
</tr>
<tr>
<td>EC</td>
<td>European Commission</td>
</tr>
<tr>
<td>ECMA</td>
<td>European association for standardizing information and communication systems, formerly: European Computer Manufacturers Association</td>
</tr>
<tr>
<td>EEA</td>
<td>European Economic Area</td>
</tr>
<tr>
<td>EEE</td>
<td>Electrical and Electronic Equipment</td>
</tr>
<tr>
<td>EFTA</td>
<td>European Free Trade Association</td>
</tr>
<tr>
<td>EIC</td>
<td>Euro Info Centre</td>
</tr>
<tr>
<td>EMAS</td>
<td>Eco-Management and Audit Scheme</td>
</tr>
<tr>
<td>EMS</td>
<td>Environmental Management System</td>
</tr>
<tr>
<td>EPA</td>
<td>Environmental Protection Agency</td>
</tr>
<tr>
<td>EPD</td>
<td>Environmental Product Declaration</td>
</tr>
<tr>
<td>EPIS</td>
<td>Environmental Product Information Scheme</td>
</tr>
<tr>
<td>ETSI</td>
<td>European Telecommunications Standards Institute</td>
</tr>
<tr>
<td>EU</td>
<td>European Union</td>
</tr>
<tr>
<td>EUEB</td>
<td>European Union Eco-labelling Board</td>
</tr>
<tr>
<td>EUROPEN</td>
<td>European Organisation for Packaging and the Environment</td>
</tr>
<tr>
<td>FIEC</td>
<td>European Construction Industry Federation</td>
</tr>
<tr>
<td>FME-CWM</td>
<td>Association founded by the merger of the Federation for the Metal and Electrotechnical Industry (FME) and the CWM Business Organization</td>
</tr>
<tr>
<td>FSC</td>
<td>Forest Stewardship Council</td>
</tr>
<tr>
<td>IPP</td>
<td>Integrated Product Policy</td>
</tr>
</tbody>
</table>
FPB  Forum of Private Business
HEC  Hautes Etudes Commerciales
INEM International Network for Environmental Management
ISO  International Organisation for Standardisation
LCA  Life-cycle assessment
LCI  Life-cycle inventory
LCT  Life-cycle thinking
LCM  Life-cycle management
NCC  National Consumer Council of the UK
NGO  Non-governmental organisation
NVTB Nederlands Verbond Toelevering Bouw
PCR  Product Category Rules
PEFC Pan-European Forest Certification
POEMS Product-Oriented Environmental Management System
PSR  Product-specific requirements
RTD  Research and Technological Development
SC  Sustainable Consumption
SME  Small and medium-sized enterprise
TNO  Netherlands Organisation for Applied Scientific Research
UEAPME the European Association of Craft, Small and Medium-sized Enterprises
UNEP United Nations Environment Programme
WEEE Waste Electrical and Electronic equipment
WWF  World Wide Fund For Nature
WOK  Wet Openbaarheid Productie en Ketens (Dutch)
11. Authentication

Name and address of the principal:
EU DG Environment
Brussels

Names and functions of the cooperators:

- TNO (The Netherlands)
  - A. Ansems
  - S. van Leeuwen

- Leiden University
  (The Netherlands Institute of Environmental Sciences (CML))
  - J. Guinée

- Ecobilancio Italia S.r.l (Italy)
  - P. Frantl

Date upon which, or period in which, the research took place:

Signature: Approved by:

Ir. A.M.M. Ansems                    Ir. H.S. Buijtenhek
Project Leader                      Head of Department
TNO-report

B&O-A R 2005/326

Making Life-Cycle Information and Interpretative tools available

- Appendices -

Date November 2005

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  - J. Guinée
- Ecobilancio Italia S.r.l (Italy)
  - P. Frankl

Order no. 36192.01.01

Keywords Life-Cycle Thinking
Awareness
Promotion
Tools
Communication

Intended for EU DG Environment
Brussels

Please note that this study has been undertaken for the European Commission but that it does not necessarily represent the views of the Commission on any of the subjects covered in this report.

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Appendices

1. Respondents market survey - Providers
2. Respondents market survey - Promoters
3. Full report market survey
4. Workshop report
5. Questionnaires for retail/consumer organisations
6. Respondents questionnaires retail/consumer organisations
7. EMS Speedometer
Appendix 1 Respondents market survey - Providers

Total list of companies/organisations contacted for the survey.

The combined telephonic (/written) survey was conducted in April 2004. The survey was announced with a letter, including a return fax on which the potential respondents could indicate their availability. At least three attempts were made to contact every company/organisation. Potential respondents who could not be reached by phone or indicated that they preferred a written or digital survey have been sent a written or e-mail questionnaire.

Companies/organisations marked with - ● - in the table are the respondents in the market survey of providers.
Companies/organisations marked with - * - responded too late, their responses were not included in the final report of the market survey (appendix 3).

<table>
<thead>
<tr>
<th>Company/Organisation</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anonymous</td>
<td>●</td>
</tr>
<tr>
<td>Department of Public Works and Services</td>
<td>Australia</td>
</tr>
<tr>
<td>Institute for Product Development</td>
<td>Denmark</td>
</tr>
<tr>
<td>KCL - Oy Keskuslaboratorio - Centrallaboratorium Ab</td>
<td>Finland</td>
</tr>
<tr>
<td>Ecobilan Price WaterhouseCoopers</td>
<td>France</td>
</tr>
<tr>
<td>DIS Informationssysteme GmbH</td>
<td>Germany</td>
</tr>
<tr>
<td>Ifeu - Institut für Energie- und Umweltforschung Heidelberg</td>
<td>Germany</td>
</tr>
<tr>
<td>Institute of Energy Economics and the Rational Use of Energy (IER)</td>
<td>Germany</td>
</tr>
<tr>
<td>Öko-Institut</td>
<td>Germany</td>
</tr>
<tr>
<td>University of Stuttgart (IKP)</td>
<td>Germany</td>
</tr>
<tr>
<td>University of Stuttgart (IKP)/PE Product Engineering GmbH</td>
<td>Germany</td>
</tr>
<tr>
<td>NEC Corporation</td>
<td>Japan</td>
</tr>
<tr>
<td>Japan Environmental Management Association for Industry (JEMAI)</td>
<td>Japan</td>
</tr>
<tr>
<td>NRI Nomura Research Institute Ltd.</td>
<td>Japan</td>
</tr>
<tr>
<td>Institute of Environmental Sciences (CML)</td>
<td>Netherlands</td>
</tr>
<tr>
<td>Institute of Environmental Sciences (CML)2</td>
<td>Netherlands</td>
</tr>
<tr>
<td>Stichting Bouwresearch (SBR)</td>
<td>Netherlands</td>
</tr>
<tr>
<td>TME, Instituut voor Toegepaste Milieu-Economie</td>
<td>Netherlands</td>
</tr>
<tr>
<td>TNO Industrial Technology</td>
<td>Netherlands</td>
</tr>
<tr>
<td>PRé Consultants bv</td>
<td>Netherlands</td>
</tr>
<tr>
<td>Assess Ecostrategy Scandinavia AB</td>
<td>Sweden</td>
</tr>
</tbody>
</table>

1 Two responses were received from IKP.
2 From CML we also received two responses (because two software packages of CML were included in the survey).
Company/Organisation | Country
--- | ---
CIT Ekologik (a division of Chalmers IndustriTeknik) | Sweden
CPM, Centre for environmental assessment of Product and Material system | Sweden
Nordic Port AB | Sweden
Carbotech | Switzerland
Sinum AG. EcoPerformance Systems Swedish | Switzerland
Boustead Consultancy | UK
PIRA International | UK
EPA - U.S. Environmental Protection Agency | USA
Green Design Institute | USA
NIST - National Institute of Standards and Technology, Building and Fire Research Laboratory (BFRL) | USA
Sylvatica | USA

Response justification

An overview of the composition of the sample.

Participating countries:

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of interviews</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Netherlands</td>
<td>6</td>
<td>29%</td>
</tr>
<tr>
<td>Sweden</td>
<td>4</td>
<td>19%</td>
</tr>
<tr>
<td>Germany</td>
<td>2</td>
<td>10%</td>
</tr>
<tr>
<td>UK</td>
<td>2</td>
<td>10%</td>
</tr>
<tr>
<td>USA</td>
<td>2</td>
<td>10%</td>
</tr>
<tr>
<td>Australia</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>Denmark</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>Finland</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>France</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>Switzerland</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
<td>100%</td>
</tr>
</tbody>
</table>
Profession:
- Director (2)
- General Manager
- Government Environmental agency
- Head of dept.
- Managing Director
- Marketing Manager Software
- Principal Consultant
- Product Manager
- Project Consultant
- Project Manager (5)
- Research scientist (3)
- Software Developer
- Teacher en Researcher
Appendix 2  Respondents market survey - Promoters

Total list of companies/organisations contacted for the survey

The combined telephonic(/written) survey was conducted in April 2004. The survey was announced with a letter, including a return fax on which the potential respondents could indicate their availability. At least three attempts were made to contact every company/organisation. For some countries with a low response, e.g. Italy, some additional attempts were made. Potential respondents who could not be reached by phone or indicated that they preferred a written or digital survey have been sent a written or e-mail questionnaire.

Companies/organisations marked with - ● - in the table are the respondents in the market survey of promoter/supporters.

<table>
<thead>
<tr>
<th>Name company/organisation</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bundesministerium fur Umwelt</td>
<td>Austria</td>
</tr>
<tr>
<td>ABB Italy</td>
<td>Belgium</td>
</tr>
<tr>
<td>Association of European Consumers (AEC)</td>
<td>Belgium</td>
</tr>
<tr>
<td>AIM - European Brands Association</td>
<td>Belgium</td>
</tr>
<tr>
<td>BLIC - European Association of the Rubber Industry</td>
<td>Belgium ●</td>
</tr>
<tr>
<td>BEUC - Bureau Européen des Unions de Consommateurs</td>
<td>Belgium</td>
</tr>
<tr>
<td>CECED - European Committee of Domestic Equipment Manufacturers</td>
<td>Belgium ●</td>
</tr>
<tr>
<td>CEPI - Confederation of European Paper Industries</td>
<td>Belgium ●</td>
</tr>
<tr>
<td>EEB - European Environmental Bureau</td>
<td>Belgium</td>
</tr>
<tr>
<td>EPE - European Partners for the Environment</td>
<td>Belgium ●</td>
</tr>
<tr>
<td>ESBA - European Small Business Alliance</td>
<td>Belgium</td>
</tr>
<tr>
<td>WWF (World Wide Fund for Nature) European Policy office</td>
<td>Belgium</td>
</tr>
<tr>
<td>Eurochambres</td>
<td>Belgium ●</td>
</tr>
<tr>
<td>EuroCommerce</td>
<td>Belgium ●</td>
</tr>
<tr>
<td>Euro Coop</td>
<td>Belgium ●</td>
</tr>
<tr>
<td>Federal Department of the Environment</td>
<td>Belgium</td>
</tr>
<tr>
<td>UEAPME – European Association of Craft, Small and Medium-sized Enterprises</td>
<td>Belgium</td>
</tr>
<tr>
<td>UNICE - Union of Industrial and Employers’ Confederations of Europe</td>
<td>Belgium</td>
</tr>
<tr>
<td>TerraChoice Environmental Services Inc.</td>
<td>Canada</td>
</tr>
<tr>
<td>DK-Teknik Energi&amp;Miljo</td>
<td>Denmark</td>
</tr>
<tr>
<td>Institute for Product Development</td>
<td>Denmark ●</td>
</tr>
<tr>
<td>Ministry of the Environment and Energy</td>
<td>Denmark</td>
</tr>
<tr>
<td>Danish Environmental Protection Agency</td>
<td>Denmark</td>
</tr>
<tr>
<td>Name company/organisation</td>
<td>Country</td>
</tr>
<tr>
<td>-------------------------------------------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Finnish Standards Association SFS - Environmental Labelling</td>
<td>Finland</td>
</tr>
<tr>
<td>Agency for Environment and Energy (ADEME)</td>
<td>France</td>
</tr>
<tr>
<td>CGPME - Confédération Générale des Petits et Moyennes Entreprises</td>
<td>France</td>
</tr>
<tr>
<td>FENNTISS - Fédération nationale du tissu</td>
<td>France</td>
</tr>
<tr>
<td>WWF - World Wide Fund for Nature</td>
<td>France</td>
</tr>
<tr>
<td>Deutscher Franchise-Verband e. V. Geschäftsführer</td>
<td>Germany</td>
</tr>
<tr>
<td>Hauptverbandes des Deutschen Einzelhandels (HDE)</td>
<td>Germany</td>
</tr>
<tr>
<td>IOEW Institut fuer Oekologische Wirtschaftsforschung</td>
<td>Germany</td>
</tr>
<tr>
<td>Umweltbudesamt</td>
<td>Germany</td>
</tr>
<tr>
<td>PERPA - ASAOS</td>
<td>Greece</td>
</tr>
<tr>
<td>The Icelandic Fisheries Laboratories</td>
<td>Iceland</td>
</tr>
<tr>
<td>ISME - Irish Small and Medium Enterprises Association</td>
<td>Ireland</td>
</tr>
<tr>
<td>National Standards Authority of Ireland NSAI</td>
<td>Ireland</td>
</tr>
<tr>
<td>Agenzia per la Protezione dell’Ambiente e per i Servizi Tecnici (APAT)</td>
<td>Italy</td>
</tr>
<tr>
<td>ANPA – National Agency for the Protection of the Environment</td>
<td>Italy</td>
</tr>
<tr>
<td>CONFAPI - Italian Confederation of small and medium-sized industry</td>
<td>Italy</td>
</tr>
<tr>
<td>Japan Consumers Association (JCA)</td>
<td>Japan</td>
</tr>
<tr>
<td>Japan Environmental Management Association for Industry (JEMA)</td>
<td>Japan</td>
</tr>
<tr>
<td>Research Centre for Life Cycle Assessment, AIST</td>
<td>Japan</td>
</tr>
<tr>
<td>NHO - Confederation of Norwegian Business and Industry</td>
<td>Norway</td>
</tr>
<tr>
<td>Hoofdbedrijfshap Detailhandel</td>
<td>Netherlands</td>
</tr>
<tr>
<td>Ministerie Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer (VROM)</td>
<td>Netherlands</td>
</tr>
<tr>
<td>MKB-Nederland</td>
<td>Netherlands</td>
</tr>
<tr>
<td>RIVM - National Institute for Public Health and the Environment</td>
<td>Netherlands</td>
</tr>
<tr>
<td>Stichting Milieukeur</td>
<td>Netherlands</td>
</tr>
<tr>
<td>Vereniging FME-CWM</td>
<td>Netherlands</td>
</tr>
<tr>
<td>VNO-NCW (Confederation of Dutch Industry and Employers)</td>
<td>Netherlands</td>
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<td>Portugal</td>
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<tr>
<td>INETI - Centre for sustainable business development</td>
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<tr>
<td>ADELMIA</td>
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</tr>
<tr>
<td>Asociación Española de Normalización y Certificación (AENOR)</td>
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</tr>
<tr>
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<tr>
<td>Ministry for the Environment</td>
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### Name company/organisation

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<tr>
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<td>UK</td>
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<td>UK</td>
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<tr>
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<tr>
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</tr>
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<tr>
<td>Institute for Environmental Research and Education</td>
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<tr>
<td>INSTITUTE FOR LIFECYCLE ENERGY ANALYSIS</td>
<td>USA</td>
</tr>
<tr>
<td>National Institute of Standards and Technology</td>
<td>USA</td>
</tr>
<tr>
<td>RTI International</td>
<td>USA</td>
</tr>
<tr>
<td>The National Retail Federation</td>
<td>USA</td>
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<tr>
<td>US EPA (Environmental Protection Agency)</td>
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### Response justification

An overview of the composition of the sample.

### Participating countries:

<table>
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<tr>
<th>Country</th>
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<th>Percentage</th>
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<tr>
<td>Netherlands</td>
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<td>Germany</td>
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<tr>
<td>UK</td>
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<tr>
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</tr>
<tr>
<td>France</td>
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</tr>
<tr>
<td>USA</td>
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<tr>
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<tr>
<td>Ireland</td>
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<td>Denmark</td>
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<td>Finland</td>
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</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>31</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

* Including European Head Offices and European Union in Brussels
Profession:
- Advisor
- Advisor Environmental Affairs
- Advisor European Federation
- Advisor on environmental issues
- Co-coordinator of the EU Ecolabeling for Sweden
- Director (2)
- EPA expert
- Head of dept. Ecolabelling
- Policy coordinator
- Principal Policy Officer
- Project Manager
- Project Manager (2)
- R&D Director
- Researcher (2)
- Scientist
- Secretary General
- Secretary Environmental Issues
- Senior Researcher
- Standards Officer
- Wholesaler
Appendix 3  Full report market survey

On behalf of TNO, Market Vision has conducted an international market survey into the marketing mix strategies of both providers of LCA databases and software and promoters & supporters of life-cycle thinking.
“Marketing Strategies on Life-Cycle Thinking”

TNO MEP
(May-04)

TNO MEP
A.M.M. Ansems
S.M.H. van Leeuwen

Market Vision BV
Drs. Bastian Verhulst
Jan N. Mulder M.S.

Utrecht, 13 May 2004
This survey was conducted by Market Vision on behalf of TNO MEP
PREAMBLE

On behalf of mr. A.M.M. Ansems and mrs. S.M.H. van Leeuwen of TNO MEP, Market Vision has conducted an international market survey into the marketing mix strategies of both Providers of LCA databases and software and Promoters & Supporters of Life-Cycle Thinking.

Purpose of the survey is to obtain an objective, reliable and representative view on the marketing mix strategies used for the sale of LCA related products and services and for the active promotion of Life-Cycle Thinking by Promoters & Supporters. This report contains the results of the survey that was conducted in the month of April 2004.

This report has been written by the undersigned,

Drs. Bastian Verhulst

Utrecht, 13 May 2004
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EXECUTIVE SUMMARY

In April 2004, Market Vision has (on behalf of TNO MEP) conducted a telephonic survey among Providers of LCA databases and software as well as among Promoters & Supporters of Life-Cycle Thinking.

Purpose of the study is to obtain objective, representative and reliable information about the marketing strategies of Providers and Promoters & Supporters with respect to the use of LCA and Life-Cycle Thinking in general. In addition, expectations about the future have been collected.

The information has been collected by means of a telephonic survey in April 2004. In total 52 people have been surveyed. The results are based on 21 interviews among Providers and 31 interviews among Promoters & Supporters.

Prior to the fieldwork Market Vision and TNO MEP developed a survey, which consisted of both closed and open questions. The interviews were conducted with CATI.

Below a summary of the answers to the main research questions:

Product
- Providers offer a wide LCA product assortment to offer full service with respect to LCA;
- Within this full service concept providing LCA databases and software is facilitating other LCA related services. A quarter of the Providers state that providing LCA databases and software is their core business;
- LCA databases are generally updated every two years (65%). The same is true for LCA software (57%);
- LCA software is generally generic (89%);
- LCA databases are generally generic (65%). However, a substantial part of the databases is industry specific (24%).
**Distribution**

- The sales channel used most frequently by Providers is their Website (94%). Half of the Providers has its own sales department.
- Most important sales channel are their Website (41%) and the own sales force (35%).
- In April 2004 the average customer base of a Provider of LCA databases and software was 253 database licenses and 215 software licenses;
- Over the next two years Providers expect an increase of 30% for LCA database licenses and an increase to 59% for LCA software licenses;
- Providers focus on Europe, South Africa, North America and the industrial -nations in Asia and Middle America. Developing countries in Africa, Asia, South America and Middle America are not part of the target group of the Providers.

**Promotion**

- Providers mainly focus on convincing potential users with product features and hence the creation of brand preference. Only one of the Suppliers mentions the environmental aspect in its message; 
- Promoters & Supporters aim at the creation of awareness by actively communicating the end-user advantages and objectives of LCA.
- The Marketing mix, and in particular the promotion of LCA products and services by Providers and Promoters & Supporters, is hardly influenced by legislation.
- On average Providers use about 3,1 different media types. Most frequently used and most important types of media are: participating in *Fairs / Congresses / Conferences* (81%) and *Symposia of Theme days* (56%);
- On average Promoters & Supporters use 2,5 different types of media. They mainly use media where personal contact with the target group is key. These are *Fairs / Congresses / Conferences* (70%) and *Symposia of Theme days* (65%);
- On the markets supply side Promoters & Supporters aim their promotional activities at function groups within *Environmental management* (81%) and *Product Design* (75%). On the producing side fewer Promoters & Supporters pay attention to the function groups *Production Managers* (60%) and *Members of the Board* (50%). On the supply side almost two third of the Promoters & Supporters (63%) aim at influencing and informing *Purchasers*. 
• 21% Of the Promoters & Supporters indicates that the government subsidizes the purchase of LCA databases and software. Actually, these subsidies are awarded indirectly through Research & Development.

Prices and Tariffs

• The average price Providers ask for an LCA database license is € 1.285,-. The most expensive database license is offered at a price of € 3.000,-. A number of suppliers provides database licenses for free;

• The average price for LCA software packages is € 1.313,- per license. The most expensive license for LCA software is € 4.650,-. A number of licenses is offered for free;

• The average price Providers charge for an integrated LCA package is € 4.293,-. The most expensive integrated package is sold for € 8.000,-. The cheapest package is marketed for € 370,-;

• Providers could not answer the question about the price of an update for software. The tariffs that apply for licenses are also valid for the update to a newer version;

• The tariffs for extra support cannot be expressed as an average tariff. 60% Of the Providers indicates that they do not charge for extra helpdesk support;

• Most Providers of LCA databases and software offer discounted/budget versions. These versions are made available to educational institutions, industrial organizations and other non-governmental users of LCA;

• On average Budget versions are offered at a 73% discount. 39% Of Providers offers their budget version for free. The smallest discount is 25%.
Future Expectations

Providers

- In the short term Providers expect (3 to 5 years) the following developments:
  - Simplification and increased use, Harmonization and Standardization, Regulation and Broadening of LCA possibilities;
- With respect to the availability of LCA databases and software (3 to 5 years) four expectations come up. These are:
  - Increased quality, making Data publicly available, No changes and simplification of LCA tools
- When Providers are asked about their expectations with regard to prices, the majority indicates that they expect no changes.
- The majority (89%) of Providers expect to develop new LCA tools in the next 3 to 5 years.
- When Providers are asked about their expectations with respect to the development of new LCA databases and software (3 to 5 year) than 4 expectations are paramount. These are:
  - Customization, User-friendly user interfaces, Extension of possible use and the linking of LCA packages to other systems.

Promoters & Supporters

- When Promoters & Supporters are asked about their general expectations (3 to 5 years) than four expectations are paramount: These are:
  - Simplification and increased use, Broadening of use, Legislations and Increased popularity;
- The majority of the Promoters & Supporters expects an increase in the availability of LCA databases and software;
- The majority of Promoters & Supporters expects that prices will fall. This expectation is based on the following foreseen developments Added competition leads to lower prices and simplification will lead to lower prices as well;
• The majority of Promoters & Supporters indicates that they expect an increase in promotional activities.
• In the long term the additional use of LCA is paramount. Consumer demand for LCA will play a bigger role.
• More than half (56%) of the Promoters & Supporters expect that new LCA tools will be developed over the next 3 to 5 years.

The future of LCA is aimed at the development of LCA tools that can show the full impact of products – and in future services as well – on their environment. An important derived objective is to lower the threshold for using LCA. This is realized by emphasizing the user friendliness of LCA products. The LCA market therefore needs to transform from a product oriented market into a customer driven market. Legislation plays an important role in the stimulation and motivation to (1) making LCA databases publicly available, (2) maintaining databases and (3) developing a ‘common alphabet’ for the interpretation of the results of LCA. These developments will widen and deepen the LCA market. The widening of the market can be stimulated with a more pro-active approach of the market (reaching potential users with a low awareness) by Providers. The negative effect on R&D due to the pricing strategies of non-commercial Providers should also be noted.
INTRODUCTION

This report shows the results of an international telephonic survey into the Marketing strategies of both Providers and Promoters & Supporters of LCA\(^1\) products. It concerns the strategies that are aimed at the promotion of both individual LCA products as well as Life-Cycle Thinking in general. This integrated report contains the answers of both groups. Results of both groups are compared where applicable. Due to the limited sample it is not feasible to break down the quantitative results into different segments. The quantitative information with respect to expectations about future developments in the target group Promoters & Supporters has been analyzed for differences between government institutions and non-governmental institution. This analysis has not led to any noticeable differences.

Purpose and problem definition of the survey

The main purpose of the surveys amongst Providers and Promoters & Supporters of LCA is to attain market information for the Inception Report of TNO MEP. In particular Task 3: Main promoters of life-cycle thinking and their strategies\(^2\) formulated as follows:

‘The objective of task 3 is to identify the main promoters of life-cycle thinking (internal to the firm, developers of methodology, providers of tools and services) in industry and business and their marketing strategies.’

\(^1\) In this report LCA stands for Life Cycle Analysis.
\(^2\) Making Life-Cycle Information and Interpretative Information tools available: Korenromp & Van Leeuwen, 2004
Providers
Market Vision collects the information that enables TNO MEP to deliver the following information:

- Overview marketing strategies Providers.

In detail this survey contains questions with regard to the products, the promotion, the availability, the prices (tariffs) and cost prices of LCA databases and software, as well as the future expectations with regard to LCA databases and software.

Promoters & Supporters
Market Vision collects the information that enables TNO MEP to deliver the following information:

- Overview private promotion and support campaigns
- Overview public promotion and support campaigns and their scope

The survey among Promoters & Supporters shows with what means Life-Cycle Thinking is stimulated.

Target Groups
The survey has been conducted among Providers of LCA databases and software as well as Ministries, Industrial associations and Consumer groups and similar organisations in this report described as Promoters & Supporters. It concerns an international survey focused on Europe and completed with responses from the United States, Japan and Australia. All respondents have been interviewed in either Dutch or English.
Set up and execution of the survey

The necessary information has been collected with a combined telephonic/written survey. Potential respondents who could not be reached by phone or indicated that they preferred a written or digital survey have been sent a written or e-mail questionnaire.

Execution of the survey

The survey has been executed by Computer Assisted Telephonic Interview, (CATI) survey. Beforehand, the target group has been approached with a written announcement asking them to participate in the telephonic survey. The survey has been developed in cooperation with TNO MEP. The target group has been approached during office hours. The survey was conducted in April 2004.

Response

In total 52 respondents have been interviewed (21 Providers and 31 Promoters & Supporters)

The reliability and accuracy of the results

Reliability is a measure of the probability that the sample is representative for the entire population. Market Vision normally uses a reliability percentage of 95,0%. In other words, the chance that a conclusion, based on this survey, is true for the entire population is 95%.

The accuracy of the statements depends on the sample size. In this case a sample was drawn from the population. With a net sample of 21 Promoters, we can say with 95% certainty that a value of $p = 50\%$ (the percentage in the sample that has a certain opinion) does not deviate more than 19,5% from the percentage that is true for the population. For Promoters & Supporters a sample of 31 completed surveys has a deviation of 18% maximum.
Report

In the following chapters we discuss the results of the survey. As indicated before, this report is an integrated report showing both the results of the Provider survey and the Promoter & Supporter survey.

The first chapter concerns the product strategy of Providers of LCA. Chapter II concerns the sales channels used by Providers. Chapter III contains the promotional activities and strategies of both Providers and Promoters & Supporters. Chapter IV discusses the price strategies of Providers. The expectations about future developments are listed in chapter V. The last chapter (VI) contains conclusions based on the first five chapters.
I. PRODUCT

With the determination of the product strategy of Providers of LCA products and services, this study focuses on the extension of the assortment. In other words, how many product groups do LCA Providers offer? In addition this chapter discusses various product features. We discuss the following items:

1. Product assortment
2. LCA databases and software as core business?
3. Development of new LCA databases and software
4. Generic or Industry focused LCA databases and software

1.1 Product assortment

Within the product strategy of LCA Providers the provision of LCA software appears to be the main activity. 95% of all Providers indicates that they offer LCA software. In other words, 5% of the Providers of LCA do not offer any software, but do offer LCA related products such as databases or consultancy. The fact that most Providers do not choose to specialize in one of the products or services, can be derived from the fact that most Providers offer in addition LCA databases (85%), LCA related studies (80%) and LCA related services (such as consultancy) (75%).
In addition almost half of the Providers (44%) offers other LCA related products. These LCA related products and services can be divided into five product groups:

- Training and Seminars
- Paid / Subsidized Research
- Publications
- Books
- Education and diplomas

Providers have a wide LCA product assortment through which they strive to offer a full service LCA product range.
1.2 LCA databases en software as core business?

The results described in the previous paragraph show that the sale of LCA databases and software form the basis for the provision of a wide assortment of derived LCA products and services, such as for instance consultancy and / or the provision of Training and Seminars. The sale of LCA databases and software is the basis for other LCA activities, but is only for a small part of the Providers its core business. For most of the Providers (75%) the sales and development of LCA databases and software is not their core business. The development and sale of LCA databases and software however facilitates LCA related turnover.

![Figure 2: core business](image-url)
1.3 Development of new LCA databases and software

When looking at the future expectations of Providers and Promoters & Supporters, it appears that the expectations about new LCA databases and software are high. Both Providers and Promoters & Supporters expect important developments shortly. In other words, the market for LCA is in motion.

To obtain an impression of how rapid these developments have been in the past years we analysed the average period between two versions, of both LCA databases and LCA software.

The results show that the majority of the Providers offers a newer version / update of both the database(s) (65%) and the software (57%) every two years. A minority of Providers indicates that, on average, they update their database (29%) and software (21%) annually.
1.4 **Generic or Industry focused LCA databases and software**

A small minority of the software appears to be (5%) industry specific. A similar number (5%) of Providers offers both generic and industry specific software. This means that 89% of the software can be described as generic.

With respect to LCA databases the distribution is different. Of all Providers of databases almost a quarter specializes in the development and sale of industry specific databases (24%). One out of every eight Providers offers both generic and industry specific databases (12%). A majority of 65% focuses completely on the development and sale of generic databases.

![Generic or industry specific LCA products](image)

Figure 4: generic or industry specific LCA databases and software

Those Providers that focus on the development and sale of one or more specific industries target the following industries:

- TV sets / Vacuum cleaners / Ventilation Systems / Lighting / Mobile phones / Furniture / Electronic devices / Steel / Iron / Electronic Devices
- Plastics / Chemicals / Steel / Building
- Manufacturing, Agriculture, Building, Automotive, Transport and plastics
- Forest Industry
- Electronic products
• Building / Construction
• Automotive / Energy / Chemistry / Transport / Retail / Electronics / Renewable resources / Building
• Automotive / Metal / Electronics / Chemistry / Energy
II. DISTRIBUTION

The choice of the distribution channel largely determines marketing activities. A Provider may for instance decide to deliver directly to end-users. Therefore, the product offering, the pricing and the marketing communication will be completely different.

The choice of a distribution channel also has a long-term effect, as such a choice often is a final choice that cannot be overturned easily. For a better understanding of the distribution channels used by Providers (LCA databases en software) we discuss the following topics:

2.1 Sales channels
2.2 Primary Sales Channels
2.3 Customer base
2.4 International Sales

2.1 Sales Channels

Typically for the sales of industrial products, distribution channels are short as the number of potential (LCA) customers is limited. Moreover, the salesperson of LCA products and services must have sufficient technical knowledge in order to sell the products. It can therefore be expected that Providers of LCA databases and software sell through their own sales force. In order to determine if selling directly is the main instrument for selling LCA database and software, we have made an inventory of the distribution channels.

The results show that Providers almost unanimously (94%) use their Website to distribute LCA databases and software. Providers indicate that customers can order databases and software without any personal interaction. In most cases they can simply download the product from the website. Direct sales, like with a sales force, is being used by 50% of the Providers, while 44% of the Providers uses Partners / Resellers to distribute their products.
Almost 40% of the Providers (39%) indicates that they use “other” sales channels as those that they could choose³.

³ Appendix II
2.2 Major Sales Channels

The impersonal distribution through the Website (41%) and the personal distribution through the Sales department (35%) are apparently not only the most used, but also the main sales channels.

Figure 6: main sales channels
2.3 Customer base

In order to quantify the size of the customer base of an average Provider, we have asked Providers to indicate the number of license holders of software and/or databases.

In April 2004 the average customer base was 253 database licences and 215 software licences. The largest customer base contained 1,000 database licences. The smallest number of database licenses was 50. The distribution of the software licences was similar.

In order to visualize the customer base we show in the figure below the average size two years ago and the prediction for the development in the next two years as made by the Providers. The future expectations illustrate a further growth of the number of licences.

Providers expect that growth will continue in the near future. They expect a growth of 30% for databases software and a growth of 59% for the number of software license holders.

Figure 7: development customer base
2.4 International sales

The distribution of LCA databases and software is an international affair. Providers indicate that they are not limited by national borders and distribute their products worldwide.

Providers indicate that they focus on Europe, South Africa, North America and the industrial nations in Asia and Middle America. Developing countries in Africa, Asia and South America are not within their target group.

Promoters & Supporters are – rather than Providers of LCA products – tied to national borders. Only one out of every eight Promoters & Supporters indicates that they have a budget for international promotional activities with respect to Life Cycle Thinking and Life Cycle Analysis.

![Figure 8: international promotion by Promoters & Supporters]
III. PROMOTION

One of the pillars of the Marketing Mix of Providers of LCA products and services is the way they promote LCA products and services. For this study “promotion” is defined as all those activities that contribute to additional sales or to the value of LCA products and services.

The following topics are reviewed:

3.1 Message
3.2 Legislation
3.3 Media
3.4 Target group: Promoters & Supporters
3.5 Awarding LCA related subsidies

3.1 Message

Providers have been asked to give a short description of their message (advantages, product features) they use to convince potential users of the value of their LCA products and/or services.

Message Providers

In response to the question to give a short description of the marketing message, most Providers focus on 3 types of values/features of LCA products:

0. Focus on the product features of the LCA products and services. This concerns the completeness, the expertise, the scientific base and the experience behind the development of the products. Also the possibility to exchange information between the different software programs, the possibility to have different organizations work together and finally, the scale on which the Provider operates are mentioned.
1. Focus on the results / product advantages of their specific LCA products. The product advantage most frequently mentioned is user friendliness and transparency. This is directly followed by speed and ease of use of the LCA product. Another feature (significantly less frequently mentioned) is the flexibility of the product. (‘Powerful in the number of different scenarios’).

2. The product features and advantages for the end-user can be translated into the core values of the products. However, a minority of the Providers only makes this translation. Two Providers actually translate the product features and the advantages into such core values. These Providers focus on the optimisation of profits by linking (1) the use of LCA, (2) environmentally friendly production and (3) optimising profits.

Noticeably only one of the Providers uses a message with the environment as the core value. Providers typically focus on the product features to create a preference for their brand. This form of marketing communication is typically used in a market where the potential user of the product already knows the product and not in a market (for LCA products) that only has a low level of awareness. Here the focus should be on creating awareness by actively promoting the core values and goals of LCA, such as cost advantages and image advantages (environmental friendly organization). This role may be filled in by Promoters & Supporters of Life-Cycle Thinking.
Message Promoters & Supporters

In their response to the question to give a short description of their marketing message, Promoters & Supporters almost unanimously focus on the core values and advantages related to the use of LCA products:

1. Promoters & Supporters do not focus on the product features of the use of LCA products and services.

2. Promoters & Supporters do not put any focus on the results / advantages to the use of LCA products and services.

3. Based on the product features / product advantages core values and advantages can be communicated to end-users. The majority of Promoters & Supporters make this translation, as opposed to the Providers who don’t do that. They focus in particular on the responsibility of the potential users of LCA products with respect to environmentally friendly production and link this to economic advantages. These economic advantages concern the three following core values and advantages:

   a. Cost reduction. This focuses on the reduction of production costs, social costs and environmental costs.

   b. To enhance the value of products by communicating the use of LCA to end users and thus creating new ‘market opportunities’ and optimising profits.

   c. Environmentally friendly production must be seen as a company’s responsibility toward the environment and the use of LCA contributes to this.

While Providers of LCA products almost completely focus on product features to convince potential buyers (and creating brand preference), Promoters & Supporters focus on the creation of awareness by actively communicating the core values and advantages of LCA. For
instance, they focus on realizing cost advantages or realizing a positive effect on the image of an organisation (environmental responsibility).

Creating awareness is essential for extending the use of LCA. Providers of LCA products however do not contribute to this goal with their marketing message. Promoters & Supporters do have the creation of awareness among potential new users (and so the use of LCA) as their main goal.
3.2 Legislation

To determine if legislation can be used in the marketing communication and to see if this can influence the marketing mix, we have asked if there is any legal obligation to use LCA. The majority of both Providers and Promoters & Supporters indicates that in their country there is no legislation with respect to the use of LCA.

Figure 9: Law concerning LCA - Promoters & Supporters

Figure 10: Law concerning LCA - Providers
Respondents who indicate that there is legislation with respect to the use of LCA live in The Netherlands and the USA. One of these respondents indicates that the USA has a “farm bill” for using LCA. The attention that both Providers give in their promotion of LCA varies from No attention to More attention - compared to the attention for product advantages and product features of LCA products.

We can conclude that the marketing mix (and in particular the promotion of LCA products and services) is hardly influenced by legislation.

3.3 Media

To determine through which media Providers and Promoters & Supporters use for their marketing communication, a choice of six types of media was given. In this paragraph we discuss the media types used by Providers and Promoters & Supporters.

Media types used

Providers use on average 3,1 different media types. Most frequently used media are the participation in Fairs/ Congresses / Conferences (81%), Symposia of Theme days (56%) and the use of Direct Mail (73%). Direct Mail is typically used for existing customers and others that are already part of the network. Direct Mail is hardly ever used to approach (cold) prospects.

Promoters & Supporters use fewer media types. Promoters & Supporters use on average 2,5 different types of media. Just like the Providers they typically use media, which focus on a personal contact with the target group. Just like with the Providers the media types are Fairs / Congresses / Conferences (70%) and Symposia or Theme days (65%).
Most important media types

The majority of Providers (55%) indicate that the focus with regard to the promotion of LCA products is on Internet campaigns and the Website. This mostly concerns information that is available on the website for interested parties and is not pro-actively or personally promoted to potential users and other interested parties. A quarter of the Providers (27%) indicates that the Direct Mail / Brochures are the most important media for the promotion of LCA products. Fairs / Congresses / Conferences are only for 18% of the Providers the most significant media type.

Some of the Promoters & Supporters indicate more than one media type as most important. For Promoters & Supporters Fairs / Congresses / Conferences is the most important media type. Remarkable is the portion of the Promoters & Supporters (33%) that indicates that they favor another type of media. This includes for instance: book publications, reports and articles.
3.4 Target groups Promoters & Supporters

Industries
In the next section you will see an overview of the target groups of Promoters & Supporters for the promotion of Life-Cycle Thinking. In addition to the Promoters & Supporters that follows a generic approach, a substantial part of the Promoters & Supporters follows a specific, function oriented approach not limited to particular industries. They include among others: Buyers, Consumers in general and Politicians.

Functions
Promoters & Supporters spontaneously came with function groups, when asked if they were targeting particular industries. In addition to this spontaneous information, we have also asked them specifically which function groups they target.

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*For a complete overview of industries we refer to Appendix 2.*
The results show that Promoters & Supporters target various function groups with their communication. On the production side of the market for Life-Cycle Thinking, Promoters & Supporters target function groups in Environmental management (81%) and Product Design (75%). Less attention is given to function groups like Production Managers (60%) and Member of the Board (50%).

Almost two third of the Promoters & Supporters (63%) tries to influence and inform the buyers on the demand side.
3.5 Awarding LCA related subsidies

21% of the questioned Promoters & Supporters indicates that the government provides subsidies for the purchase of LCA databases and software. While 58% indicates that their country does not award any subsidies for the purchase of LCA databases and software. More than one fifth of the surveyed Promoters & Supporters (21%) indicate that they were not aware of any subsidies for purchasing LCA databases and software.

![Governmental subsidies for the purchase of LCA databases and software](image)

Figure 14: subsidies for purchasing LCA databases and software

The answers to the question when these subsidies are awarded show that it mostly concerns indirect subsidies through Research & Development. These subsidies are indirectly awarded through:

- Through research (USA)
- In financing research (Portugal)
- Integrated in public R&D financing (Netherlands)
- By subsidizing the development of databases and software (Netherlands)
IV. PRICES EN TARIFFS

An important part of the marketing mix is the Prices and Tariffs charged by Providers when marketing their LCA products. In order to analyze the pricing, we have listed the average purchase prices for LCA databases and software.

We discuss the following items:

4.1 Prices of LCA databases and software
4.2 Price for an update / subscription
4.3 Tariffs for extra support
4.4 Discount versions

4.1 Prices of LCA databases and software

Next we discuss the Prices / Tariffs used for databases, software and software packages including the price of a database.

LCA Databases

Providers have been asked to indicate the average price for the database(s) they market.

The average price Providers ask for a LCA database license is € 1.285,-.\(^5\)
The most expensive database license is sold for € 3.000,-.\(^6\)
A number of Providers offers free database licenses. These are not discount versions, but databases that are free available for interested parties.

\(^5\) The average price for databases, not counting free databases, is € 2.249,-.
\(^6\) Providers have been asked to indicate the average price of their LCA databases. When we speak of the most expensive database, we mean the highest price mentioned by the Provider.
LCA Software

Software Providers have also been asked to indicate their average price for the LCA software packages they market.

The average price a Provider asks for an LCA software package is € 1,313.7 per license.

The most expensive license for LCA software is € 4,650.8.

Also for software packages, some licenses are for free. This does not concern discounted version, but packages freely available for interested parties.

Integrated LCA packages

In practice a number of Providers offer integrated packages. They offer software packages with the price of the database included. Hence we also show a listing of these integrated LCA products.

The average price Providers ask for integrated LCA packages is € 4,293.2.

The most expensive integrated package is marketed for € 8,000.9.

The least expensive version costs € 370.2. It does not concern a discounted version, but an integrated package available at this price for all interested parties.

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7 The average price for LCA databases, not counting free LCA software, is € 1,750.
8 Providers have been asked to indicate the average price of their LCA software packages. When we speak of the most expensive software package, we mean the highest price mentioned by the Provider.
9 Providers have been asked to indicate the average price of their integrated LCA packages. When we speak of the most expensive integrated software package, we mean the highest price mentioned by the Provider.
4.2 Price Update / Subscription

The question about the price for an update of the software could not be answered as users typically buy a new license when a new LCA software package becomes available. The tariffs in the last paragraph for LCA software are therefore also valid for updates for newer versions.

The average price for updating an LCA database update is € 977,-\(^{10}\)

The most expensive database costs € 2,500,-.

The cheapest update is offered for free.

4.3 Tariffs for Extra Support

The tariffs for extra support cannot be expressed as an average tariff. 60% of the Providers indicates that extra support, like a helpdesk, is for free. In one case extra support must be paid for (helpdesk function). This Provider charges € 2,300,- annually.

Costs for support on-location, for instance in the form of training are charged against an hourly tariff. These tariffs vary from € 800,- per day to € 1,000,- per day.

\(^{10}\) The average price for an LCA database update, not counting free LCA database updates, is € 1,085,-
4.4 Discount Versions

Most Providers of LCA databases and software appear to offer discount versions.

Such versions are provided for the following types of organizations:

- Educational institutions: most Providers provide free LCA databases and software for universities and colleges. Students and faculty do not have to buy a license, but are asked to give feedback on the results of Life Cycle Assessments performed with those products.

- Industrial organizations and non-commercial users of LCA: discounted versions are provided for free by a number of Providers. One Provider answered: “Goal are Small and Medium Enterprises companies who want to demonstrate LCA. Our goal is to create Word-of-Mouth and free publicity for LCA in general and our products through these channels”

![Figure 15: discount versions](image)

Discount versions are offered on average at a discount of 73%. 39% of the Providers offers the discounted version for free. The smallest discount was 25%.
V. FUTURE EXPECTATIONS

One of the features of a onetime market survey is that it is a snapshot in a dynamic market. By listing future expectations, we can quantify the expectations about the future dynamics in the market. We have asked both Providers and Promoters & Supporters about their expectations for the development of LCA and Life-Cycle Thinking.

This chapter discusses the following topics:

5.1 Future expectations Providers
5.2 Future expectations Promoters & Supporters

5.1 Future expectations Providers

Expectations with regard to Life Cycle Analysis in 3 to 5 years.

Providers have been asked to give their expectations about future developments in the short term (3 to 5 years). Four major developments came up. It concerns the following developments:

1. Simplification and extended use
   The expectation most often mentioned is that LCA will become accessible to a larger group of potential users. Providers indicate that presently an abundance of methods exists and that potential users presently need to know too much about the software in order to be able to use it. The expected standardization of LCA and LCA protocols, as well as the development of LCA packages for Small and Medium Enterprises, will lead to increased use of LCA. More companies will use LCA in the next three to five years for more products.
2. Harmonization en Standardization

According to Providers the standardization and harmonization of LCA is an important precondition for increased use of LCA. This standardization and harmonization is expected soon through an IPP document. One Provider indicates that this is essential and that national governments must stop their local thinking and must realize that Life Cycle Thinking is a worldwide affair.

3. Regulation

A number of Providers expects that the IPP document will stimulate the focus on Life Cycle Analysis. They expect that regulation following out of the IPP document will make Life Cycle Analysis a common part of product development.

4. Extended application

In addition to the general expectation with regard to the use of LCA, a number of Providers also expressed their expectations with regard to the use of the LCA products. These developments concern the extension of the use of this product. In particular they mention the measurement of Land use effect and Toxological Modeling, the integration of Costing and Social Issues, as well as the use of Hybrid LCA

*Expectations with regard to the offering of LCA database and software in the next 3 to 5 years.*

When Providers are asked to predict future developments about the availability of LCA databases and software (3 to 5 years) four expectations stand out. These expectations are:

1. Enhanced Quality

Most frequently mentioned is the expectation that the quality of LCA databases will increase due to increased knowledge about LCA and increased experience with LCA. In addition increased transparency of the data and increased public availability of LCA databases. Condition for this positive quality development – with regard to LCA databases – is that the industry realizes that LCA databases must be kept up to date due to the dynamic nature of the data. Various Providers indicate that the industry presently unjustly assumes that a single investment is sufficient.
2. Make Data publicly available
   The availability of data is a precondition for quality development. Part of the Providers expects that LCA will become publicly available. This availability makes it possible to harmonize the data and combine national databases into a highly qualified product.

3. No change
   Part of the Providers does not expect any changes in the short term. This is particularly so for expectations with regard to LCA software.

4. Simplification of LCA tools
   Contrary to some Providers who indicate that they do not expect any changes, other Providers indicate that they expect that LCA tools will soon become more user friendly. With such developments these Providers expect to anticipate the changed needs from (potential) users of LCA databases and software.

Expectations with regard to prices of LCA databases and software in the next 3 to 5 years.

When Providers are asked about their expectations of future developments the majority indicates that they do not foresee any changes. Those Providers that do indicate to expect a lower price, base their expectations on expected Economies of scale and the simplification of LCA packages.
Expectations with regard to the development of new, other databases and software for Life-Cycle Analysis in the next 3 to 5 years.

The majority (89%) of the Providers expects to develop new LCA tools in the next 3 to 5 years.

When Providers are asked to express their expectations about the development of new LCA databases and software (3 to 5 years) than four expectations stand out. These expectations are:

1. **Customization:**
   Providers expect to develop customized solutions for specific industries in the next three to five years.

2. **User-friendly user interfaces:**
   In response to the increased demand for ‘Easy to use, fast and quick’ LCA solutions, Providers will focus on the development of user-friendly user interfaces in order to enhance the accessibility.
3. **More expectations:**
   Providers will develop new tools so that next to the traditional Life Cycle Analysis also studies can be done into among others *Complete Environmental impact and Cost predictions.*

4. **Connecting LCA packages to other systems**
   In order to become an integral part of the production process, a number of Providers indicate that they will develop LCA tools that make it possible to connect LCA to other systems such as purchasing systems and administration packages.

*In the next paragraph we discuss the expectations expressed by Promoters & Supporters.*
5.2 Expectations of Promoters & Supporters

Expectations with regard to the development of Life Cycle Analysis in the next 3 to 5 years.

When Promoters & Supporters are asked about their expectations for the next 3 to 5 years about Lifecycle Analysis than four expectations stand out. These expectations are:

1. Simplification and extended use
   In correspondence with Providers – Promoters & Supporters expect that LCA will become available to a larger group of potential users. Promoters & Supporters indicate that the threshold to the use of LCA will be lowered in the next 3 to 5 years due to the following developments with regard to LCA databases and software:
   - Development of Easy to use LCA tools;
   - ‘Common alphabet for interpretation of LCA outcomes’;
   - Being able to perform simple LCA’s with ‘Fast track’ tools

2. Extended use
   In correspondence with Providers, Promoters & Supporters expect that the usability of LCA and the information LCA delivers increases. Compared to Providers, Promoters & Supporters have higher expectations about these developments. The expectations about the changes expressed, are comparable with those of Providers. Promoters & Supporters foresee the following changes in the coming years:
   - LCA will include – influenced by an All end attitude – all phases of the Product Life Cycle.
   - In addition this will also include:
     o Social aspects
     o Economic / cost aspects
     o Safety aspects
     o Complete environmental impact
3. **Legislation**

Part of the Promoters & Supporters expect in the relative short term (3 to 5 years) legislation with regard to the use of LCA. They indicate that the IPP plays an important role in this development. One Promoter & Supporter fears too much legislation. Reason, making the use of LCA obligatory will lead to an enormous administration and therefore higher costs.

4. **Increased Popularity**

In spite of the fact that Promoters & Supporters add a lot of conditions to the three (positive) developments, they remain positive about the future of LCA. They expect a wider and increased use of LCA.

*Expectations with regard to the availability of LCA databases and software in the next 3 to 5 years.*

When Promoters & Supporters are asked about their expectations about the availability of LCA databases and software in the next 3 to 5 years, they remain positive. Most Promoters & Supporters expect an increase in the availability of LCA databases and software.

*Expectations with regard to prices of LCA databases and software in the next 3 to 5 years.*

When Promoters & Supporters are asked about their expectations regarding the pricing of LCA databases and software (3 to 5 years) the majority of the Promoters & Supporters indicates that they expect the prices to sink. This expectation is based on the following expected development:

- Increased competition
- Simplification of packages

Promoters & Supporters that indicate to expect prices to rise do not agree with this and say prices go up due to:

- Due to the expected regulation the incentive for LCA Providers to develop new (cost efficient) products disappears
- Less competition will lead to increased prices
Expectations with regard to the promotion of LCA databases and software in the next 3 to 5 years.

When Promoters & Supporters are asked to express their expectations about the promotion of LCA databases and software (3 to 5 years), the majority indicates to expect an increase in the promotional activities. Two Promoters & Supporters indicates that this is caused by national governments and actions initiated by the European Union.

Long term expectations with regard to Life Cycle Analysis in 5 to 15 years time.

When Promoters & Supporters are asked about their long-term expectations (5 to 15 years) with respect to Life Cycle Analysis, the increased use of LCA continues. In the longer term the demand from consumers will play an increasingly big role in this development. This demand from consumers originates from a growing awareness with regard to LCA and the environmental impact of products and services.

Expectations about the development of databases and software with regard to Lifecycle Analysis in the next 3 to 5 years.

More than half (56%) of all Promoters & Supporters expects that within 3 to 5 years new LCA tools will have been developed.
When Promoters & Supporters are asked about their expectations with regard to the development of new LCA databases and software (3 to 5 years) than they express a great variety in expectations. Such expectations vary from expectations about the set up of the software, such as enhanced user friendliness, to expectations about LCA databases such as the necessity to develop consistent LCA databases. Anyhow Promoters & Supporters expect that these developments will be realized in the short term (< 5 years).

A complete overview of all expectation expressed by Providers and Promoters & Supporters is listed in Appendix II.
VI. CONCLUSION

LCA products are products and services that are bought and used by companies and organizations. They are used by these organizations in their own company processes. This market is formed by a relatively small number of (potential) buyers, a relatively high price level, an extensive need for information from the (potential) customers, an extensive purchase process and a large number of people involved in the purchase decision.

These market features require a specific market approach. The information need from potential customers is likely to ask for a sales format where personal contact and information transfer is key. In the part hereafter we discuss the different parts of the Marketing Mix Strategies of LCA Providers and Promoters & Supporters.

Product availability

Providers offer a wide range of LCA products in order to realize full service level. The full service character of the product offering assures a high level of service and typical a free helpdesk and free support by the Providers.

Both Providers and Promoters & Supporters expect that the product assortment will get an advanced and deeper character due to the development of new tools. Such tools will have a better user friendliness, and need less time and knowledge to execute an LCA. There will also be more customized solutions. The effect of this broadening and deepening is that it will lower the threshold for the use of LCA and enlarge the market for LCA.

Promotion strategy

Classical promotion generally has as its purpose to enhance turnover. By enhancing the value of the product or the service, or by lowering the price, the attractiveness of a product is temporarily enhanced.
This form of promotion however does not affect the attitude of (potential) customers with respect to (LCA) products. Classical promotion in the form of communicating action prices or discounts therefore does not combine with the objectives of LCA Providers and does not happen. The objectives of Providers are, in practice, aimed at enhancing the knowledge of (potential) customers. Noticeable is that this form of promotion has a reactive character. The reactive character of the promotion can also be derived by their most important media types: Internet campaigns and the (company) Website.

This media type is entirely aimed at (potential) customers who look for information. This is also true for Direct Mail / Brochures and Fairs/ Congresses Providers use to approach customers and relations but not potential customers, hence new turnover. In other words, Providers aim their promotion at the maintenance of existing contacts. Thus the Providers and the industry in general do not use the opportunity to convince new customers of the value of LCA and so grow the LCA market.

Where Providers of LCA products almost completely focus on reactively convincing (potential) buyers based on product features and the creation of brand preference, Promoters & Supporters aim at creating awareness. They do this by actively communicating the ultimate advantages and objectives of LCA and thus enhance the size of the market for LCA.

The present strategy of Providers can be typified as a penetration strategy: growth in the past years and expected future growth are realized from a growing market. This however concerns growth by selling more products in an existing growing market.

In addition to this present growth strategy, there is a growth potential among new potential users with a low current awareness level. The creation of awareness amongst this group of new users is essential for the further use of LCA.

Providers of LCA products do not contribute to this objective as can be derived from their marketing communication / message. Promoters & Supporters however do have the creation of awareness as a main objective in their promotional activities. In future,

Promoters & Supporters say they will use more of a pull strategy coming from consumers. Their promotional activities are aimed at creating awareness among consumers and other end
users. The increased awareness will lead to a demand for LCA by end-users. In order not to lose any customers, organizations are forced to perform an LCA and to make the LCA results available to consumers.

**Pricing strategy**

Due to the weaker economy, prices have become more important within the Marketing Mix Strategies of LCA Providers. The increased importance of pricing also follows from increased noticing of unfair competition by non-commercial Providers of LCA. Commercial Providers indicate that Universities and other non-commercial Providers of LCA pressure them. These non-commercial Providers offer their LCA products mostly for free. In combination with the trend:

"Interest is sinking because of economic reasons. Management cuts back on environmental investments. LCA will become more popular again when the economy rises again. LCA always is one of the first victims of cutbacks"

This leads to additional Providers who complain about unfair price competition due to free or budget versions. Ultimately this unfair pricing has a negative effect on R&D.

Notably commercial Providers of LCA products use discounted versions within their own pricing strategy. They link a promotional objective to this by spreading knowledge about their products and its specific product features.

**Distribution strategy**

Typically for industrial products, distribution channels are short. These markets concern a relatively small number of potential buyers of LCA products and the salesperson needs a lot of technical know-how in order to sell LCA products.

Personal sales are in practice not the most important means for selling. The conclusion about promotional media is also true for the distribution strategy. It is again
about the choice for a distribution channel (website) with a reactive character, aimed at already convinced interested parties and users. Future use of pro-active distribution channels (such as commercial partners / resellers) offer a chance to fasten the growth of the LCA market.

The future of LCA is aimed at the development of LCA tools, which can show the full impact of products – and in future services as well – on their environment. An important derived objective is to lower the threshold for using LCA. This is realized by emphasizing the user friendliness of LCA products. The LCA market therefore needs to transform from a product oriented market into a customer driven market. Legislation plays an important role in the stimulation and motivation to (1) making LCA databases publicly available, (2) maintaining databases and (3) developing a ‘common alphabet’ for the interpretation of the results of LCA. These developments will widen and deepen the LCA market.

The widening of the market can be stimulated with a more pro-active approach of the market (reaching potential users with a low awareness) by Providers. The negative effect on R&D due to the pricing strategies of non-commercial Providers should also be noted.

Market Vision advises, in support of the European objectives, to perform repeat research into the awareness development of potential users regarding LCA. In view of the transformation into a customer-oriented approach Market Vision also advises to perform a study into the needs of present and potential users. In addition we recommend repeating this study periodically in order to see any trends and to update decisions and adjust investments.
APPENDIX I  RESPONSE JUSTIFICATION

In this first Appendix an overview of the build up of the sample.

Promoters & Supporters

Participating countries

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<th>Country</th>
<th>Number of interviews</th>
<th>Percentage</th>
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<tr>
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<tr>
<td>Greece</td>
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<tr>
<td>Denmark</td>
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</tr>
<tr>
<td>Finland</td>
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<td>3%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>31</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

* Including European Head Offices and European Union in Brussels

Profession

- Advisor
- Advisor Environmental Affairs
- Advisor European Federation
- Advisor on environmental issues
- Co-coordinator of the EU Ecolabeling for Sweden
- Director (2)
- EPA expert
• Head of dept. Ecolabelling
• Policy coordinator
• Principal Policy Officer
• Project Manager
• Project Manager (2)
• R&D Director
• Researcher (2)
• Scientist
• Secretary General
• Secretary Environmental Issues
• Senior Researcher
• Standards Officer
• Wholesaler
Providers

Participating countries

<table>
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<tr>
<th>Country</th>
<th>Number of providers</th>
<th>Percentage</th>
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Profession

- Director (2)
- General Manager
- Government Environmental agency
- Head of dept.
- Managing Director
- Marketing Manager Software
- Principal Consultant
- Product Manager
- Project Consultant
- Project Manager (5)
- Research scientist (3)
- Software Developer
- Teacher en Researcher
APPENDIX II OPEN ANSWERS AND EXPLICATIONS

In this second Appendix an overview of all the answers to the open questions and all explications. The overview contains all answers literally. Where relevant, the country of the respondent is added.

Promoters & Supporters

What specific groups or industries does your organization target?

- Wide spectrum/ Building/ Packaging
- SME in all sectors
- Research Society/ Concerned and aware businesses
- Purchasers
- Politicians/Business organizations
- Paper industry
- Non-governmental/Consumer groups
- Members and trade associations/Central and local government/NGO's
- Generic approach (4)
- Fisheries / Chemicals / Forestry / Agriculture.
- European institutions/Consumers/Academia
- Consumers in the USA with Info Cards/ Producers/ Purchasers
- Consumer products and services except Food and Phone
- Consumer products
- Consumer cooperatives/ Retail
- Commerce associations/ Wholesaler associations
- All sectors but especially SME's
- 16000 members/ 20 different industries
- Metalworking industries / Industries with R&D function
Short version of the message (advantages and product features) you or your members
use to convince target groups of the value of Life Cycle Thinking and the use of Life Cycle Assessment

- We market our label based on LCA
- Use in product design, product policy and in end of life policy to get optimal environmental results; next step will be eco-coefficient policy and products
- To add value. Better products integrating in new products (LCA and Eco-design)
- The nature of packaging is that it cannot be assessed just as an item but has to be considered in the context of a system for delivering products in a supply chain. We can show that if changes are made to just one part of the life cycle then other parts of the life cycle are affected.
- Sustainable purchasing
- Relevance of the tool. We focus on realizing a program that enforces LCA Thinking not promoting it to individual companies
- Promotion of pollution prevention
- LCT reduces actual and future costs & risks, LCT might increase market opportunities
- Inform consumers on Ecolabels
- Hoofddoel is het wegbrengen van de perceptie van de doelgroep van het kijken naar 1 deel van de milieuproblematiek. Denk bijvoorbeeld aan luchtverontreiniging of het gat in de ozonlaag. Wij willen naar het bewustzijn en kijken naar de Bigpicture.
- Environmental: save the environment. Environment is good for your business in the long run because of reputation and image. Promotions of declaration. Diploma on products for B-to-B to see and use. It is a diploma on environmental impact of products.
- Environment and cost reduction
- Cradle to grave thinking when developing the Eco labeling criteria.
- It is a tool to focus on the most substantial environmental impacts in the life cycle of a product but it has also a indirect positive influence on the bottom line of a company if it is used correctly.
• Better knowledge of the environmental impact of a product throughout its life cycle + remedying measures taken / implemented + final results
• Beschrijvend en neutraal informeren over ontwikkelingen op het gebied van LCA. Kan dus ook negatief zijn. Niet automatisch een positief oordeel
• Implementing environmental aspects in product design

Other types of media used to promote LCA Thinking

• Kaarten met informatie (USA)
• Papers and publication (USA)
• Publication in journals (Germany)
• Influencing the political arena (Belgium)
• Reports (Sweden)
• School programs / education (Greece)
• Website (Norway)
• Regular commission meetings (Netherlands)
• Books & Reports (Germany)
• Word of Mouth (UK)
• Covenants (Netherlands)
• Economic Press (Portugal)
• Course Ecodesign (Netherlands)

What industries do you target in your communication?

• Tire industry, Automotive, Chemicals
• Several
• Influencing the political arena
• Producers of Electronic devices
• Packaging supply chain, Government
• Industries producing products for which an Eco label can be obtained
• Generic
• General approach, Politicians
• CTOC sponsoring, 50000 euro from federal funds, Scientific,
• Agrifood, Electronics, Textile
• Metalworking industries / Industries with R&D function

Other target functions within target group

• Scientists
• Politicians, Consumers
• Politicians
• Consumer organizations, Policy Makers
• Consumers

How and when does your government subsidize the purchase of LCA databases and software?

• Through research (USA)
• Integrated in public R&D finance (Portugal)
• In financing research (Netherlands)
• By subsidizing the development of databases and software (Netherlands)

Future expectations with regard to the development of LCA in the next three to 5 years?

• We hope that the concept of considering all parts of a lifecycle becomes mainstream. We believe the best way to achieve this is to limit assessments to mass and energy inputs and product and solid waste outputs, rather than complicate them with calculations of water and air emissions. We have concerns that there may be trends to amalgamate the findings of assessments into single figures or "ecological footprints" which we believe oversimplifies and may lead to inappropriate conclusions. (UK)
• Fear for a rigid legal structure. Concentrate on wider use. Distribution companies for instance cannot use it at this time. LCA should never be obligatory: enormous administration and related costs. No standardization. Undesirable. (Germany)

• Through the IPP we expect more in operation for the public procurement for the public (Greece)

• The LCA tool needs to be improved and extended to cover social/safety and economic aspects. It can’t stay with environmental considerations alone. (Belgium)

• Increase. All end attitude: understanding of cause and effect in early stage. This is and must be driven by middle management. (Sweden)

• Need for new models. Legislation is coming. Trigger new wants by making more industries sign letters of commitment. (Belgium)

• More popular in future (Japan)

• More LCT, less formal LCA, application of other methods (Germany)

• More extensively used. More standardization wanted and needed. Intergovernmental discussion on e.g. ecolabels. "What should be used and what not?" Make decisions on the standard to be used. Discussion between countries in extremely important. (UK)

• Main driver all over the world is the IPP document. With IPP LCA will be a requirement for product development. Not solely Danish initiatives, it is a international affair. (Denmark)

• LCA will show not to be totally useful because it is too time consuming. You need it for each product rather than for one group of products. So there is a need for an easy to use database. Then we believe in LCA thinking and Analysis (Finland)

• Integration of social and economical issues. Linkage with value analysis and best practice databases (Portugal)

• In the beginning reflection in IPP. LCA is a good tool but in the future we need a methodology that is accountable for organizations looking for common decisions. Today results lead to different decisions. There is no common alphabet for interpretation which leads to different interpretations based on the same results. (Belgium)

• I fear that LCA will be viewed as a powerful tool. It is relied upon too much, which leads to limitations. These limitations are being proven by governments and environmental groups. Sleek and simple is necessary and an objective for the coming years. Before this is realized we will see a lot of mistakes in the next years to come (Netherlands)
• Getting more important and therefore more discussion. In the future the whole life cycle of a product in the agenda. (Belgium)
• Further development: systematic approach
• Relation between social - economical and environmental aspects. Applicability: the whole system will be covered in the future. Fast track LCA will become more popular. LCA and Ecolabelling should broaden it’s scope: not only product related. Widen the scope. For example: don't only look at the product outcomes. (Germany)
• Focus on sustainable purchasing. Decision making. Give answer to environmental questions asked by purchasers (Belgium)
• Easier access to life cycle data. Public databases are needed. Improved method for impact modeling (USA)
• Better and simpler LCA systems which facilitates a wider implementation (Netherlands)
• Becomes more important. Simplification of the results. For procurement it is now to complex. Make main indicators on the few most important. (Norway)
• If Bush stays than I don’t expect any changes and it will go unchanged. Democrats show more interst. In effect very dependent on politics. Initiating of public databases is very important. With private input realizing national consistent databases that are all encompassing. Expect a lot from UNAP-SETEC efforts to realize a consistent framework. In the coming years the structure will fall into place, but the money is not. It must be federal funding because industry will not invest. (USA)
• A change to use LCA in a eco-efficient way
• Depends on EUP directive

Future expectations with respect to the offering of databases and software in the next three to 5 years?

• Few changes (USA)
• Further increase due to expected legislation. (Netherlands)
• Not sure, depends on whether assessment is limited to mass/energy flows (splitting energy into fossil and other) or includes air and water emissions. (UK)
• Increase (Germany)
• Increase (Netherlands)
• Increase (Finland)
• Huge increase (USA)
• Higher (Japan)
• Er zijn nog geen allesomvattende pakketten (alleen textiel) Er is nu een probleembewustzijn, maar moet in de komende jaren naar oplossingsgericht. Alleen Europa werkt overigens aan een compleet pakket. (Germany)
• Enhance (Netherlands)
• Easy access, best diffusion by public administrations (Portugal)
• Do not strive for a one for all solution. Not possible (Belgium)
• Depending on market demand. Emphasis on the availability of data. There are wholes in the data e.g. nuclear effect. More LCA-thinking for interpretation. (Sweden)
• A lot of promotion. We hope to get money from Danish APA (Denmark)
• Bad (Netherlands)

**Future expectations with respect to prices of databases and software in the next three to 5 years?**

• Prices down, because of amount of competing databases (Sweden)
• Not very good. Not enough competition. (Belgium)
• Lower prices (is essential) (Portugal)
• LCA light versions that are less cost intensive (Germany)
• Duurder door verwachte wetgeving. Geen prikkel meer voor producenten om verder te ontwikkelen (Netherlands)
• Drop significantly. Cost related to access to the data. If access is easier, costs will drop significantly. (USA)
• Down (Japan)
• Depends on level of complexity (UK)
• Decrease (Germany)
• Decrease because of economies of scale (5 years) (Denmark)
• Decrease (Netherlands)
Future expectations with respect to the promotion of LCA databases and software in the next three to 5 years?

- Will increase by governmental actions and by UNEP/SETAC Life cycle initiative (Netherlands)
- Wider spread. Awareness will increase among the large retailers. Small organizations have no idea because they do not produce themselves. Medium sized have no idea when they do not produce. (Belgium)
- Stable (Germany)
- Onderdeel van ISO-normering en promotie aangaande ISO. (USA)
- More easily (Japan)
- It would be useful to utilize it on EU projects (Portugal)
- Intensiveren (Netherlands)
- Increase. More resources will become available. (Norway)
- Increase, but no change in the message (UK)
- Increase (Finland)

Future expectations with regard to the development of LCA in the long run (5 to 15 years from now)?

- Whole. Public authorities use it in everything. But also like private companies like schools, hotels for buying. End-user will start to use for buying products. (Greece)
- On a limited scope letters of commitment, this will continue over the next 15 years. Effective enforcement of legislation is not possible because of shaky LCA programs. It is all about motivation and not legislation. (Belgium)
- Not he methodology but the communication and promotion should be emphasized. Not only to the public but also to develop different approaches / scenario development for whole sectors e.g. Food or building. (Germany)
- Nieuwe vorm de norm: Environmental Impact Assessment (Netherlands)
- Neemt toe. Bewustzijn vergroot door discussie en informatie van consumentengroepen. (Germany)
- More popular (Japan)
• More methods of LCA (Norway)
• More important in policy development (Netherlands)
• Maybe an everyday tool for product design (Finland)
• LCA is often embraced by politics and the (demand of the) consumer. However it may be hard to realize because of the interest in other issues like Global warming. (USA)
• Knowledge increases over time. There should be a shift in legislation. In the future you must know beforehand if the product is in contrast with the procedure/ rules and not when you already put in on the market. (Sweden)
• It should be voluntary. No regulation. It should be about motivation. (Belgium)
• Informing the consumers becomes the norm not the exclusion. LCA thinking becomes the norm and is no longer the exclusion. (UK)
• Increase (Germany)
• Increase (Netherlands)
• Good because there is an increased understanding that imposing policy at one point in a supply chain impacts on all other parts. (UK)
• Consensus between stakeholders is the key for the future. Consensus on the interpretation of scientific findings. (Belgium)
• Proces - 30 years, Product 15 - 20 years (Netherlands)

What kind of LCA tools will become available in time?

• Yes, provided mass/energy flow becomes mainstream (Not sure when, depends on whether industry makes more use of such assessments or whether it remains an academic tool, UK)
• Weegmethoden en Basisdata (in 4 years, Netherlands)
• Question of money. In the commerce sector there is no long-term thinking. LCA only used as a problem-oriented (ad hoc) tool to solve a problem. External and internal motivated (Belgium)
• Other tools, linking the environment with sustainability (very soon, Germany)
• Life Cycle Inventory systems, also related to economic sectors and Life Cycle Impact Assessment models and databases (within 5 years, Netherlands)
• LCC, DfE and Eco-Balance tools (in a few years, Japan)
• Integrating simultaneously environmental, economic and social objectives (in 3 years, Portugal)
• In the field of more easy to use tools. Specific trade/branche tools. Industry specific and maybe even more product specific (Denmark)
• There is a great need for consistent databases. They should be made available shortly. Software should be structured around that. As long as there is no new databases there will not be any new software development. (in 5 years, USA)
• Change in target users. More focus on Product designers as a target group for new tools (in 3 to 4 years, USA)
• To implement environmental aspect in product design

General Remarks

• We believe that LCA's need to be simpler than those that use "black hole" databases and make academic calculations but not so simple that they add all effects together. They must start from actual, real life data not scenarios. We include below our concerns about limitations of some assessments.
• We are moving toward smaller LCA's. A difference between industry (e.g. Chemical) and Commercial sector. The Commercials think in short term = no investments and Industry does invest.
• Weigh who says what. Providers will be too positive.
• Like to be informed (2)
• Difficult to use in decision making, because it would by definition require comparisons between different materials and processes, which, at least at the moment cannot be done. LC thinking, - making sure that an attempt to solve one problem does not shift it to another place, time or environmental media - should be an integral part of policymaking.
• Congratulations with your survey. It is very clear and simple
Providers

Other Sales Channels

- Written request (Sweden)
- Sales Partners (Finland)
- Return fax (Netherlands)
- Personal selling / networking / Experts (Denmark)
- Personal networking (Netherlands)
- Consultancy (USA)

Industry specific LCA databases and software

- TV sets / Vacuum cleaners / Ventilation Systems / Lighting / Mobile phones / Furniture / Electronic devices / Steel / Iron / Electronic Devices
- Plastics / Chemicals / Steel / Building
- Manufacturing, Agriculture, Building, Automotive, Transport and plastics
- Forest Industry
- Electronic products
- Building / construction
- Automotive / Energy / Chemistry / Transport / Retail / Electronics / Renewable resources / Building etc.
- Automotive / Metal / Electronics / Chemistry / Energy

In what countries are you selling your LCA products?

- Worldwide, but not in USA. Focus on Sweden and Europe. Also Asia but not yet in Africa (Sweden)
- Worldwide with a focus on France, Sweden, Germany, Denmark and South Africa (Denmark)
• Worldwide with a focus on Europe, Asia, USA and Canada and Australia, but no activities in developing countries (Netherlands)
• Netherlands, Belgium (Netherlands)
• Globally, worldwide (UK)
• Globally, worldwide (Sweden)
• Globally, worldwide (Sweden)
• Globally, worldwide (Netherlands)
• Globally, worldwide (Netherlands)
• Globally, worldwide (France)
• Globally, worldwide (Finland)
• European Union, Switzerland, Norway, Hungary, Turkey, USA, Canada, Korea, Japan, Taiwan, China, Australia, Brazil, Mexico, South Africa (Germany)
• Europe, USA, South Africa, Australia (UK)
• Europe, South Africa, Asia, India (Switzerland)
• Europe, Japan, Canada, Australia, South Africa, Korea, China, Taiwan, Mexico, Brazil and USA (Germany)
• 45 countries with a focus on Japan, Industry countries in Asia, Europe (Netherlands)

Short version of the message (advantages and product features) you use to convince potential users to use your LCA products and/or services

• We have been involved in LCA for more than 10 years, performing studies for private and political sector customers. We closely follow LCA method development and we have had representatives in the standardization process for more than 12 years. (UK)
• Transparent, includes closed-loop possibilities. Quick, for large flow sheets also. (Finland)
• Transparency (Sweden)
• Scientific basis. Scientific view on LCA (Netherlands)
• None; Customers usually find us and we make a technical B2B selling to them. This can typically take 6 - 12 months (Sweden)
- LCA provides an insight into the activities of a firm. In addition LCA can answer questions from the marketplace. It can also be used for taking decisions and for shortening the learning curve. Our software: transparent and easy to operate (Netherlands)
- Largest database (size) Not spreadsheet based. Specifically LCA calculations. (UK)
- Generic, but we make it possible for different companies to work together with LCA. (Sweden)
- Flexible tool for LCA to see environmental data optimize your potential. Correlation with economic and social indicators (Switzerland)
- Flexibility due to parameters - Non-linear input/output analysis. Main fold analysis features / Density analysis / Monte Carlo / Scenario Analysis etc. And multiple exchange possibilities. (Germany)
- Fast and simple wizards for total assessment. Import and export to Windows software. For everybody to use. Simple and Easy to use. (Netherlands)
- Extensive experience. We began in the 1990's. Involved in development of methodologies. Situated near the university of Göteborg and it's researchers. Deep experience and knowledge of different branches. Software is very general. For everybody to use because it is very general. User does not understand specific tools. (Sweden)
- Expertise and experience and scale of our operations. User friendliness of databases. Most important is our flexibility. Powerful in making very much scenarios. (France)
- Database: covers whole national economies. Comprehensiveness. Software is educational (Netherlands)
- It is a tool to focus on the most substantial environmental impacts in the life cycle of a product but it has also a indirect positive influence on the bottom line of a company if it is used correctly. The applications of LCA are orientated environmental work can go hand in hand with increased earnings. (Denmark)
- (LCA) Eco-quantum gives the environmental value of a building in one score on a scientific basis (Netherlands)

**How much do you charge for extra support?**

- Service and support are for free
- For free (7)
• Euro 800 a day
• Euro 1000 a day
• Based on order
• 800 per day. Helpdesk free. Courses two days for 1500 euro
• 800 euro per day
• 2300 a year for a maintenance contract

Who can use discount / budget versions of LCA Databases and Software?

• Use for education not commercial (Switzerland)
• Universities. MKB companies who want to demonstrate LCA (e.g. consultancy). Our goal is to create Word-of-Mouth and free publicity for LCA in general and our products through these channels. (Netherlands)
• Students. They have to return their results and findings in return for free use of our software and databases (Sweden)
• Owner companies (Finnish forest industry) (Finland)
• Not to be specified (Germany)
• Local collectivities (France)
• HBO-schools (Netherlands)
• Free to all (USA)
• For study purposes, but not professional consulting (Germany)
• For students and any non-commercial organization (Sweden)
• Every non-commercial organization (Netherlands)
• Companies with multi-user licenses (Sweden)
• Brancheorganisaties en multiple cliënt levert een korting op (Netherlands)
• Academic Licenses (UK)
• ABB has an agreement (Sweden)
**Future expectations with regard to the development of LCA in the next three to 5 years?**

- LCA will become a common language (Netherlands)
- Life cycle costing is included (Finland)
- Harmonization of LCA activities e.g. naming of flows / Harmonization of LCI and LCIA activities / country specific LCI models / Impact assessment development in synergy with engineering sciences. (Germany)
- More industry specific tools (USA)
- More normal to do LCA, less skeptical industry. Used more as a basis for decision making. (Switzerland)
- Development of country specific information, inventory modeling. Toxicological modeling. Harmonization of names of inventory and flow. Better model with regard to land use effect (Germany)
- Introduction of regulations and incentives to reduce the impact of materials in the environment. (Australia)
- LCA will need to broaden it’s aims to include costing and social issues (UK)
- The biggest advance we expect is the simplification of the interpretation (standardization) of LCA information / Analysis. Countries and organization should stop thinking local, Life Cycle Thinking is global. (UK)
- More development of LCA because of IPP. In the building sector more attention toward LCA; more organizations will do more products. LCA users can be satisfied more easily by just obtaining a package and not the whole thing. (France)
- We see more emphasis on LCA. EU regulation makes this happen with IPP. The change will eventually come when the threshold is lowered with simplified packages for Small and Medium Enterprises. Otherwise too much expertise is needed to use them. (Netherlands)
- The market has been busy learning over the last couple of years. Next step is to really use it. Detailed LCA will not happen again in the future. Focus on the really necessary indicators in the future (otherwise it is too cost and time intensive) Focus on fast and easy to use LCA. (Sweden)
- Interest is sinking because of economic reasons. Management cuts back on environmental investments. LCA will become more popular again when the economy rises again. LCA always is one of the first victims of cutbacks. (Sweden)
• Main driver all over the world is the IPP document. With IPP LCA will be a requirement for product development. Not solely Danish initiatives, it is a international affair. (Denmark)

• It is very expensive at the moment. Especially for small companies. In the future they need more usable LCA need to inform their customers. Now users need to make very extensive reports. LCA analysis will be part of ISO certification (Italy and Japan). LCA is complex and it will stay that way. Simplifications should only be done by experts. Simplifications and therefore faster for small companies = less expensive. Life Cycle Thinking is here to stay and not only the assessment. Now people think in fases of a life cycle. In the future integrated focus on the whole life cycle. (Sweden)

• Increase the usability. Presently a plethora of methods. Develop Best Practiceds. Use these for further development. (Netherlands)

• Wider spread. More emphasis on short and fast studies. More yet shorter. LCA is wider used but in a less extensive form. (Netherlands)

• More global harmonization is something we expect to happen. Standardization and building common protocols between different (international) databases and methodologies. Use of hybrid LCA = combining input and output with process statistics focusing, among other things, on cost effectiveness. (Netherlands)

• Hopefully there will be a greater need for LCA in the product development process due to IPP, etc. However the competition from universities (on their safe economical ground) is prohibiting a flexible and dynamic development of a sound market driven … development of LCA tools. There is too much governmental project money given to different players making obstacles to a sound competition. … This market has to go more commercial in order to let te LCA-market sustain in the long-run. The LCA-market is necessary for the industrial future. If it does noet get truly commercial it will self die !!! Since people cannot stay alive from the earnings generated in this branche. (Sweden)
Future expectations with respect to the offering of databases and software in the next three to 5 years?

- Widely accepted format for users. More site specific data, less agglomerated. (Finland)
- stay about the same number (USA)
- Software: geen wijzigingen, Database: vanuit Zwitserland (UNE{ SITEC) (Netherlands)
- Shake-out van leveranciers leidt tot minder keuze. Er blijven twee tot drie pakketten over. Er zal een discussie ontstaan over het openbaar beschikbaar stellen van databases. Publieke databronnen leiden tot een hogere kwaliteit van databases en daarmee LCA in general. (Netherlands)
- No changes. Market is already full. (Sweden)
- More expertise, experience and therefore better use. Having a typewriter does not automatically give you a Nobel price in literature. (Switzerland)
- Laagdrempelige pakketten. Easy to use. (Netherlands)
- Hybrid software. Database to enable hybrid analysis. In a process-based hybrid analysis the product quantities for the individual product are collected as is done in a conventional LCA, but the environmental data are derived using IOA (Netherlands)
- Higher data quality due to reviewed industry data = less transparency, but better documentation / High flexibility of software function e.g. parameters. Customized integrated software solutions. (Germany)
- Greater consistency and transparency (UK)
- Exchange of data between several national databases! Customers want that and it will improve the quality of databases and LCA. (Sweden)
- Databases of the three tool builders in the Netherlands will be harmonized (Greencalc, Eco-quantum, Dubo-calc), updated and extended. (Netherlands)
- Databases must be regularly maintained in order to provide valid outcomes. Software must conform to industry practices in terms of design and management frameworks. (Australia)
- Better quality. User can not check quality now. Quality label is needed! Databases should be maintained and be dynamic. They are not at the moment. One time investment is not enough! (Germany)
- As long as databases are up-to-date in the perception of both providers and industry we expect more national databases. In a lot of countries people think databases are good forever (mainly USA, Australia and Italy). Only a one time investment in LCA
databases and expect them to last forever. That’s not right. Databases are or should be dynamic. (UK)

• A lot of promotion. We hope to get money from Danish APA (Denmark)

**Future expectations with respect to prices of databases and software in the next three to 5 years?**

• Stay as they are (Finland)
• Stable. Time saving (cost) by having better data (hopefully) (Germany)
• Stable (UK)
• Software and database cost are not relevant with respect to overall cost of LCA studies (Germany)
• Price of software will go down. The specialized software is difficult to use if you only use it once in a while and not on a regular basis. More simple tools needed and they will be less complex and therefore cheaper. Price of databases unchanged. (Sweden)
• No real change expected (UK)
• No changes, because it is very expensive to develop. (Sweden)
• No changes (Netherlands)
• No changes (Switzerland)
• No changes (Sweden)
• Moet anders. Kosten zitten niet zozeer in de database en software, maar in de volledige kosten van een assessment en de druk op de organisatie. (Netherlands)
• Lower (USA)
• Higher for the process database. Input/output database: reduced. Providers complain about low cost versions which are available. Negative effect on R&D. (Netherlands)
• No major changes (Netherlands)
• Decrease because of economies of scale (5 years) (Denmark)
Which new LCA tools (database and software) do you expect your organization to develop in the future?

- Simplified user interfaces for: designers (VC-tool) and maintainers (municipalities) (Netherlands)
- Refining results. More transparent and therefore applicable in a wider range / broader application of LCA possible. (UK)
- Oriented towards environmental management tools. (Sweden)
- Normalization database (USA)
- More graphically oriented and more educational for students (USA)
- Work on more userfriendly interfaces for specific target groups. Link software to other systems (like administration and purchasing) so it will be integrated in the productionproces. (Netherlands)
- LCA / LCE / LCWE / DFE / Risk Assessment / Sustainability (Germany)
- Including features that make able to work with different databases (Finland)
- In the field of more easy to use tools. Specific trade/branche tools. Industry specific and maybe even more product specific. (Denmark)
- Hybrid software. Updates in hybrid format (Netherlands)
- End-of-life software for our own services. Ability to recycle. (EU-legislation) Complete environmental impact and cost estimations. We also foresee the exchange of data between the different packages. (Netherlands)
- Customizing to specific sectors (e.g. Unilever) and extension toward other sectors for specific products. Web-tools to modify centralized system through the internet. (France)
- Customized for branches (Germany)
- Combining life cycle costing and social aspects with traditional LCA to consider wider sustainability issues (UK)
- Adaptation to specific needs (Customization). Not planned though. (Switzerland)
**General remarks**

- We sent in a tender as well for this study.
- We are interested in receiving the findings of the research.
- Please include me in results!
- My "faith" in the value of LCA has been shocked after I found how you can cheat, or push away problems. The value of the tool is limited (for a firm to get a grip on the supply chain, but no more than that), and not to be used a legal tool. The most important consideration for my negative view on LCA as a legal tool as it can be compared to the input-output analysis in the period 1945 – 1990 to plan the economy in the communist countries. The results are known! LCA does not differentiate from this I-O analysis. So as a planning- or policy setting tool it is very weak.
- If the EU funds LCA than data should be stored centrally (public). Presently it is lost.
- I would like to react on the draft version of your report.
APPENDIX III SURVEY PROMOTERS & SUPPORTERS

Thank you for your time to answer this survey. Please read this instruction carefully before you fill out this survey:

Duration
This survey contains mostly closed questions and some open questions. Completing this survey will take approximately 10 minutes.

Completing the survey
The survey contains mostly closed questions, with space for your reply in the right hand column.
Please check the box for the appropriate answer. Note that for most questions you can give more than one answer.

Confidentiality
All information will be kept confidential. Your answers are reported in the aggregate only and therefore remain anonymous, so your privacy is fully respected.

Return
After completing this form, we would like to ask you to return this survey to Market Vision, before April 27, 2004 via fax +31 30 272 38 32

If your are interested in the results of this survey, than please fill out your e-mail address. In order to prevent that you will also be surveyed by phone, please fill out your name on the next page.
In this part of the survey some questions about yourself and your organization.

<table>
<thead>
<tr>
<th>Question</th>
<th>Response Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What is your function within your organisation?</td>
<td>Function: ..................................................................</td>
</tr>
</tbody>
</table>
| 2. Does your organization in its communication to the various target groups call attention to matters that concern the environment? Think for instance about environmentally friendly production, reducing pollutants and enhancing environmental thinking within companies. | □ Yes  
□ No                                                   |
| 3. Does your organization contribute to knowledge and awareness about Life Cycle Thinking and Life Cycle Assessment? | □ Yes (next question: 4)  
□ No (next question: 6)  
□ No, but our members do (next question: 6) |
| 4. What specific groups or industries does your company / institution target?                      | 1. ........................................................................ |
| 2. ........................................................................ |
| 3. ........................................................................ |
| 4. ........................................................................ |
| 5. Can you give a short description of the message (like advantages / product features) that you or your members use to convince target groups of the value of Life Cycle Thinking and the use of Life Cycle Assessment. | Description: ........................................................
.................................................................
.................................................................
.................................................................

6. Does your country have a law concerning the use of LCA?                                           | □ Yes (next question: 7)  
□ No (next question: 8)  
□ Don’t know (next question: 8) |
7. With regard to your marketing communication, when you compare the attention for legislation and the attention for your product features; do you give legislation:

- No attention
- Less attention
- Equal attention
- More attention

8. I will now list a number of media types. Can you please indicate, if your organization or your members use them to promote LCA Thinking and LCA Analysis by checking the box if yes.

**Check if Yes (More than one answer possible)**

- Fairs / Congresses / Conferences
- Advertising in industry magazines
- Internet campaigns
- Symposia or Theme days
- Telemarketing / Telephonic sales
- Direct mail / Brochures
- Other Media:
  - ..............................................
  - ..............................................

9. Which type of media is most important for the promotion of LCA Thinking?

**Check if Yes (One answer)**

- Fairs / Congresses / Conferences
- Advertising in industry magazines
- Internet campaigns
- Symposia or Theme days
- Telemarketing / Telephonic sales
- Direct mail / Brochures
- Other Media:
  - ..............................................

10. Do you have a budget for promoting Life Cycle Thinking internationally?

- Yes, internationally
- No, only local

11. What industries do you target in your communication?

Industry 1: ..............................................
Industry 2: ..............................................
Industry 3: ..............................................
12. I will now list a number of functions. Please check if they are within your (or your members) target group by checking the box if yes.

**Check if Yes (More than one answer possible)**

- Purchasers
- Product Designers
- Environmental managers
- Production managers
- Members of the board
- Other, nl …
  - ………………………………………

13. Does your government subsidize the purchase of LCA databases and software?

- Yes (next question: 14)
- No (next question: 15)

14. How and when do they provide these subsidies?

**Description:** ………………………………………
……………………………………………………
……………………………………………………
……………………………………………………
……………………………………………………
……………………………………………………
……………………………………………………
……………………………………………………

The next set of questions concern your future expectations with regard to LCA.

15. What are your expectations with regard to the development of Life Cycle Assessment in the next 3 to 5 years? More in particular, what changes do you foresee?

**Description:** ………………………………………
……………………………………………………
……………………………………………………
……………………………………………………
……………………………………………………
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……………………………………………………
……………………………………………………
……………………………………………………
<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
</table>
| 16. What are your expectations with respect to the availability of      | Availability: ………………………………………
| databases and software in the next 3 to 5 years?                       |          |
|                                                                         |          |
|                                                                         |          |
| 17. And your expectations with regard to prices of LCA databases and    | Prices: ……………………………………………
| software in the next 3 to 5 years?                                     |          |
|                                                                         |          |
|                                                                         |          |
| 18. And the promotion of LCA Thinking and LCA products (databases,      | Promotion: ………………………………………
| software and related) in the next 3 to 5 years?                        |          |
|                                                                         |          |
|                                                                         |          |
| 19. And what are your expectations with regard to the development of    | General: ………………………………………
| Life Cycle Thinking in the long run (like 5 to 15 years).              |          |
|                                                                         |          |
|                                                                         |          |
| 20. Do you expect that in time new, different LCA software tools (and   | □ Yes (next question: 21)
| databases) will become available?                                      | □ No (next question: 23)                      |
|                                                                         |          |
|                                                                         |          |
|                                                                         |          |
| 22. And how soon do you think such tools will be made available?        | In       |
|                                                                         | about:……………………………………
|                                                                         |          |
This was the final question of the survey.

23. Do you have any more questions or remarks regarding this survey?

........................................................................................................................................
........................................................................................................................................
........................................................................................................................................

Thank you for your cooperation. Your answers will be used by TNO Netherlands to inform the European Union about Life Cycle Thinking. If you would like to be informed about the results of this survey, please note your e-mail address so we can inform you:

Name: ..............................................................................................................

E-mail: ..............................................................................................................

Thank your very much for your cooperation. Please return this survey to Market Vision by fax as soon as possible and **before April 27th** to

Fax: +31 30 272 38 32
APPENDIX IV  SURVEY PROVIDERS

Thank you for your time to answer this survey. Please read this instruction carefully before you fill out this survey:

Duration
This survey contains mostly closed questions and some open questions. Completing this survey will take approximately 10 minutes.

Completing the survey
The survey contains mostly closed questions, with space for your reply in the right hand column.
Please check the box for the appropriate answer. Note that for most questions you can give more than one answer.

Confidentiality
All information will be kept confidential. Your answers are reported in the aggregate only and therefore remain anonymous, so your privacy is fully respected.

Return
After completing this form, we would like to ask you to return this survey to Market Vision, before April 27, 2004, via fax

+31 30 272 38 32

If your are interested in the results of this survey, than please fill out your e-mail address. In order to prevent that you will also be surveyed by phone, please fill out your name on the last page.
In this part of the survey I have some questions about yourself and your organization.

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What is your function within your organization?</td>
<td>Function: ...........................................</td>
</tr>
<tr>
<td>2. Here we mention a number of products and services. Can you indicate if your organization offers these types of LCA products by marking the box if Yes?</td>
<td>Mark if Yes (More than one answer possible)</td>
</tr>
<tr>
<td>LCA Software</td>
<td></td>
</tr>
<tr>
<td>LCA Databases</td>
<td></td>
</tr>
<tr>
<td>LCA related studies</td>
<td></td>
</tr>
<tr>
<td>LCA related services (e.g. consultancy)</td>
<td></td>
</tr>
<tr>
<td>Other product(s):</td>
<td></td>
</tr>
<tr>
<td>............................................................................</td>
<td></td>
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<td>............................................................................</td>
<td></td>
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<tr>
<td>............................................................................</td>
<td></td>
</tr>
<tr>
<td>3. Is the sale of LCA software and/or databases the core business of your organization?</td>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
<td></td>
</tr>
<tr>
<td>4. Can you indicate through which sales channel your customers can order your products?</td>
<td>Mark if:</td>
</tr>
<tr>
<td>Internet</td>
<td></td>
</tr>
<tr>
<td>Sales department</td>
<td></td>
</tr>
<tr>
<td>Intermediaries / Reseller(s)</td>
<td></td>
</tr>
<tr>
<td>Other channels</td>
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<td>............................................................................</td>
<td></td>
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<tr>
<td>5. And what is your main sales channel?</td>
<td>Mark if Yes (one answer):</td>
</tr>
<tr>
<td>Internet</td>
<td></td>
</tr>
<tr>
<td>Sales department</td>
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<td>Intermediaries</td>
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<td>Other</td>
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<tr>
<td>............................................................................</td>
<td></td>
</tr>
<tr>
<td>Question</td>
<td>Database:</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>6. How many licence holders do you presently have for your products? (db’s and software)?</td>
<td>= ..... licences</td>
</tr>
<tr>
<td>a. How many was that 2 years ago?</td>
<td></td>
</tr>
<tr>
<td>b. And how many active licenses do you expect to have in two years?</td>
<td></td>
</tr>
<tr>
<td>7. On average, what is the average period between two versions of your product? In other words, after what period do you publish an update or a new version of your product? Is that?</td>
<td>Software:</td>
</tr>
<tr>
<td></td>
<td>❑ Monthly</td>
</tr>
<tr>
<td></td>
<td>❑ Every 2 years</td>
</tr>
<tr>
<td>8. Are your databases / software generic or industry specific?</td>
<td>Software:</td>
</tr>
<tr>
<td></td>
<td>❑ Generic (next question 10)</td>
</tr>
<tr>
<td></td>
<td>❑ Industry specific (next question 11)</td>
</tr>
<tr>
<td>9. For which industries have you developed products / services?</td>
<td>Industry 1: ........................................</td>
</tr>
<tr>
<td></td>
<td>Industry 2: ........................................</td>
</tr>
<tr>
<td></td>
<td>Industry 3: ........................................</td>
</tr>
<tr>
<td>10. In what countries are you selling your LCA products?</td>
<td>........................................................</td>
</tr>
</tbody>
</table>
The next questions concern the way you advertise your products / services.

<table>
<thead>
<tr>
<th>Question</th>
<th>Description:</th>
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</thead>
<tbody>
<tr>
<td>11. Can you give me a short version of the message (advantages / product features) you use to convince potential users to use your products and /or services?</td>
<td>……………………………</td>
</tr>
<tr>
<td>12. Is there a law in your country concerning the use of LCA?</td>
<td>Yes/No/Don't know</td>
</tr>
<tr>
<td>13. Can you indicate if your organization uses the mentioned media types by saying yes or no?</td>
<td>Mark if Yes (More than one answer possible)</td>
</tr>
<tr>
<td>14. Which type of media is most important for the promotion of your products?</td>
<td>Mark if Yes (one answer)</td>
</tr>
</tbody>
</table>
The next set of questions are about the prices that you charge:

<p>| | | |</p>
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</table>
| 15. What is the cost of one license? | Database: € ……,-  
Software: € ……,- |
| 16. What is the price of an update / license? | Database: € ……,-  
Software: € ……,- |
| 17. How much do you charge for (extra) support? | € ……,- per ………………… |
| 18. Do you provide discount/budget versions? For instance for Universities? | ☐ Yes (next question 19)  
☐ No (next question 21) |
| 19. Which (other) types of organizations can order these discount/budget versions? | Description: ………………………………… |
|   |   |   |
| 20. And at what price do you offer these discount/budget versions? | € ……,- |
The following questions concern your future expectations with regard to LCA Thinking:

<p>| | |</p>
<table>
<thead>
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<th></th>
</tr>
</thead>
</table>
| 21. | What are your expectations with regard to the development of Life Cycle Assessment in the next 3 to 5 years? More in particular, what changes do you expect? | General: ……………………………………
……………………………………………………
……………………………………………………
……………………………………………………
……………………………………………………
……………………………………………………
……………………………………………………|
| 22. | What are your expectations with respect to the offering of databases and software in the next 3 to 5 years! | Availability: ……………………………………
……………………………………………………
……………………………………………………
……………………………………………………
| 23. | And your expectations with regard to prices in the next 3 to 5 years? | Prices: ……………………………………
……………………………………………………
……………………………………………………
| 24. | Do you expect that you will develop any new, other software tools or databases) in the future with regard to Life Cycle Assessment? | ☐ Yes (next question 25)
☐ No (next question 26)
| 25. | And which tools does that concern? | Open
……………………………………………………
……………………………………………………
……………………………………………………|
This was the last question of this survey

26. Do you have any more questions or remarks regarding this survey?

..............................................................................................................................................
..............................................................................................................................................
..............................................................................................................................................

Thank you for your cooperation. Your answers will be used by TNO Netherlands to inform the European Union about Life Cycle Thinking. If you would like to be informed about the results of this survey, please note your e-mail address so we can inform you:

Name: .........................................................................................................................

E-mail: .........................................................................................................................

Thank your very much for your cooperation. Please return this survey to Market Vision by fax as soon as possible and before April 27th to

Fax: +31 30 272 38 32
Appendix 4  Workshop report

Workshop Making Life-cycle information and interpretative tools available
June 14th 2004

A project by
TNO, Ecobilancio Italia and the Institute of Environmental Sciences (CML)

DG Environment
Room S4, Charlemagne Building, Rue de la Loi 170
B-1040 Brussels

List of participants

<table>
<thead>
<tr>
<th>Last name</th>
<th>First name</th>
<th>Name organisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSEMS</td>
<td>Toon</td>
<td>TNO</td>
</tr>
<tr>
<td>BICKERSTAFFE</td>
<td>Jane</td>
<td>INCPEN - Industry Council for Packaging &amp; the Environment</td>
</tr>
<tr>
<td>CSORBA</td>
<td>Orsolya</td>
<td>DG Environment, European Commission</td>
</tr>
<tr>
<td>DAVIDSON</td>
<td>Christel</td>
<td>UEAPME</td>
</tr>
<tr>
<td>FRANKL</td>
<td>Paolo</td>
<td>Ecobilancio Italia</td>
</tr>
<tr>
<td>GOODCHILD</td>
<td>Robert</td>
<td>DG Environment, European Commission</td>
</tr>
<tr>
<td>GUINEE</td>
<td>Jeroen</td>
<td>Institute for Environmental Sciences (CML)</td>
</tr>
<tr>
<td>LINDFORS</td>
<td>Lars-Gunnar</td>
<td>Swedish Environmental Research Institute</td>
</tr>
<tr>
<td>MARECHAL</td>
<td>Freddy</td>
<td>BCF Consult Sprl</td>
</tr>
<tr>
<td>PESSON</td>
<td>Allain</td>
<td>French Ministry of economic Affairs</td>
</tr>
<tr>
<td>POLL</td>
<td>Christian</td>
<td>IPU (Instituttet for Produktudvikling)</td>
</tr>
<tr>
<td>RUBIK</td>
<td>Frieder</td>
<td>IOEW (Institut für ökologische Wirtschaftsforschung)</td>
</tr>
<tr>
<td>SAUR</td>
<td>Konrad</td>
<td>Five Winds International</td>
</tr>
<tr>
<td>SCHEBEK</td>
<td>Liselotte</td>
<td>Institute for Technical Chemistry, Karlsruhe</td>
</tr>
<tr>
<td>SONNEMAN</td>
<td>Guido</td>
<td>UNEP</td>
</tr>
<tr>
<td>VAN LEEUWEN</td>
<td>Saskia</td>
<td>TNO</td>
</tr>
<tr>
<td>WOHLER</td>
<td>Claudia</td>
<td>BDI - Bundesverband der Deutschen Industrie</td>
</tr>
</tbody>
</table>
### Agenda

<table>
<thead>
<tr>
<th>Time</th>
<th>Item</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>10h30</td>
<td>WELCOME</td>
<td>By DG Environment</td>
</tr>
<tr>
<td>10h45</td>
<td>Introduction of the project</td>
<td>By Mr. Toon Ansems</td>
</tr>
</tbody>
</table>
| 11h00 | Presentation of the methodology and results | State of awareness by Mr. Paolo Frankl  
Availability of LCA tools by Mr. Jeroen Guinee  
Promotion of life-cycle thinking by Mr. Paolo Frankl  
Scenario by Mr. Toon Ansems |
| 12h00 | Preliminary discussion                    |           |
| 12h30 | LUNCH                                    |           |
| 14h00 | Presentation of the draft conclusions     | by Mr. Toon Ansems |
| 14h30 | Discussion                               |           |
| 16h00 | Summing up                               |           |
| 1615 | END                                       |           |
Welcome

Environment Directorate-General, European Commission - Robert Goodchild
Mr Goodchild welcomes everybody, opens the workshop and sets out the outline of the day on the basis of the agenda [Agenda]. The participants are asked to briefly introduce themselves [List of participants]. Representatives from retail and consumer organisations were unfortunately not able to come to the workshop.

Introduction of the project – Toon Ansems

Project manager Mr Ansems introduces the project team composed of TNO (the contractor), Ecobilancio Italia and the Institute of Environmental Sciences (CML). The background and objective of the project are illustrated and the structure of the project in tasks is presented. The introduction concludes with the working approach and deliverables per task. [Project introduction].

Project presentations

State of awareness - Paolo Frankl
Mr Paolo Frankl (Ecobilancio Italia) gives a presentation of the current state of awareness regarding life-cycle thinking of the target groups [State of awareness]

Main trends in the use of LCA tools - Jeroen Guinee
Mr Jeroen Guinee (CML) sketches the main trends in the use of LCA tools by the target groups. The presentation includes the use of LCA tools (how commonly, for what reason and by whom) and the developments in the availability and affordability of LCA tools. [Trends in the use of LCA tools]

Promotion of life-cycle thinking - Paolo Frankl
Mr Paolo Frankl gives an overview of the promoters of life-cycle thinking, country differences and best practices. It was found that awareness and promotion of life-cycle thinking depend on a combination of correlated factors: position of SME in the product chain, product group category, industry sector and country. [Promotion of life-cycle thinking]

Scenario - Toon Ansems
Mr Toon Ansems presents the main results of the tasks 1, 2 and 3. The main results and main needs of the target groups are the starting points for a Community Platform. Elements in the base scenario for a Community Platform are given (LCT
Preliminary discussion

Mr Goodchild asks the participants for any comments on the presentations. The preliminary discussion is continued after lunch to offer all participants the opportunity to give a first response. The response of the consultants is given afterwards.

Frieder Rubik
Mr Rubik responds by asking “What is life-cycle thinking (LCT)?” and “What are the main elements of LCT?”. After all, there are differences in LCT between the target groups. Also it is asked why consumer test organisations were not included, as these organisations are applying LCT practises in their businesses. Another remark is that LCT is interpreted here as LCA, whereas LCA is not an important tool for these target groups (on the other hand checklists are).

Response
In the base scenario for a Community Platform LCT manuals are proposed aimed at the target groups. In this way a targeted and specific LCT description and instruction can be given. Also in the report definitions will be given of the main terms regarding LCT.

Consumer (test) organisations will be included in the study. However, consumer organisations often focus on specific aspects (e.g. energy consumption, hazardous substances) of the life-cycle.

It is of course true that other tools, such as checklists, are more important here than LCA tools. The call for tender however mentions life-cycle assessment (LCA) tools as subject of study for the analysis of the main trends in the use of tools.

Jane Bickerstaffe
Mrs Bickerstaffe mentions that a very simple data collection of e.g. material inputs can be sufficient. The question is what LCA can add for these target groups.

Response
Life-cycle inventory aspects and simple tools are indeed important. The need for easy tools (e.g. checklists) and user-friendly tools for the target groups is recognised.
Christian Poll
Mr Poll expresses his disappointment with the software focus in the study and suggests to assess also other tools than just software tools, such as handbooks. E.g. in Denmark the development of a number of simple, easy-to-use tools was started.

Response
In the study software was taken as representative for other tools. Considering the budget for the study the main focus was and will be on LCA software tools.

Konrad Saur
Mr Saur asks who outside this room will be able to understand this and underlines the importance of talking the language. He also indicates that the term LCA needs to be defined (“What exactly does LCA mean?”).
The major results of a user needs assessment reflect the strong need 1) to link individual tools, and 2) for business cases: “What is the economic incentive?” For instance, we will have to make clear how to improve decision making processes. There are more analytic tools, such as energy analyses and economic life-cycle studies. Mr Saur went on to say that from his personal experience the reason for selling software is to win consultancy contracts. Moreover he points out that eco-design can also be single issues driven. Therefore both the advantages and the limitations of a tool will have to be presented.

Response
The approach is to address target groups in sectors (sector by sector approach). Elements in the base scenario will be further developed in association with target group organisations to address companies/organisations in the right language and to present striking examples. Combining tools can be more complex, e.g. LCA/LCC combinations; user-friendliness is again very important to reach the target groups.

Guido Sonneman
Mr Sonneman asks “What is life-cycle information”, as there are much more simple tools than seen here. What about lessons learnt, e.g. in the building sector there are lots of lessons learnt from LCA. Looking at different sectors, it can be sufficient to just tell the key lessons learnt.

Response
The developments of the LCI Group of UNEP are mentioned. It is recognised that lessons are crucial. However these can be more difficult to obtain for other sectors than the building sector.
On the other hand “lessons learnt” have to be communicated in the several sectors or target groups. Initiatives regarding changing consumer patterns are mentioned here as well.
**Claudia Wohler**
Mrs Wohler asks “What is ecodesign, LCA?” and remarks that life-cycle thinking is part of normal business, just not from the environmental perspective. Furthermore she asks for the assessed costs/benefits for environmental tools, and what if market benefits are lower than costs.
She proceeds to say that the level of labels is not a sufficient measure for awareness. She asks for the reason for the low level of use of the EU Flower? Are labels sufficiently practicable for SMEs?
Also Mrs Wohler asks who will demand this newsletter/internet platform if SMEs have no need for this information?

**Response**
Mr Goodchild mentions the limits of the study.
The consultants respond by saying that costs have to be recognized. The opportunities for green products and the positive effects for the market position have to be communicated to the SMEs in the several sectors.

**Paolo Masoni**
Mr Masoni indicates that we are all well aware that the implementation of LCT is a very complex task. He suggests to balance the results of the study with the resources available. Mr Masoni also underlines to share experiences: implementation of tools in the field of LCT is quite negligible; increase drivers and lower barriers, especially for SMEs; most effective way here is by rules and legislation, while IPP is mainly addressed at voluntary participation; show real market advantages; recognition of the market of products developed with LCT; focus on labels most visible for consumers; in most cases labels are not the most effective tools for SMEs due to costs and application period; lower the entry level by using simple tools and technical guidance; importance of building internal capacity for SMEs.
Mr Masoni also asks why trainings were not stressed in the summary, and remarks the importance of the use of national languages for the Community Platform.
The results of the eLCA project are available for the study and Mr Masoni suggests to look at the website (www.elca.enea.it) for further information.

**Response**
We will consider the results of the eLCA project and if possible include this in the study.
After lunch

Freddy Marechall
Mr Marechall remarks that LCT not only improves environment, but also has to initiate innovations with the aim of costs decrease. Moreover there is a role for universities with respect to education of students in the area of LCT.
Mr Marechall also mentions a survey within UNEP-SETAC about the needs as expressed by SMEs.

Mr Sonneman responds that the survey indeed presents needs, however the survey does not really give the needs as expressed by SMEs themselves.

Konrad Saur
Mr Saur asks “What is green (products..etc)?” He also reminds that the first step in an LCA study is the goal and scope definition (a real question). Therefore one should be careful in the use of LCA studies as the scope and objective may be different. Mr Saur mentions a UNEP-SETAC document made on the life-cycle approach and why the life-cycle approach is useful. He also mentions a parallel project in Canada and the US with efforts made on the same issues.

Response
We will start the report with definitions. Regarding the communication of lessons learnt it is recognised that results of LCA studies cannot just be communicated, but will have to be considered with the intended objective and scope in mind.

Allain Pesson
Mr Pesson says he is not disappointed at all and underlines the need for better regulations. Also policymakers need a life-cycle perspective. In addition Mr Pesson stresses that a life-cycle approach is not enough, sustainability needs to be considered as well in the background.

Lars-Gunnar Lindfors
Mr Lindfors thinks it is a nice piece of work so far. He does not think it is correct to use the eco-label as an indicator, as not all eco-labels consider the complete life-cycle.

Response
Mr Goodchild remarks that if anyone has a better indicator they should mention this.
Mr Ansems responds by telling that indeed some eco-labels are not life-cycle oriented. The ISO classification of labels can be helpful in this.
**Frieder Rubik**

Mr Rubik remarks that EPD is a tool and not an indicator. The challenge is to make clear references, examples of the complete process: from looking for the actual needs up to the integration of LCT into daily routine.

**Presentation of the draft conclusions - Toon Ansems**

Mr Toon Ansems presents the draft conclusions of the study. The draft conclusions and the base scenario for a Community Platform are illustrated and further explained with examples from the target groups [Draft conclusions]

**Discussion**

**Konrad Saur**

Mr Saur mentions he has worked with some big retailers. He is not sure whether retailers want an educational role. Retailers will offer shelf place for selected products with certain properties. They indeed have a big role in making products, e.g. selling just products with an A or B energy-label.

Mr Saur agrees with the draft conclusions on the differences in awareness and promotion. He wonders whether it will be possible to have one newsletter.

**Response**

Because of their influence in the product chain retailers are an important actor to involve in any life-cycle thinking-approach. This high potential of retailers is recognised, e.g. in Italy energy labels are not all known. But before they can educate the consumer, first the retailers will have to be educated (e.g. also on consumer behaviour, such as washing at lower temperatures).

**Liselotte Schebek**

Mrs Schebek asks what LCT is and how all tools (which tools?) can be included in one platform.

**Response**

We will need to express what is meant by LCT. Definitions will be given in the report.
Guido Sonneman
Mr Sonneman first expresses that he appreciates the broad ideas for a scenario. He wonders if the needs can really be met with just one platform. He also indicates that retailers not just have a marketing/educational role, but also adds procurement and an involvement in production. There is a need for education in the retail sector. After all, are people involved in procurement aware of LCT? He also mentions specific attention for the accession countries and expresses that UNEP would like to work with the European Commission in this.

Response
A strong relation between the Community Platform and national platforms, as well as the UNEP-SETAC Life Cycle Initiative is suggested.

Frieder Rubik
Mr Rubik asks what is meant by ‘retailers’ (is this the small Italian, 2-persons shop?), or are larger shops meant here. Regarding the Community Platform Mr Rubik has the feeling the platform is developed from a top-down perspective. Are the target groups reached with this platform? He remarks that a Community Platform is a bit over the head of the target groups. Mr Rubik also asks for the relation between the platform and national initiatives, such as BDI? The central question should be how to improve the work of national initiatives to disseminate the LCT approach to the target group (bottom-up approach).

Response
The relative economic power of the retail will have to be considered. We will also have to look more deeply into the top-down approach. Besides national initiatives the Community Platform will also have to relate to sector initiatives (e.g. on a European level). The suggestion regarding a network of mediators is welcomed. The identification of 1st movers is an important issue.

Claudia Wohler
Mrs Wohler underlines the remarks made by Mr Rubik. She appreciates the recommendations made. Furthermore Mrs Wohler expresses that SMEs do not have the time for searching the internet, reading newsletters and attending workshops, they are rather busy just surviving. The idea to link European and national initiatives is fine; the focus will have to be on the economical advantages of LCT. Mrs Wohler also remarks that it may be helpful to distinguish between legislator and market driven examples of LCT implementation. She extends an invitation for attending the next BDE-IPP working group meeting.
Paolo Masoni
Mr Masoni agrees with the bottom-up versus the top-down approach and with differences as found and illustrated in the presentation. He asks why the scenario did not include something more. Now it is mainly focused on the first three steps of the AIDA model, why not go into Action (and focus on using tools)? Mr Masoni underlines it is very important to stay in contact with those who already are in contact with SMEs. The Community Platform should be integrated with other initiatives. A network of mediators can be developed. As a coordinator of the eLCA-project he mentions the website with information on courses, tools etc. He also mentions a demonstration project, covering 6 sectors, where all these things have been discussed 4 to 5 years ago. He recommends to have a look at the results of the project.

Jane Bickerstaffe
Mrs Bickerstaffe says she is struggling with the term LCT and indicates it is all about the awareness of a product flowing through a chain. She makes a plea to share the conclusions on all differences (in awareness/promotion and scenario) with other experts. A warning not to support a European ‘average platform’ is expressed. The emphasis should be on understanding the complexity. Sometimes the focus from consumers is on the small environmental impacts, instead of the big impacts.

Christian Poll
Mr Poll stresses to focus on the success stories. In Denmark examples of success stories are integrated in tools. At the same time he indicates that benefits cannot always be quantified, e.g. being involved in the chain, benefits of the company being in the news. Furthermore Mr Poll remarks that SMEs will not visit websites. It is recommended to use local initiatives, contacts and neighbours. Regarding tools and the need for user-friendly tools, he expresses the need for better and fewer, more targeted tools, and not just more tools. There is not one answer to what tools to use. There are too many choices to be made and the black box approach is too high. He remarks that in the scenario for a Community Platform chat rooms were mentioned and asks whether perhaps discussion platforms were meant here.

Response
The need for fewer and better tools is recognised, and indeed a discussion platform is meant instead of a chat room.
Mrs Davidson expresses that lots of remarks were already made and that everyone about said it. She would like to stress that SMEs include about 70-80% of all business, which is worth mentioning here; that SMEs already have a problem with environmental legislation, let alone IPP and finally that it is important that they are contacted by people they know and trust.

She mentions a recent study from the DG Enterprise regarding support systems; face-to-face contact is important, but SMEs are reluctant about consultancies, which do not always understand SMEs and are too much involved in selling their product.

The platform should gather best practises, instead of being an extra layer.

Response

Regarding the best practises, it is mentioned that for very small SMEs industrial districts are important.

Mr Saur urges to define the target group. In his view SMEs are companies with own product development. He indicates that there is a variety of approaches of how to reach the SMEs (reference/guide/how-to-do books, local initiatives). He also mentions the summer courses for SMEs and sharing experiences, university teaching for those who will be the decision makers in time (also to prevent the not-invented-here problem).

There are so many tools not being used, why more? What is hindering people from the LCT approach? What to do with misuse of LCA and perceived problems?

The target groups mentioned here are the groups most difficult to reach with a newsletter or website. Is there any indication of the budget needed, if you want to be specific?

LCA studies may result in an other prioritisation of environmental impacts for consumers. Regarding retailers, you will have to get them engaged. Furthermore he asks how to get more input from consumer and retail organisations.

Mr Marechal asks whether it is intended to suggest that local initiatives are encouraged to be involved in developing guidelines. He also mentions the risk of simple LCAs: the simpler an LCA, the more risk of getting things wrong. (at least in case of the A in LCA meaning assessment, in case of the A meaning approach it is ok to have a simple LCA).

Response

The need for a ‘think globally, act locally’ approach is recognised, as well as the need to also consider failure stories to deal with the barriers of LCT. Also recommendations to prioritise will have to be made.
Summing up

Mr Goodchild sums up some of the main responses/issues:
- Where are the consumer test magazines in the study?
- Is software a good indicator for the developments of LCA tools?
- Training and education is given little attention.
- The way of retail to be involved in LCT.
- What are we really talking about when we speak of SMEs?
- Is a top-down approach the way to proceed?
- How to build on existing initiatives, and not just build an extra layer?

The European Commission will give their response in the coming days. A draft report will be delivered in July, a final report will be delivered in September.

END
Appendix 5  Questionnaires for retail/consumer organisations

Questionnaire for retailers/retail organisations

An additional questionnaire was distributed by e-mail to large retailers and retail organisations in October/November 2004. An amount of twelve retailers/retail organisations was contacted for the questionnaire. In the choice of the interviewees the geographical distribution of the interviewees was considered. The questionnaire was announced beforehand and potential respondents were contacted at least four times. The interviews were all in the English language.

Subjects for the interviews

1.  Awareness

1.  To what extent are you familiar with the concept of life-cycle thinking?

2.  Is the concept of life-cycle thinking put into practice in your company/organisation?
   If not: Why not?
   If yes: How is this being done?

   Is life-cycle thinking integrated in your company’s management?

   Are any actual demands made upon producers/suppliers regarding the environmental performance of their products?
   If not: Is there a specific reason why no demands are made upon producers/suppliers
   If yes: How do producers/suppliers handle these demands?

   Are you actually informing consumers about the environmental performance of products?
   If yes: How do you inform consumers?
   If not: Is there a specific reason why consumers are not informed?

3.  What is the general awareness of retailers regarding life-cycle thinking?

4.  What are the main differences between small and large retailers regarding the awareness?

5.  What are the main differences between (groups of) countries in Europe regarding the awareness?
2. Use of tools

6. Are any LCT tools (such as checklists, LCA, EPDs and eco-labels) used by your organisation / company?
   If yes: Which tools are being used, for what purposes, at what frequency?
   If no: Is there a specific reason why tools are not used?

7. Are LCT tools used by retailers in general?
   If yes: Which tools are commonly used, for what purposes, at what frequency?; Are software tools and handbooks commonly used?
   If no: Is there a specific reason why these tools are not used?

8. Do you use the results from LCA studies?

9. Has your company/organisation been involved in LCA studies?

10. Is/was your company/organisation the last two years involved in the preparation of an EPD or the application of an eco-label?

3. Promotion

11. Is your organisation/company actively supporting or promoting life-cycle thinking?
   If yes: How is this being done and who are the target groups?; What are the key issues (messages)?
   If no: Is there a specific reason why life-cycle thinking is not promoted?

12. (Retailer) Is there a specific target regarding the share of eco-labelled products in the product assortment?

13. What are the main promoters of life-cycle thinking in the retail in Europe?

14. What are the main differences in promotion between (groups of) countries in Europe?

15. Has your company/organisation directly profited from any kind of public support regarding life-cycle thinking? Any other kind of support?

16. Are you aware of any public LCT promotion/support initiatives (in other countries)?

4. Needs

17. What are the real needs of retailers/retail organisations with respect to communication and the exchange of information on life-cycle thinking?

18. What are the main differences in the needs of retailers between (groups of) countries in Europe?
Questionnaire for consumer organisations

An additional questionnaire was distributed to consumer organisations. An amount of eleven consumer organisations was contacted for this questionnaire. In the choice of the interviewees the geographical distribution of the interviewees was considered. The questionnaire was announced beforehand and potential respondents were contacted at least four times. The interviews were all in the English language.

Subjects for the interviews

1. Awareness
   1. To what extent are you familiar with the concept of life-cycle thinking?
   2. Is the concept of life-cycle thinking actively being practised in your organisation (e.g. in product tests, published information in consumer magazines)?
      If not: Why not?
      If yes: How is this being done?
   Are you informing consumers about the environmental performance of products?
   Are life-cycle aspects considered in product tests by your organisation?
      If yes:
      - What aspects are considered, for what products and how often (%)?
      - What are future expectations regarding including life-cycle aspects in product tests?
   Is life-cycle thinking integrated in your organisation’s management?

2. Use of tools
   5. Are any LCT tools (such as checklists, LCA, EPDs and eco-labels) used by your organisation?
      If yes: Which tools are being used, for what purposes, at what frequency?
      If not: Is there a specific reason why no tools are used?
6. Are LCT tools used by consumer organisations in general?  
   If yes: Which tools are commonly used, for what purposes, at what frequency?; Are software tools and handbooks commonly used?  
   If not: Is there a specific reason why these tools are not frequently used?  

7. Do you use the results from LCA studies (e.g. for product comparisons)?  

8. Has your organisation been involved in LCA studies (during the last two years)?  

9. Has your organisation been involved in projects regarding EPDs or eco-labels (during the last two years)?  

3. Promotion  
10. Is your organisation actively supporting or promoting life-cycle thinking (by consumers)?  
    If yes: How is this being done (e.g. articles in consumer magazines, consumer awareness campaigns) and who are the target groups (consumers, retailers, industry, government)?; What are the key issues (messages)?  
    If not: Is there a specific reason why life-cycle thinking is not promoted?  

11. What are in your opinion the main promoters of life-cycle thinking by consumers in Europe?  

12. What are the main differences in promotion between (groups of) countries in Europe?  

13. Has your organisation directly profited from any kind of public support regarding life-cycle thinking? Any other kind of support?  

14. Are you aware of any public LCT promotion/support initiatives (in other countries)?  

4. Needs  
15. What are the real needs of consumers with respect to communication and the exchange of information on life-cycle thinking?  

16. What are the real needs of your organisation with respect to communication and the exchange of information on life-cycle thinking?  

17. What are the main differences in the needs consumer organisations between (groups of) countries in Europe?
## Appendix 6  
**Respondents questionnaires retail/consumer organisations**

*Total list of retailers/retail organisations contacted for the survey.*

The retailers (organisations) marked with - ●● - in the table have responded by a telephone interview or completed questionnaire.

The organisations marked with - ● - in the table have responded, but have not given an interview or completed the questionnaire.

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<tr>
<th>Name retail (organisation)</th>
<th>Country</th>
<th>Remark</th>
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<tr>
<td>EuroCommerce</td>
<td>European</td>
<td>●●</td>
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<tr>
<td>Czech Confederation of Commerce and Tourism</td>
<td>Czech Republic</td>
<td>●  Little knowledge of LCT</td>
</tr>
<tr>
<td>Federation of Finnish Commerce and Trade</td>
<td>Finland</td>
<td>●  Too little time</td>
</tr>
<tr>
<td>Carrefour</td>
<td>France</td>
<td>●●</td>
</tr>
<tr>
<td>Hauptverband des Deutschen Einzelhandels</td>
<td>Germany</td>
<td>●  Close cooperation with Eurocommerce on LCT; refers to Eurocommerce’s position</td>
</tr>
<tr>
<td>General Confederation of Trade, Tourism, Services and SMEs in Italy</td>
<td>Italy</td>
<td>●  Little knowledge of LCT</td>
</tr>
<tr>
<td>Ahold</td>
<td>Netherlands</td>
<td>*</td>
</tr>
<tr>
<td>Sonae</td>
<td>Portugal</td>
<td>*</td>
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<tr>
<td>IKEA</td>
<td>Sweden</td>
<td>●●</td>
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<tr>
<td>Coop</td>
<td>Switzerland</td>
<td>●●</td>
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<tr>
<td>British Retail Consortium</td>
<td>United Kingdom</td>
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<tr>
<td>Kingfisher Group</td>
<td>United Kingdom</td>
<td>*</td>
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</table>

* Annual Environmental/Sustainability reports are consulted
Total list of consumer organisations contacted for the survey.

The organisations marked with - ●● - in the table have responded by a telephone interview or completed questionnaire.
The organisations marked with - ● - in the table have responded, but have not given an interview or completed the questionnaire.

<table>
<thead>
<tr>
<th>Name organisation</th>
<th>Country</th>
<th>Remark</th>
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<td>BEUC European Association of European Consumers (AEC)</td>
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<tr>
<td>Association Belge des Consommateurs – Test-Achats</td>
<td>Belgium</td>
<td>●●</td>
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<tr>
<td>Consumers Defence Association of the Czech Republic</td>
<td>Czech Republic</td>
<td>● LCT concept almost unknown</td>
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<tr>
<td>Forbrugerrådet (FR) / Danish Consumer Council</td>
<td>Denmark</td>
<td>● Not willing to cooperate, there is a rule not to contribute for free to questionnaires</td>
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<td>Informationscenteret for Miljø &amp; Sundhed</td>
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<td>Union Federale des Consommateurs - Que Choisir</td>
<td>France</td>
<td>● Made no study of the subject and cannot answer to the questionnaire</td>
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<td>General Consumers Federation of Greece</td>
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<td>Polish Consumer Federation</td>
<td>Poland</td>
<td>● Not much experience in the area of IPP</td>
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<tr>
<td>The National Consumer Council</td>
<td>United Kingdom</td>
<td>● Unable to participate</td>
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Appendix 7  EMS Speedometer

Based on literature reference [145], December 2003.

**Indicator 1 – Amount of certifications per country**  
61,295 certifications in 128 countries

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**Indicator 2 - Population per Certificate**

1000 inhabitants per certificate

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<td>2</td>
<td>Finland</td>
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<tr>
<td>3</td>
<td>Switzerland</td>
<td>6,31</td>
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