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Scientific Support to Policies (SSP) - Specific Support action

Sustainable Consumption Policies Effectiveness Evaluation (SCOPE²)

Inventory and assessment of business initiatives (final draft)

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Preface

The issue of Sustainable Consumption and Production was mentioned as action point in the Rio Conference in 1992 and later in the Johannesburg Plan of Implementation of 2002 that called for the development of a Ten-year Framework of Programs on Sustainable Consumption and Production (10 YFP on SCP). In 2006 SCP was included in the revised EU Sustainable Development Strategy (SDS). Implementing an action from the revised SDS, the EC published an SCP Action Plan (EC, 2008). Given the policy interest in SCP, under the EU’s 6th Framework Programme, a project was executed on the topic of the ‘effectiveness of policy instruments for SCP’. The project was performed by the Netherlands Organisation for Applied Scientific Research TNO (Netherlands), the Sustainable Europe Research Institute (SERI, Austria/Germany) and the International Institute for Industrial Ecological Economics (IIIEE) of Lund University (Sweden). The project was named Sustainable Consumption Policy Effectiveness Evaluation, in short: SCOPE2. Parallel to SCOPE2, a project lead by IÖW from Germany, with SIFO (Norway) and the Free University of Brussels (Belgium) was executed called ASCEE, also on policy instruments for SCP.

One work package (WP) in SCOPE2, WP2, focuses on business initiatives. The second deliverable of this WP is a review and assessment of business initiatives. The deliverable is formed by this report that will be integrated into a consolidated report of the full project in the in the course of the project.
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1 Introduction

1.1 Aim of the chapter

The main objective of WP 2 is to collect an inventory of business initiatives to promote sustainable consumption and greening of the markets and to analyse their effectiveness in various contexts.

The specific tasks are:

- to develop an inventory of business initiatives and best business practices for sustainable consumption and greening of markets, including services and initiatives where products were replaced by product-services;
- to evaluate effectiveness of the business initiatives and best business practices in realising sustainable consumption and greening of the markets;
- to identify barriers for use of these initiatives for different products and sectors (energy in housing, mobility and food) and in different countries;
- to identify factors contributing to initiation and implementation of business initiatives in different contexts.

In the work package 2 an inventory of business initiatives is made and their potential to facilitate the realisation for sustainable consumption practices and greening of the market will be evaluated. The activities of companies will be mapped along the life cycle of a product, which will improve the possibility to identify interdependencies and potential gaps with policy instruments.

To fulfil Task 1, the inventory of business initiatives will be made, which will include business practices that directly or indirectly influence private consumers and households and which have influence on reducing the environmental impacts of households, at least in the following three priority domains: energy (housing), mobility and food. Business activities to reduce environmental impacts from manufacturing processes will therefore be omitted, but not communication initiatives to consumers about achieved reductions in the production phases. If supply chain requirements have the ultimate effect on the final consumers or collaboration with suppliers leads to improved environmental profile of products, these types of initiatives will be included.

In Task 2, the business initiatives from the inventory in three areas of highest environmental impact of household consumption - energy (housing), mobility and food - will be evaluated from effectiveness perspective. Effectiveness of business initiatives will be judged from the sustainability perspective and will include economic, environmental and social effectiveness wherever possible.

In Task 3, drivers and barriers for the business initiatives in different contexts, including different product groups, different sectors, for various actors and in different countries will be investigated.

In Task 4, factors that facilitate realisation of business initiatives for sustainable consumption and production in households and for greening of the markets will be analysed.
1.2 Categorisation of SCP business initiatives

Sustainable consumption and production business initiatives can be divided into those addressing the supply side of the product life cycle – upstream from retailers and those that address the demand side of the life cycle – downstream from retailers and consumers. Since in the last decade a lot of attention of businesses and policies was directed at the supply side and many strategies were developed and applied successfully, the supply strategies chosen in this study are the more recent ones that have not been explored and applied to the same degree as for example cleaner production or environmental management systems. In this study we included green procurement and greening products through eco-design. The demand side strategies included ecolabelling and social labelling, green marketing, corporate social responsibility and product service system.

Table 1 Categorisation of supply and demand side strategies in three domains of household consumption: energy use in housing, mobility and food

<table>
<thead>
<tr>
<th>Supply side strategies affecting consumption patterns and levels</th>
<th>Demand side strategies affecting consumption patterns and levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green procurement</td>
<td>Ecolabelling and social labelling</td>
</tr>
<tr>
<td>Greening products through eco-design</td>
<td>Green marketing</td>
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<td></td>
<td>Product service system</td>
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</tbody>
</table>

Within each category of strategies several short examples of initiatives will be presented and a case study will be developed and evaluated according to criteria presented in the next section.

1.3 Assessment approach of SCP business initiatives

The business initiatives will be evaluated separately within the respected areas of energy use in housing, food and mobility. In order to better focus the study, the examples and case studies will be chosen from the following areas/products and will be investigated in more detail:

Table 2 Investigated areas and specific products and strategies within the areas

<table>
<thead>
<tr>
<th>Energy use in housing</th>
<th>Mobility</th>
<th>Food</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy-efficiency of buildings</td>
<td>Collective modes of transport</td>
<td>Organic farming</td>
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<tr>
<td>Energy-efficiency of appliances</td>
<td>Fuel efficient cars</td>
<td>Organic products</td>
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<tr>
<td>Car sharing</td>
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<tr>
<td>Bicycle use</td>
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</tbody>
</table>

Approximately 15-20 case studies within these areas and strategies will be developed and evaluated, which will be either based on a specific company case or on a concept case, e.g. passive houses, with several examples from companies. The presentation and evaluation of each case will be done in accordance with the following criteria as much as possible:

Table 3 Business initiatives evaluation
### Presentation of the case company

1. Describe the case company and a specific initiative within greening supply or demand area in each of the three domains of household consumption: energy in housing, mobility and food;

2. Identify drivers for the company to devise and employ the initiative;

3. Identify barriers for the company to devise and employ the initiative;

4. Identify factors contributing to initiation and implementation of the initiative.

### Evaluation of effectiveness of the business initiative according to the following criteria

#### 1. Environmental

- **a. Goal attainment** – what is the impact of the initiative with the regard to its goal – achieved percent reduction of environmental impact per unit or action

- **b. Relevance of the type of impact**: does the initiative address an important environmental problem?

- **c. Impact level** - Does the initiative have a high or low share in the impact of consumption e.g. car driving?

- **d. Outcomes** – What percent reduction per unit or action has the initiative lead to?

- **e. Rebound effects**
  1. Are there side-effects? Positive or negative?
  2. Is there danger of problem shifting? E.g. savings for consumers allow spending in consumption domain with higher environmental impacts

#### 2. Economic

- **a. Cost effectiveness**
  1. Does the initiative lead to higher operational or production costs?
  2. Could the initiative have been undertaken with lower financial costs?
  3. Tangible costs, e.g. new investments, more expensive material, more maintenance, higher use phase related costs
  4. Intangible costs, e.g. higher risks or uncertainties due to the application of new technologies or skills

- **b. Market share that the initiative has already reached or its diffusion potential?**

- **c. Competitiveness**
  1. Is the competitiveness of industry or company positively or negatively affected by the initiate?
  2. What is percent of cost enhancement?
  3. What is percent of enhanced user value?
  4. Did the initiative lead to the development of new capabilities that fit better into the future industry environment
<p>| | |</p>
<table>
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<tbody>
<tr>
<td>d.</td>
<td>Job market: is there change in the quality and quantity of jobs?</td>
</tr>
<tr>
<td>e.</td>
<td>Does the initiative changes user value and related customer acceptance?</td>
</tr>
<tr>
<td>1.</td>
<td>Tangible or intangible</td>
</tr>
<tr>
<td>2.</td>
<td>Increased or reduced</td>
</tr>
<tr>
<td>3.</td>
<td>Does the WTP changed due to tangible or intangible value for the user?</td>
</tr>
<tr>
<td>4.</td>
<td>To what degree individuals and organisations accept the initiative?</td>
</tr>
<tr>
<td>3.</td>
<td>Social</td>
</tr>
<tr>
<td>a.</td>
<td>Equity</td>
</tr>
<tr>
<td>1.</td>
<td>Intra-generational equity: how are the outcomes and costs distributed between different groups of society?</td>
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<tr>
<td>2.</td>
<td>Inter-generational equity: are there positive or negative effects for future generations?</td>
</tr>
<tr>
<td>b.</td>
<td>Enhancement of social quality of life: how does the initiative affect the social local fabric?</td>
</tr>
<tr>
<td>c.</td>
<td>Transparency and participatory rights: can customers participate in the design and implementation of the initiative?</td>
</tr>
<tr>
<td>d.</td>
<td>Respect to cultural values and diversity: does the initiative allow people to live according to their beliefs and values?</td>
</tr>
</tbody>
</table>

Based on the case studies and overview of strategies and with contribution of literature analysis, that will include evaluation studies, strong and weak sides of the identified strategies will be investigated, wherever possible including their performance against the three dimensions of sustainability: economic efficiency, environmental effectiveness and social soundness. The strategies will be evaluated with regard to the level of their dissemination and penetration in various countries. It will not be feasible within the scope of this project to conduct a thorough investigation on how much these strategies are known and applied in all 25 European countries. The ambition however is to collect expert opinions on this issue and find existing knowledge, which would allow us to make a reasonable judgement.

The drivers and barriers to various strategies and factors influencing their uptake and employment are of course context dependent – country, economic and cultural situation, business and political climate, etc. Therefore, findings pertaining to the specific context of countries will be paid special attention, while the main focus will remain on the EU level.

All types of evaluation will be based on the results of conducted studies in various countries and at the EU level and on interviews with experts in various strategies at EU level and possibly at national level. Such studies will include both the overviews of the state of the art in various strategies, evaluation of their efficiency, effectiveness and soundness, the level of their dissemination across Europe and their future trends. In the case such studies will not be available, results of studies and evaluations of strategies according to the sustainability dimensions will be collected on the case-by-case basis.
and complemented with results of the interviews with experts. Thus, a picture regarding the effectiveness-efficiency of strategies as well as of their dissemination in various European countries and regions will emerge.

1.4 Assumptions and hypotheses regarding SCP business initiatives

A number of assumptions pre-empt this investigation regarding the effectiveness-efficiency of environmental strategies of companies and the level of their dissemination across Europe:

- There is a great diversity of business initiatives across Europe and across various sectors.
- The uptake of business strategies differs considerably among member states.
- Factors that are of major influence for the uptake of business strategies, as well as the effectiveness and efficiency of strategies, are national legislation and its enforceability in each country, public environmental awareness and cultural context and traditions.
- Sectors that are under considerable pressure from legislation boast many more initiatives, than sectors that are typically or rarely under legislative pressure
- The legislative pressure can sometimes be enhanced by the raising public awareness and public pressure on the sector, due to the importance of the impacts or actions for population, negative publicity and similar.
2 Structured inventory of SCP business initiatives

2.1 Introduction to the inventory
The goal of this chapter is to provide a structured inventory of SCP business initiatives without dividing them into the major domains. The business strategies are instead divided into supply- and demand-side strategies. Green procurement and greening products through eco-design are investigated as supply-side strategies, while the demand-side strategies include voluntary ecolabelling and social labelling, green marketing, and product service systems.\(^1\)

2.2 Greening supply side
Greening supply side includes green private procurement and eco-design strategies that are presented below.

2.2.1 Green private procurement
Green private procurement refers to procurement practices of companies that include environmental and social criteria for products and services. By purchasing products and services that have lower environmental and social impacts, companies can gain certain benefits. In addition to improving environmental performance within the company if for example more energy efficient equipment is bought and used, GPP has much broader effects for companies that follow green private procurement principles. The main effect is that these companies send the demand for environmentally and socially sound products and services upstream the supply chain and stimulate market creation for such products and services downstream. Thus, green procurement is an innovative way of stimulating sustainable production and consumption. Since it is a voluntary initiative, it is considered to be less expensive than for example, regulation, and more able to provide flexibility to companies. The regulation also has its limitations, as for example, limited enforcement opportunities in countries other than the country, where purchasing legislation has been developed. Voluntary codes of conduct, including green private purchasing criteria, might be the only possibility of introducing any kind of influence on production methods in other countries, especially in developing countries, in which legislative framework is weak or non-existent.

On the other hand, green private procurement also has its limitations. One of the main limitations is that still many procurement managers and companies have difficulties with defining what environmentally sound product or service is and how green procurement criteria can be developed so that a balance is found between multiple environmental, economic and social criteria. A key challenge for introducing green procurement in companies is therefore changing procurement practices within the purchasing departments. Procurement is based on established supplier relationships, personal preferences and brand name. Prices and costs of products and services is the first and often the only consideration of companies, who often not have guidelines for what and how environmental and social considerations should be included in the purchasing practices. Even fewer is the number of companies that internalise environmental or social costs, consider full product life-cycle costs or include the total cost of the product ownership.

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\(^1\) Corporate social responsibility is a collective term for a number of strategies including greening supply chain and initiatives associated with Fairtrade issues and community development. In order to avoid confusion and overlaps each of the contributing to CSR strategies are therefore presented under the respective title in accordance with the structure presented in 2.1.
2.2.2 Green products, technologies and operations

Some large multinationals and some small and medium-size enterprises initiated strategies to develop own eco-design approaches that are based on life cycle thinking and life cycle analysis methodology. For some companies life cycle thinking means that eco-design practices create incentive for introducing green demands into the supply chain. Overall, however, the number of European companies that can claim that they systematically use or have integrated eco-design practices into everyday routines is still very limited. A survey of European companies demonstrates that only in few countries, e.g. Germany, Netherlands, Sweden, eco-design practices that are based on life cycle considerations have been applied by companies (Tukker, Haag et al. 2000). The business-as-usual case still does not include concerns for environmental impacts and features of company products and consequently no actions for investigating possibilities of reducing environmental impacts through innovation in processes and products. In cases when companies employ eco-design strategies, they are of rather incremental nature, rather than radical (Rubik 2002).

Despite the growing number of various help tools and manuals for eco-design, companies state that there is still lack of practical eco-design procedures. Market research reveals lack of market demand for green products, which is contradictory to numerous consumer surveys that show growing interest of consumers in health and environmental features of products and growing willingness to buy ecological produce or energy-efficient products. The producers of for example electric and electronic equipment show much higher level of interest and activity in eco-design practices because they are very much stimulated by EU Directives for electric and electronic products to improve their energy efficiency.

The countries leading in eco-design activities are Denmark, Germany, the Netherlands, Austria and Sweden. In these countries, eco-design programmes and initiatives have been initiated and/or supported by governments, non-governmental organisations, such as academia, and companies themselves or industry associations (Tukker, Haag et al. 2000). They typically target small and medium-size enterprises from different sectors or comprise sectoral initiatives, e.g. in the British and Danish electronic industry (Tukker, Haag et al. 2000).

The main limitations of the current eco-design strategies is that their use and results are limited by lacking fiscal incentives that could compensate for increases costs of designing green, increases time-to market period, potential rebound effects and lack of market demand for many types of green products, although there is a huge diversity of consumer awareness and the level of active demand in different sectors and among different products categories.

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2 There is conflicting evidence on the interest in environmental information and action from the side of consumers. Several marketing studies have indicated that the number of “green” consumers is increasing, while results at the retail level show that environmental criteria is often not reflected in actual purchases (OECD (1997). Eco-Labeling: Actual Effects of Selected Programmes. Paris, OECD; 81;OECD (1999c). Education and Learning for Sustainable Consumption. Paris, OECD, Environment Directorate, Centre for Educational Research and Innovation: 48. It appears as if many consumers in OECD countries show a high level of environmental activism, but medium to low willingness to pay for green products Environics (2000). The Environmental Monitor. Canada.
2.3 Greening demand side

2.3.1 Ecolabelling and social labelling

Eco-labels are a useful and effective way of communicating product attributes that meet consumers’ social and environmental preferences. The main strengths of labelling schemes are visibility and simplicity since labels can provide support for purchasing decisions to consumers that have no time, interest or ability to search for information about product features. Besides company reports and advertising, eco-labels are another tools for companies to promote more environmentally sound products and services on the market (UNEP 2005a).

In order to increase credibility of eco-labels, companies apply for certification of their activities and of environmental features of eco-designed products by third parties, such as standardisation organisations and certification systems. The increasing number of companies, which have joined national and/or international eco-labelling schemes (ISO type I schemes), indicates that many schemes and labels for certain product groups are quite successful. It also indicates that there is a growing number of consumers, who are willing to pay for eco-labelled products and are interested in obtaining broader range of information about product features than price and quality.

Eco-labels can be a cost effective way for marketing environmental features of products and services, if market and customer demand is present. Mandatory and voluntary labels lead to the behavioural change of manufacturers and thereby have direct effect on the entire consuming public through supply and communication about green products.

The goal of the eco-label is certainly to promote innovation on the market, but also and mainly to help the entire range of products in a single product category to improve with time.

Figure 1 Theoretical mechanism of ecolabelling (Lindhqvist 1996)

Labels also stimulate changes in several stages of supply chains and by several actors. For example, they encourage distributors and retailers to purchase and provide eco-efficient and environmentally and socially sound products.

Despite the relative visibility of eco-labels on the market, many businesses seem to still be unenthusiastic about their use. However, the share of eco-labelled products differs
significantly among product categories. For example, in the EU class A and B refrigerators reached 20% market share already in mid-1990s, while the market for organic food currently represents only 1.5% of all EU food sales (EEA 2001). On the other hand, there are 108 different eco-labels for food products in Europe (Nilsson, Tuncer et al. 2004). This presents a possibility that sheer number of eco-labels may create confusion among consumers and may lead to erosion of credibility to labels in other product groups.

There are also large variations in uptake of eco-labelled products in various countries. For example, the market share of eco-labelled laundry detergents in Sweden reached 90% (Coop Norden 2005). In late 1990s, Sweden more than doubled the number of eco-labelled products, with class A washing machines gaining 30% of the market. Organic produce is growing in many countries, but has the highest market share in Germany, Italy, France, and the UK. The majority of Fairtrade products are sold in Switzerland, Germany and the UK (FLOI 2007).

2.3.2  Green Marketing

Marketing can promote change towards sustainability, through increasing public awareness on sustainability issues (UNEP 2005a). However, traditional marketing may not be suitable for “selling” sustainability (McKenzie-Mohr and Smith 1999), because of the main goal being profit maximisation that is currently defined in selling more and more material goods. Thus, a new branch of marketing has emerged that is geared towards selling sustainability through greener products, alternative offers, such as product-service systems, and other socially and ethically sound goods. The so-called green marketing can potentially create a better way for marketing more sustainable products.

Green marketing integrates social and environmental aspects, which respond to the concerns and attention given to these aspects in the society in recent years. Due to increasing consumer and societal awareness about environmental and social issues, green marketing is gaining importance. UNEP sees green marketing to be one of the key elements of fostering more sustainable consumption patterns (UNEP 2005a), not least due to increasing the role of cause-related marketing.

Green marketing is a more specialised strategy than traditional marketing. In various groups of products various issues are being marketed. For instance, Fairtrade issues have deserved wide attention on coffee market, problems and solutions related to GMOs are discussed with regard to milk products, obesity issues are communicated about in the fast-food and fizzy drinks sectors. Organic farming has been promoted in association with vegetables and meat products (Belz 2006). As demonstrated, the various environmental and social issues are given different level of importance in the society, often driven by mass media, investigative journalists and non-governmental organisations and interest groups. Academia and researchers that provide scientific basis for identifying priority issues that require policy intervention or business action do not always define the agenda of societal discussion. Therefore, companies also use green marketing tools to create strong and good reputation and own customer base, which can help them in times when unexpected issues or facts about environmental and social impacts come into light of public.
2.3.3 Product service systems

Product-service system is often defined as “a marketable set of products and services capable of jointly fulfilling a user’s need” (Goedkoop, van Halen et al. 1999) or as a a system of products, services, networks of actors and supporting infrastructure that continuously strives to be competitive, satisfy customer needs and has a lower environmental impact than traditional business models (Mont 2004b). “A product-service system consists of tangible products and intangible services designed and combined so that they jointly are capable of fulfilling specific customers’ needs. As most of the business focus today is either on product manufacture or on service provision the strategic design of Product-Service-System shifts the business innovation focus from mainly product or mainly service design to an integrated product-service design strategy. This can result in the involvement of additional stakeholders and even the customers in the PSS development and design process” (Tischner, Verkuijl et al. 2002).

The PSS approach changes the price cost systems of the present economy, because the costs of production are only a very small part of the costs involved in making a product available to the customer. Consumers pay not for material goods, but for intangible services that satisfy their needs. The PSS concept has the potential to bring about changes in production and consumption patterns that might accelerate the shift towards more sustainable practices and societies.


There is also a great difference between the dissemination of PSS in different sectors and in different regions. For example, in the U.S. automobile sector chemical management services already embrace 50-80% of the market, in electronics – 35%, in metalworking – 20% and in aerospace industry – 10% (Votta 2003). Stahel (2000) estimated that in 1998 the EU market of “products sold as services” was around 10% of GDP or 758 billion Euro. Within this sector 60% came from leasing, fleet management and sharing arrangements while remanufacturing activities generated 40%. Undoubtedly, companies also differ in the extent they shifted to providing services. For example, service provision of Interface Inc. accounts only for 10% of U.S. market of the company and only for 5% in Europe (Parnell 2004). Conversely, other companies, e.g. Schindler and General Electric, generate up to 75% of their sales volume from providing services (Stahel 1998). Additionally, there are many examples of companies that have developed elements of potential product-service systems, such as eco-design, optimisation of distribution, product customisation, added services, take back systems, remanufacturing, and recycling, but in some sectors there are not many companies that have systematically explored concurrent development of several elements, which can also allow for system optimisation in environmental and economic terms.

Private consumers on the other hand might not be very enthusiastic about ownerless consumption. Numerous examples of practical applications of product-service ideas in
the commercial sector did not facilitate operationalisation in the private market. The successful models such as car sharing are still limited to small market niches. Customers’ demands and purchasing behaviour appear to be potentially more complicated than expected. The assumptions that the customer is more interested in use, rather than the ownership, or is looking for the use, rather than the product itself, does not exactly represent reality.
3 Effectiveness evaluation of SCP business initiatives

The goal of this chapter is to provide an overview of existing SCP business strategies and of real life examples of how they are being applied or used by businesses from the different sectors within the domains of the highest environmental impact from households: food, housing and mobility and to evaluate these strategies from environmental and economic perspectives. The chapter is structured according to domain and then according to the business strategies selected from the demand and supply side that were outlined in section 2.

3.1 Business initiatives in the “Energy Use in Housing” domain

Energy consumption in the European Union is increasing and with it Europe’s dependence on the imported fossil fuels. This creates challenge for Europe to reach the 8% reduction targets of greenhouse-gas emissions by 2012 compared to 1990 levels according to the Kyoto Protocol (European Commission 2006). According to the Green Paper adopted by the European Commission in 2000 (European Commission 2000), there are two ways for how Europe can reduce its dependence on imported energy: to improve energy efficiency and to increase the use of renewable energy produced in the EU. The next Green Paper on Energy Efficiency from 2005 suggested developing energy efficient technologies and changing consumer behaviour in order to save 20% of energy consumption by 2020 (European Commission 2005b). In addition to the Green Papers, in 2005 the Biomass Action Plan proposed to expand the production and use of biomass in the EU as a contribution to the goals of increasing the use of renewable energy sources (European Commission 2005a).

Almost 40% of total final energy consumption in the EU is used by buildings (Janssen 2004). Therefore, it is very important to increase energy efficiency of both new and old buildings. It is estimated that in the next 15 years within the EU more than a million new buildings will be constructed. In addition to new buildings, approximately 1-2% of the building stock is renovated every year. Residential sector currently accounts for 27% of total energy consumption in the EU. The reduction of the energy consumption by the residential sector can be achieved by designing energy efficient buildings and by reducing energy consumption in the operational phase of the buildings’ lifecycle, since about 80-85% of total building energy is consumed during its use phase through heating, cooling, ventilation, and hot water use, if a building life is more than 50 years (WBCSD 2007).

In the operational phase, space heating is responsible for 70% of the household energy use in the EU (EEA 2005). The total amount of energy used for space heating continues to grow, due mainly to the increase in the number of households and the size of the average home (Enerdata 2004), but also as a result of increased energy use for heating and appliances, despite the increasing energy and resource-efficiency of each appliance. The share of households in total energy consumption has increased in the past 10 years in almost all the EU-15 countries and in some new Member States. Households contributed 10% of CO2 emissions in the EU-15 in 2002. A shift to renewable energy has balanced the increase in energy use and therefore CO2 emissions from households remained stable between 1990 and 2002, only fluctuating with outdoor temperatures in winter (EEA 2004).
3.1.1 Greening supply side

3.1.1.1 Green private procurement

Supply chains of construction industry are going global – construction materials have been shipped around the globe being often extracted in developing or low labour cost countries often in conditions that adversely affect local environments and workers health and safety. Therefore, in recent years there has been a growing pressure on European construction companies to exercise their power to exert pressure on their suppliers to ensure that their operational practices are in line with international health and safety and environmental standards. In addition to upstream supply chain management practices of construction companies, companies operating in housing sector, as for example building owners, are also becoming active in environmental and social issues. For example, in several European countries building owners are starting to request energy efficiency audits that should provide recommendations for how energy efficiency measures could be undertaken in a cost-effective manner (Commission on Sustainable Development 2006).

The Chartered Institute of Building (2005) argues that one of the main drivers for the construction industry to develop environmental and social supplier requirements is to preserve the reputation of businesses, whose activities are under continuous attention from the public, media, environmental pressure groups, and potential clients and investors. Many construction companies are working oversees and their activities in other countries also come into close scrutiny by pressure groups, citizens or governments there. For example, the UK construction industry exports for about £10 billion per year. Recently, however, for a construction company to win a tender or a contract, it needs to demonstrate that on-site working conditions and the environmental and social impacts of the activities will not adversely affect company’s reputation (Jones, Comfort et al. 2006). One example of a company that developed supplier requirements is the ACS Group, Spain that is in the business of development, construction and management of infrastructure (ASG Group 2003). To address the supply chain issues the company included environmental criteria in the evaluation process of its suppliers and a specific paragraph in the contract specifying the supplier’s environmental obligations, which include the handling of permits, storage conditions for hazardous products and waste management issues. The environmental performance of the suppliers according to the contact and obtained permits is also checked after the work has been completed. Other companies, such as Alcatel-Lucent, France, have requirements to suppliers and subcontractors to submit an eco-declaration or to fill in an extensive questionnaire related to the environmental features of their products (Alcatel-Lucent 2007).

In order to respond to the raising concerns of public regarding environmental practices of businesses, some construction companies start collaborating with NGOs. For example, building materials company Holcim, Switzerland and environmental group the World conservation union (IUCN) have signed a 3 year agreement to improve the firm’s approach to biodiversity (ENDS 2007d). Conservation aims will be incorporated in the firm’s global business strategy and measures introduced to reduce biodiversity impacts at site level. The first projects are planned to take place at Holcim’s quarries in Sri Lanka that affect local coral ecosystems.

**BASTA initiative, Sweden** BASTA initiative aims at reducing and phasing out the use of hazardous substances in construction products. It has been initiated by the four
largest construction companies in Sweden, NCC, JM, Peab and Skanska together with their trade organisation, the Swedish Construction Federation. The roots of the BASTA project lie in the European chemicals regulation REACH, in which responsibility rests heavily on suppliers to study and inform their customers about the impact on health and the environment. Suppliers are responsible for providing information that proves that products, chemicals and substances meet the developed criteria. In addition to this self-proclaimed information, a system of auditing procedures for assuring and validating the quality of the information has been developed, which included requirements on supplier’s organisation and documentation, and random audits of the suppliers’ data. To ensure future success of the system, an industry-wide standard for properties’ criteria has been developed and endorsed by major players of the Swedish construction sector.

In order to better understand the reasons for companies to initiate work with suppliers, a case of the Swedish construction company *Skanska* is investigated in more detail.

### 3.1.1.1 CASE 1 Skanska, Sweden: green procurement in a construction company

Skanska is a Swedish construction company. The company has started to develop procedures for organised green purchasing and demands to suppliers quite recently, but nevertheless Skanska together with NCC is the leader in environmental strategies on the Swedish market, in which five large constructions companies prevail. The construction sector in Sweden is undergoing a restructuring from purchasing at operational and project based level of assignments towards more central purchasing and strategic planning.

The main drivers for the considerable shift in practices come from legislation and increasing public awareness about environment related issues, as well as company knowledge about benefits to the bottom-line. The shift is also stimulated by periodic media attention to building companies. The company considers media attention to their activities as one of the main indicators as to what is perceived as important in the society. Media is also seen by the company as a channel for increasing knowledge about the company and its activities by society at large and customers.

One of the issues that often receives attention is the energy use in buildings, both in the process of their construction and in the use phase. The reduction of energy use of buildings and operations in a construction company can be achieved by procurement of more energy-efficient windows, purchasing of green electricity, procurement of green diesel that is used in company’s own transport and purchasing of cement from local sources.

The company experiences several barriers to fulfilling these strategies. One external barrier is the lack of green alternatives on the market for competitive prices, which could help the company to make more sustainable choices, e.g. the availability of biodiesel on the market. So far Statoil is one of few companies on the market that provides diesel fuel with 5% raps oil and so far in Sweden the demand exceeds the supply. Skanska has interest in having these markets grow and considers supporting the niche markets by buying a certain percent of their total purchases of available alternatives from small suppliers for higher price. The second external barrier is the sometimes conflicting procedures and requirements of some institutions that prevent more environmentally sound and innovative products and solutions from entering the market. And the third barrier is the lack of customer demands for more environmentally sound, energy efficient and low-cost maintenance housing, which would provide incentive and
set pressure on Skanska for their environmental choices and decisions. Skanska sees its role in both creating the market of more environmentally and socially sound alternatives and in creating the client basis. The main internal barrier is the nature of project oriented work in construction industry and transition towards centralising purchasing function in the organisation.

When it comes to supplier demands, Skansa has various levels for their evaluation. The minimum level is the availability of the material safety data sheets. The next level is the requirement to test supplier’s product samples in Skanska’s lab. The company also has specific requirements when it comes to the working environment. The minimum requirement here is that the supplier has CE or another kind of labelling. The next level is product testing and the last one is the two-step testing with the second level testing that products will not injure workers. The specificity of the construction business is reflected in the fact that the risk picture of products and activities changes depending on the type of product, on the type of supplier, on the level of media interest in specific country or specific location and on the type of customer who will be using the product. The company reports increasing interest from institutional customers, such as communities, in the supply chain management and supplier requirements. When evaluating suppliers from abroad the requirements are the following: compliance with local legislation and availability of all the needed licences for operations as a minimum requirement, appointed environmental manager on site as the medium level requirement, and the highest level is the third party evaluation of supplier practices.

**Environmental evaluation**

Greening the supply chain of construction companies may reduce life cycle environmental impacts of buildings, including energy use in their construction and use. The actual impact is difficult to estimate, but some studies demonstrate that the construction phase accounts for 3% of the total CO2 burden on houses (Lazarus 2003). This embodies CO2 of houses is less significant than the energy consumption and CO2 emissions during their use phase. Therefore, green purchasing is also more relevant for reducing energy use in the use phase of a house life cycle phase, which is responsible for about 30% of total energy consumption (Lazarus 2003). However, there the impact of green purchasing is more associated with the operations of building managers, than construction companies. They can choose renewable energy sources and educate tenants in energy use reduction measures.

**Economic evaluation**

Putting demands on suppliers may entail increased purchasing costs, especially in cases when there is limited demand of more environmentally sound alternatives on the market and when companies are willing to support small- and medium-size companies with their niche products, which typically cost more than mass produced products and technologies. Both the tangible and intangible costs may be higher. The tangible costs include more expensive environmentally sound alternatives that construction companies may be willing to purchase. The intangible costs include uncertainties associated with finding and evaluating new suppliers, which are often small or unknown to construction companies. Incorporation of environmental criteria in purchasing specifications requires new skills from purchasing and environmental departments in companies, which leads to increased tangible and intangible costs. The case company foresees increased competitiveness in the future with the development of green purchasing practices. This initiative however does not have immediate impact on competitiveness, due to low demand from customers and lacking client base for green construction projects and
green buildings in Sweden. Including environmental criteria into purchasing guidelines leads to changed quality of jobs, especially in purchasing and environmental departments. It is however not likely that this change is so dramatic as to lead to drastic increase in job places. In Skanska, one new working place was created to support the purchasing department with environmental issues. The green purchasing initiative is likely to improve customer value by extending the offer of environmentally sound products and technologies in housing construction and by reducing environmental impacts associated with their production and use in the final product – buildings. The value is likely to increase not only due to the reduction of use-related costs of building, but also due to reduced direct and indirect social impacts of products as well. The progress of the initiative is slow due to the perceived increase in price of the final product. According to Skanska, the environmental and social awareness of the customer base needs to be further developed.

3.1.1.1.2 CASE 2 BedZED, UK³: green purchasing and local sourcing

The British construction industry uses 420 million tonnes of various construction materials annually (Lazarus 2003), which represents over 50% of all the resources used by weight in the society. Construction materials also need to be transported and this road freight accounts for 30% of all transport miles in the UK. In addition to the transportation, construction and demolition industry produces large quantities of waste – more than 4 times that of the domestic sector. All these activities lead to adverse environmental and social impacts on nature and people.

However, the life cycle of a house demonstrates that the highest environmental impacts of a house stem not from the production-construction phase, but from the use phase, during which various consumables, e.g. energy, water, gas, are used. For example, in the UK, construction materials account for 2-3% of the total CO₂ emissions, while household energy consumption accounts for 29%. Therefore, it is important to design houses that are energy and water efficient in the use phase and this was the goal of the the BedZED scheme. To allow that, the BedZED project used the latest energy efficiency construction technologies, including super-insulation of the house and double and triple glazing. In order to reduce the 29% of the CO₂ emissions related to the use of houses, the BedZED generates on-site electricity from renewable and carbon neutral sources. The houses also use more materials than traditional houses, but with the same level of embodied environmental impacts – total embodied CO₂ of BedZED is 675 kg/m², while traditional houses aim at 600-800 kg/m² range. Although the amount of the used construction materials in the project increased, the total embodied impact of the project has been reduced by 20-30% due to the sourcing of local and low impact goods and materials.

Since the transport of construction materials in the UK accounts for 30% of all road freight and emits 28 million tonnes of CO₂ per year, BedZED decided to source its materials from within 35 miles.

One of the many purchasing choices that needed to be made in BedZED was the choice of windows. Since modern windows are made from high impact materials, such as uPVC and Al, a traditional and more sustainable material - timber - was chosen instead.

Environmental evaluation

The chose of timber however was not a straightforward one. The Design Team wanted to make frames from local hardwood, which has longer life and lower life cycle costs than softwood types. The team also wanted to support locally grown timber and stimulate development in local timber production. However, local companies did not have experience with working with hard types of wood and had little expertise in manufacturing state of the art triple glazed windows. In addition, the BedZed project was simply too big for the local small- and medium-size companies. all these factors led to the decision to look for suppliers of windows elsewhere. The Design Team chose Danish window manufacturer Rationel, which met financial and performance criteria developed by the team. The fact that the company was sourcing 40% of their timber from FSC certified forests also contributed to the final decision.

In order to ensure that the Danish choice is preferable and environmentally more sound than traditional uPVC or Al windows, an evaluation was made with the use of Environmental Profiling - an evaluation method developed by the Building Research Establishment and measured in Ecopoints (see Figure 2). The method is based on the life cycle assessment and measures impacts of materials in 12 impact categories: waste disposal, water extraction, minerals extraction, fossil fuel depletion eutrophication, eco-toxicity, human toxicity to water, climate change, ozone depletion, human toxicity to air, acid deposition, and summer smog. The end results on the material’s impact in each impact category are weighed against the impact of an average UK citizen and allocated an Ecopoint score (Lazarus 2003).

![Figure 2 Environmental Profiling of timber framed windows, uPVC-framed and Aluminium framed windows](image)

**Economic evaluation**

Traditionally timber-framed windows are cheaper than uPVC or Al-framed ones. They however may imply higher maintenance costs in the downstream stages of the life cycle. In this sense, windows produced by Rationel cost more than other timber-framed windows, but due to their high performance quality, e.g. air tightness and durability, the cost of maintaining them was lower. For example, Rationel’s windows costed in the range of £130-300/m², while comparable Al-framed windows were priced at £185-275/m².

During the BedZED project it was found that often environmental options are actually cheaper than traditional alternatives and materials. For example, the timber framed
windows are cheaper than Al-framed and uPVC windows, and save up to 12.5% of the embodied CO2. Sand and other recycled materials are cheaper than virgin raw materials. Recovered structural steel is cheaper than the newly produced one and saves 96% of the associated environmental impact. Therefore, in the project, 15% of all the materials were recovered or recycled materials. The goal of using local materials as much as possible was achieved by sourcing 52% of all the materials from within the 50 kilometres radius and with having the average sourcing distance of 90 kilometres. The conscious work on reducing transportation distances allowed the BedZed project to save about 2% of the scheme’s embodied CO2. It is reported that the local sourcing did not cost additionally and did not require additional expertise. The overall costs of the BedZED project can be seen in the case of environmental products from BedZed.

3.1.1.2 Green products and technologies: buildings and appliances

Businesses can employ several strategies for reducing energy consumption associated with buildings and appliances through design of more efficient – green - homes and by developing more energy-efficient appliances. Currently, no comprehensive statistics are available at the EU level concerning the number of “green buildings” in Europe, due to the fact that there is as yet no common “green building” definition in the European Union (Strohmer 2006) or in fact even no common name. One can find such titles as passive houses, low energy houses, energy-efficient buildings, green buildings, zero energy building zero-carbon housing or net zero energy building. Other strategies may include a number of approaches, such as using less materials or more effective materials in the construction; using recycled or recyclable products, extending lifetime of buildings, construction materials and appliances used in homes. In many countries more sustainable designs of housing are based on long term local tradition and knowledge of local climate conditions. These traditional designs are often much more energy, material and water efficient and rely on local supplies of materials.

Despite the above mentioned diversity of strategies, there is general understanding of what constitutes a more energy-efficient building: it requires little energy for space heating, is well insulated, may use renewable sources of energy, as biomass, or have own energy production unit, such as through solar panels or to be attached to a local wind mill, to a geothermal installation, a small hydro station or have photovoltaic (PV) units. There are numerous examples of companies that build new or reconstruct old buildings to make them more energy efficient. For example, GBG construction company, Germany has renovated houses built during the early 1930s and made them a 3-liter house – house heating requires no more than the equivalent of an annual 3 liters/m² of heating oil (German Energy Agency 2006). It is a high degree of energy efficiency for a historical building. Even newly constructed homes are legally allowed to consume twice as much under German law. Under German law, buildings are required to have a minimum of 12 centimetres of insulation on their facades, but for this complex, GBG used 20 centimetres. The insulation on the cellar ceiling is four times as thick as the legal requirement. The windows are also more rigorously insulated than building regulations demand. The building’s energy needs were reduced by 9%. But that kind of efficiency is still rare when it comes to historical buildings, which often consume between 20-25 litres of heating oil per square meter each year. Consumption levels of 30 litres or more are not unusual. Another German company, Viebrock construction company, is now building houses that consume only 2 litres of heating oil per square meter (German Energy Agency 2006).
Among the various concepts named above one can see the evolution of energy-efficiency in various housing projects, starting from improving energy efficiency of a house, moving towards passive houses, to the so-called zero-energy building or even positive energy houses.

The passive house (PassivHaus) standard originated from cooperation between the PHI (Germany) and Lund University (Sweden), and may be described as an enhancement of the low-energy-building standard. It combines the advantages of the “passive solar design” with the “super-insulated design”. The passive house (including its special technology) can be applied to new building construction and to renovation objects. There are five key elements of a passive house: all components of the house envelope should be highly insulated; all air leakages through unsealed joints should be tightened; in terms of ventilation a mechanical system with heat recovery should be used so that hot air leaving the building would warm the cooler air coming in; thermal “bridges” should be created so that to eliminate heat loss from poorly insulated points in windows, doors or other parts of the envelope and windows should be designed so as to minimise heat loss in winter and heat gain in summer.

In Europe, the definition of a passive house requires that the annual heating energy be less than 15 kWh/(m²a) (4755 Btu/ft²/yr) and the specific heat load for a heating source at design temperature is lower than 10 W/m². Moreover, the energy consumption of the living area should not exceed 120 kWh/(m²a) for heat, hot water, and household electricity combined (Wimmers 2006). The combined end energy consumed by a passive house is less than 25% of the energy consumed by the average new home constructed in Europe. Compared with normal US houses, passive houses in Austria use as little as 1/30th the energy for heating, cooling, and hot water. If a house built close to “passive house” standards uses renewable energy (solar cells, solar thermal energy, wind energy, biofuels, or an earth-heat exchanger), it can even generate more energy than it uses. Such buildings may be called “energy-plus houses”. With its saving potential of 80% for new buildings and up to 95% for renewing old ones, the passive house is the most sustainable and economically feasible total concept of future-oriented construction standards.

Since the mid-1990s, the number of passive houses has constantly grown, typically doubling each year. The world’s largest passive office complex is called “Energon” and was built in Ulm, Germany in 2002. Today more than 6,000 passive buildings exist in Germany, Austria and Switzerland. They include residential complexes, office buildings, factories, day-care centres and schools. The number of passive houses in Europe is expected to double in 2008.

The next level of low energy houses is a zero energy building (ZEB) with annual zero net energy consumption that is measured either in costs, energy consumption or CO2 emissions. The zero energy use housing is seen as a potential solution to European dependence on imported oil, as a way to reduce CO2 emissions from buildings and a measure to secure energy security.

The zero energy buildings are designed with the zero energy use target from the very outset of the project, in contrast to the traditional construction practices lead by the goal of reducing construction costs. In the latter case, architects do not typically perform energy analysis and even more rare are the cases when life cycle costs associated with the lifespan of the building are calculated. The zero energy building projects conduct
analyses that estimate the consequences of any decision in the construction project on the final energy demand of the building in the use phase. This means that typically decisions are made to allow higher construction costs if these are compensated by the reduction of maintenance and operating costs. Zero energy buildings use renewable energy, but in addition utilise energy generated by white goods, appliances and lighting. They are super-insulated houses that use passive solar heat and adapt to daily variations of outdoor temperature. In some cases, micro-scale energy generators, e.g. solar cells or wind turbines, might be installed on individual houses, which could generate energy in form of heat and electricity. Some houses are connected to the electricity grid and may even supply electricity to the grid, thereby reducing energy production and use costs.

Economic evaluations of passive housing differ from project to project, as well as the design of passive houses itself. In some cases, passive houses cost as much as traditional new houses, while in other cases, doubling of construction costs has been reported. This is also due to the diversity of energy producing technologies and their costs that are currently used in passive houses: solar panels, individual small-scale wind mills, equipment for extracting geothermal energy, small-scale hydro power stations and photovoltaic cells. For example, the cost of generating electricity by photovoltaic cells is still significantly higher than generating electricity from fossil fuel. On the other hand, solar heating is already cheaper than heating produced from fossil fuels (IEA 2007).

Although technologies for zero energy buildings are available, the zero energy buildings are still a small niche on the market. Reasons for this is partially high perceived costs of construction, lack of knowledge in construction companies in energy efficient buildings and construction techniques and materials, as well as lack of expressed demand from customers.

3.1.1.2.1 CASE 3 BedZED, UK: green products in construction business

BedZED or the BedZED Zero Energy Development, is the largest carbon-neutral eco-community near Wallington, England. The community has been designed and built by several companies including the Peabody Trust, Bill Dunster Architects and BioRegional Development Group - environmental consultants (Lazarus 2003). The community was built in 2000-2002 and comprises 82 houses and 1,405 m² of working space. It uses energy generated only from on site renewable sources and has 777 m² of solar panels. To maximise solar panels use, all the houses are designed and situated to face south. All houses have triple glazed windows and are super-insulated. In order to reduce environmental impact from transportation, construction materials are sources locally – 53% within 50 km radius (Lazarus 2003). In addition, construction materials come as recovered or recycled materials wherever possible. Waste management facilities also facilitate recycling.

Residents have access to car sharing system and the amount of car parking spaces is limited in the community. When the car sharing scheme purchases cars, preference is given to electric and LPG cars, also because parking spaces are equipped with charging station.

Environmental evaluation

After the community was built, the final results were evaluated and all the planned savings and targets were reached, the main being drastic savings in CO2 emissions in
all areas (Corbey 2005). The results of the post-construction monitoring demonstrate that in a number of areas, the target reduction was outperformed by the actual results.

Table 4 Monitoring results of environmental performance of BedZED (Corbey 2005)

<table>
<thead>
<tr>
<th></th>
<th>Monitored reduction (%)</th>
<th>Target reduction (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Space heating</td>
<td>88</td>
<td>90</td>
</tr>
<tr>
<td>Hot water consumption</td>
<td>57</td>
<td>33</td>
</tr>
<tr>
<td>Electricity used(^4)</td>
<td>25</td>
<td>33</td>
</tr>
<tr>
<td>Main water consumption</td>
<td>50</td>
<td>33</td>
</tr>
<tr>
<td>Fossil fuel car mileage</td>
<td>65</td>
<td>50</td>
</tr>
</tbody>
</table>

In terms of environmental costs and savings, the BedZED project results in water savings of 1,025 m\(^3\)/year and in CO\(_2\) savings of 147,1 tonnes/year (BioRegional 2007).

**Economic evaluation**

In total, the BedZed project showed that it does cost to build carbon neutral buildings. Table 5 provides comparison of a zero energy building with 100% of renewable energy sources, 100% recycling of wastewater and full Green Transport Plan.

Table 5 Cost savings for developer and to the occupants (Lazarus 2003)

<table>
<thead>
<tr>
<th>Costs or savings to Developer</th>
<th>Added build costs</th>
<th>£571 208</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Potential added revenue</td>
<td>£688 000</td>
</tr>
<tr>
<td>Costs or savings to BedZED occupants</td>
<td>Reduced bills</td>
<td>£3 847/year</td>
</tr>
<tr>
<td></td>
<td>Added value</td>
<td>Qualitative</td>
</tr>
</tbody>
</table>

A 6 plot terrace zero energy building costs £571,208 more than a traditional building. However, each terrace can generate £208,800 of profit (Lazarus 2003). It is estimated that besides that, the added value of sky gardens, on-site services and bill saving measures can add £480,000 in value. Therefore, the design team of the project decided to target environmental savings and high quality design, which will allow recovering higher construction costs in some period of time.

High construction costs are partially related to lack of expertise in building such zero energy buildings and partially to the high cost of specialised components that are needed in the construction of zero energy houses. Once the zero energy houses become more spread, these costs will be significantly reduced through bulk purchasing and improved level of expertise.

The Green Transport Plan in the BedZed community costs £12,385 for a 6 plot terrace, but results in 46.8 tonnes annual savings of CO\(_2\) emissions. It is hard to estimate for how long such level of emission reductions can be sustained, since this depends on lifestyle choices of residents. In order to facilitate alternative transport choices, congestion charging, increase of fuel prices and dissemination of car sharing schemes should be promoted. In the BedZed community, every meter that was saved from

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parking was used to generate the added revenue that could balance high construction costs.

3.1.2 Greening demand side

Since the energy crisis in the 1970s and especially since the 1990s, when climate change and energy consumption became strongly linked, there has been a focus on energy savings in most Western European countries. In many of them, households consume approximately 30% of all the energy used (EEA 2005).

3.1.2.1 Ecolabelling and social labelling

In Europe, household use accounts for about 30% of energy consumption. Households have therefore been the focus of several measures such as taxes, subsidies, information campaigns or labelling schemes aiming at stimulating energy savings. The European Directive 2002/91/EC on the Energy Performance of Buildings requires that every building sold after the 4th January 2006 has to be labelled in accordance with its energy performance (European Commission 2002).

One way to reduce energy use in housing is to build more energy efficient houses and appliances – these examples were described and evaluated in the previous section. In order to improve the chances for more environmentally sound products and technologies to enter market space many companies use labelling to demonstrate their efforts and to communicate to consumers and customers about the features of their offers. One communication strategy employed by many companies is through ecolabelling or social labelling, such as Fairtrade.

There is already a first Nordic Swan labelled house, built by the Swedish construction company **Skanska** according to the Danish design “Uniqhus” (ByggaBoDialog 2007). The design includes criteria for reduced raw material use, preference of natural materials and low energy use. In order to satisfy the criteria of the Nordic Swan ecolabelling programme, Skanska had to develop a comprehensive list of criteria for their suppliers and to increase demand for eco-labelled products. The company also increased demands on procurement of FSC/PEFC-labelled wood. The company claims that eco-labelled house makes it easier for the company to communicate with customers and to improve environmental awareness among employees (Skanska 2007). The company also perceives that experiences from the eco-labelled house can be transferred to other areas.

There are of course also experiences of companies of labelling modules and components of buildings, such as the example from **Elitfönster AB, Sweden**. The significant energy losses in buildings caused by poor glazing designs of windows can be significantly reduced by using windows with low emissive glazing and a warm edge construction (Tommerup and Svendsen 2005). A Swedish producer of windows made a strategic decision to design windows with lower U-values on the market i.e. windows with higher insulation properties. The company was able to do so by offering windows with lower U-values at the same price as windows with higher values. When faced with the decision, the natural choice for the customer was to choose the window with improved performance. This led to a situation where other producers were forced to produce improved windows to comply with this new market standard. This strategy also was a tool for the company to get increased public attention and to position itself as a market leader with regard to energy efficient windows (Browall 2007). To support the design efforts by communicating about them, Elitfönster has developed an
environmental declaration for all its products that provides life cycle environmental information. The company has also labelled its products with the Nordic Swan Label – the type I eco-labelling – since many consumers are familiar with the label and the SIS Miljömärkning, organisation that awards the label, has high credibility (Elitfönster 2007).

Together with improving efficiency of houses and construction products, it is important to improve the efficiency of products that are used in the house, e.g. domestic appliances, since their electricity consumption increases most drastically. It is therefore important to provide information on energy use by appliance to final consumers and one way to do that is through various types of eco-labels – type I, II or III. Various companies choose to apply for various types of labels. Some companies apply for EU or national labelling schemes or even several different types of labels depending on the type of products; others develop their own logos for specific products. For example, Sharp has received the EU eco-label for TVs, which the company claims is the only consumer electronics brand to be awarded with this label (HDTV 2007). HP is a founding partner and active supporter of the American Energy Star eco-label since 1992. In addition to this, Scandinavian IT Eco Declarations have been issued for more than 1000 HP products, and many of HP’s printing and imaging devices qualify for the German eco-label Blue Angel and many HP displays qualify for Sweden’s TCO label (HP 2007).

**Philips Electronics, the Netherlands** introduced “Green Tick” logo - type II label - for own electronic goods that are more environmentally sound and safe to use. The logo aims to assist consumers in choosing more energy efficient products or products with other improved environmental features, such as reduced use of flame-retardants.

### 3.1.2.1.1 CASE 4 Indesit Company, Italy: ecolabelling

Products like fridges, washing machines and ovens generate 80% of their energy and environmental impact in the household. Indesit is one of the main household appliance producers in Europe, with annual global sales reaching 15 million units (Indesit 2006). Indesit Company produces energy efficient refrigerators, washing machines, ovens and other household’s appliances that, according to EU Energy Label, have energy efficiency class A (on the range from A - most energy efficient - to G - the least efficient).

The main drivers for the company to upgrade the appliances and use energy labels are EU Directives: 92/75/CEE, 94/2/CE, 95/12/CE, 96/89/CE, 2003/66/CE that require that most white goods, light bulbs and cars must have an EU Energy Label. Another driver is the added value for stakeholders through energy savings and reduction of CO2 emissions.

**Environmental evaluation**

Product innovation - such as the development of products in class A+ and higher - delivers substantial environmental benefits:

- washing machines sold in Europe today consume, on average, 44% less energy and 62% less water than in 1985;
- fridges sold today consume 25% less energy, on average, than in 1990.
Upgrading of appliances is a major factor in the pursuit of sustainable development and reduced energy consumption. Through direct action by its top management and indirectly through its membership of various associations, Indesit Company works with Italian and European institutions to explain to consumers how product innovation helps protect the environment: if the over 188 million appliances in use and over ten years old in Europe were replaced with new models there would be a saving of 20 million tons of CO2 a year, the equivalent of annual emissions by ten 500 MW power stations (CECED 2006).

**Economic evaluation**

Increase in sales: The main product innovations, also from an environmental and energy saving viewpoint, are generated by the introduction of new platforms (a cyclical process over the years). 2005 saw the launch of the new 60 cm fridge platform based on design solutions that ushered in a whole range of A+ and A++ class products with the lowest consumption levels in the industry. In the 2004-2006 three-year period, the introduction of these super efficient models made it possible to up the energy mix of sales products in A class and higher by over 10%. In 2006, 91% of dishwashers sold by the Group were in A class, up 13% on 2004; 57% of fridges sold were in A class or higher (up 11% on 2004); and 96% of washing machines sold by Indesit Company were in A class or higher (up 7% on 2004). Significantly, new A class models are replacing products that are on average around 10 years old, which means enormous benefits in terms of energy savings and CO2 emissions.

Competitiveness: In 2006, the washing machine Aqualtis was the best advertisement for Indesit Company’s environmental commitment to sustainable development and it has gained leadership in all the Group’s markets. Aqualtis is the first standard size washing machine to offer large machine performance (up to 7.5 kg), and all this with full respect for the environment. Aqualtis is in energy class A+, helps to achieve a reduction in energy and water consumption of up to 10%. Aqualtis was designed to Indesit Company most stringent eco-design criteria: The Aqualtis was designed with strict regard for the provisions of the European WEEE Directive, in terms of both rendering the product safe at the end of its life cycle and of product recycling targets. The Aqualtis won the 2006 Ecobitech Award 2006, the most important eco-compatible technology/low energy consumption award in the environmentally sound product category.

3.1.2.2 Green Marketing

Green marketing is the company strategy of developing and promoting green products, most often specifically towards green consumers (UNEP 2005a), but it also includes issues of “green” consumer behaviour, market segmentation and collection of market information about environmentally aware consumers (Peattie 1999). However, it is in a way difficult to identify green consumers, because as Peattie (2001) also points out, all consumers are green consumers; given the choice between two identical products, except that one is better for the environment, all consumers would choose the greener option.

In the area of reducing energy use in housing there are interesting business initiatives aiming at increasing awareness of people regarding the state of energy use in housing when they sell or buy the property. For example, *Home Condition Reports* introduced in 2007 in the UK are produced when a property is sold or undergoes a change of tenancy (Dresner, Ekins et al. 2006). Similar initiative is undertaken in France where
the point of selling a house triggers the upgrade in energy efficiency of the house through better insulation, energy efficiency measures, etc. Marketing of more energy-efficient housing and equipment is an important approach that increases people awareness by applying life cycle cost analysis to demonstrate the life cycle cost of purchasing, using and disposing of equipment and appliances. For example, 8 British firms have teamed up to tackle climate change by offering cheaper prices for products such as insulation and low-energy light bulbs that help reduce emissions of carbon dioxide from homes (ENDS 2007a). Firms include retailer Tesco, DIY chain B&Q, British gas and Barclays. Their efforts are being coordinated by NGO The Climate Group as part of a campaign called “We’re in this together”. As part of this campaign, Tesco aims to sell 10 million energy-efficient light bulbs in 2008. Here is how the company describes how it sees its role in initiating and implementing the change. “You told us that you wanted to do more in the fight against climate change but wanted our help to make it easier and more affordable. So we have halved the price of our energy-efficient light bulbs and are investing millions in re-packaging them, extending our range and promoting them. We want to break down the barriers to being green by helping to make the green movement a real option for everyone, not just the few. We want to see green consumption become mass consumption. Switching your light bulbs over to the energy-saving kind is one of the Energy Savings Trust’s Top Ten recommended energy saving measures. If every household changed just three bulbs, it would save enough energy to power all the street lights in the country. And it isn’t just the planet that benefits: because they last longer and use less energy when in use, they save you money too. For every bulb you switch, you can expect to save £9 a year on your energy bill. So if you have 10 bulbs in your house, you are wasting £90 a year by not changing them”.

Kingfisher Group, UK is Europe’s third largest electrical and home improvement retailer. Kingfisher is focusing on home improvement with its main brands being Castorama and B&Q. The company has carried out many communication initiatives promoting sustainable consumption to customers. In 2002, the British B&Q even won the Management Award for Sustainable Development at the European Awards for the Environment for running several communication and green marketing initiatives. For example, B&Q (UK) ran a campaign to encourage customers to buy home insulation . to stimulate that, the company lobbied for reduction of the VAT on energy-saving materials, e.g. insulation. The company paid the VAT for customers who bought loft insulation during 2001 Energy Efficiency week. During that week, sales of the loft insulation went up by 120%. After such a success, the campaign was repeated in 2002. In addition to running own campaigns, the B&Q works in close collaboration with other organisations, such as the Energy Saving Trust. Together two organisations increase customer awareness about the benefits of energy-saving materials by using various means, such as product labelling, in-store demonstrations and printed material.

3.1.2.3 Product service systems
The concept of product service systems is based on the notion that product ownership leads to inefficient use of products, and therefore product services or functions should be sold to consumers. For example, instead of owning a washing machine an access to washing facilities should be provided, instead of owning a car, one should have a membership in a car-sharing club. In the domain of energy use in housing the concept is of particular interest since it can reduce use-related impacts of energy and energy using products. Two areas are of specific importance here: improving energy efficiency in
household and providing systems of shared use that reduce energy use per household and in addition reduce other environmental impact due to the collective ownership.

An example of the latter is communal washing centres in Sweden. They provide the function of clean cloth to households through the system of facilities that became an integral part of the urban development. Since 1950s, real estate companies started to regularly equip newly built houses with washing rooms (Mitchell 1993) and by the end of the 1960s, 80% of the population had access to small washing centres, equipped with automated washing machines. Out of these, less than half owned washing machine at home. Later, Swedish regulation developed guidelines on the location of communal washing centres and their baseline equipment for building and housing companies. In the mid-1990s, the energy authority and other organisations devised guidelines and advocated instalment of energy-efficient equipment in communal washing centres. Therefore, nowadays communal washing centres use semi-professional washing machines and drying equipment, which is more efficient than individual washing equipment both in terms of water and energy use. Since this equipment is used more intensively by many households, it gets technically worn out faster and is updated to the new equipment more often. Thus, the function of clean cloth is delivered through a collective system, which has lower environmental impact than the system where the function is provided through individual ownership of washing machines.

Another example is from the area of energy provision to households. Restructuring of electricity and gas markets in Europe in the last decade lead to the increase of provision of energy efficiency services, which include thermal comfort, lighting and cooking. These services can be provided with less primary energy input by the installation of energy-efficient devices, such as compact fluorescent light bulbs or insulating equipment to prevent heat losses. This increased energy efficiency can be sold in the form of “Negawatts” (Lovins 1996). The basic idea is that, in many cases, it is cheaper to save a unit of electricity than to generate that unit. The energy supplying companies can therefore profit from selling or supplying energy efficiency measures, including maintenance and operation, monitoring and evaluation of savings, supply and installation of energy-efficient equipment to its customers and other activities. These energy efficiency measures pay back their investment over a short period in the form of reduced electricity bills (ECS 2003). There are also companies that not only provide services, but also educate people from neighbourhoods to become energy auditors and help their neighbours with advice on the choice of energy-efficient appliances, the use patterns and on disposal of energy-using equipment (Halme, Hrauda et al. 2005). Everybody benefits from energy efficiency services - the customer from cheaper bills, the company from avoidance of investment in expensive new generating plants, and the environment from reduced emissions due to more efficient energy use.

One example of the traditional energy selling company that shifted to energy efficiency market is a local French gas distributor, Gas de Bordeaux, which sells more than 4 TWh/year to almost 200 000 customers in the Bordeaux region, have over the years noted customers’ concerns about fuel costs, equipment amortisation and maintenance costs. In addition, the community’s concern about general improvement in the environmental condition became increasingly evident. In 1993, Gas de Bordeaux realised these changes and made several decisions that led to another market opportunity. The new ideas in the company’s business were related to providing energy consultations and the maintenance of equipment. The company started a least-cost programming service that provided the consumers with individual plans of the cheapest
energy use options. The company performed a detailed analysis of current and future energy supply and came up with several local solutions of a more efficient supply of gas and other alternative energy types, such as geothermal energy. As a result, the company reduced its operational costs by increasing the efficiency of energy production and supply. The costs for consumers were also reduced due to the adoption of their consumption patterns to optimal payments schemes, utilisation of alternative energy sources as well as better equipment maintenance. This led to annual savings of about 10 GWh equivalent to savings of US$ 795 857. Furthermore, the company also offers financial services to its customers.

In addition to the traditional companies shifting towards service provision, there also new established companies that are providing energy efficiency services. These companies are called Energy Service Companies or ESCOs. It was estimated that in year 2000, the market for energy efficiency services in Western Europe was around 150 million Euro per year with the annual growth potential 5–10 billion Euro (Bertoldi, Berrutto et al. 2003). In Europe, the majority of energy efficiency projects were so far undertaken in the public sector that is considered to be a safe client for energy efficiency companies and because in some countries public authorities are retrofitting public sector buildings. The typical activities in energy efficiency projects include cogeneration of energy and heat, upgrading of public lighting installations, modernisation of air-conditioning and ventilation in buildings and retrofitting the heating systems, as well as energy management systems. Below, a more detailed case of solar heat service is described.

3.1.2.3.1 CASE 5 AMG solar heat service, Palermo, Italy

AMG is a traditional utility company that provides the Italian city of Palermo with gas and lighting. The company is also active in environmental innovation and development. It actively supports the use of renewable energy and the implementation of pilot project related to energy and the environment.

The “solar heat service” is a service of selling hot water as a final product (UNEP 2002). Hot water is produced with new equipment that can run on solar energy, methane and traditional sources of energy. A specific contract is signed by the installer of the equipment, who guarantees a certain level of efficiency. To ensure that the equipment functions properly, a heat meter for real life system monitoring is also installed. This type of product-service systems is supported by a new financial mechanism, in which customers are invoiced not for the amount of methane that the provision of hot water requires, but rather for the entire service package with the final result being hot water. The service package includes different elements, including the transportation of methane to the boilers, the procurement and installation of heat meters, and equipment maintenance. The company initiated this service with strong belief that environmental problems are mounting and that increasing solar energy use may reduce the use of non-renewable sources of energy and thereby reduce associated environmental impacts and resource depletion. The company understood that environmental performance can be used as a factor in increasing competition on energy market. The example of AMG has inspired the Ministry of the Environment to financially support energy efficiency projects.

Environmental evaluation

The “solar heat service” can significantly reduce environmental impacts associated with energy production because a combination of solar energy and methane are used
contributing up to 70% of the needed energy. The payment for the service package triggers the company to find ways to reduce the amount of solar energy and methane used to deliver the required amount of hot water and thereby reduce the costs, while keeping the price constant. In environmental terms, the new way of providing service package may decrease CO2 emissions by 100 tons per year.

Economic evaluation

AMG profits from selling service package of hot water, by providing the incentive to reduce the costs for methane and substitute them with solar power generation units. Additional value is added because the company improved its competitiveness through diversification of their products and services. Since the company was quite early on the market of energy efficient services, it capitalised on the first mover advantage and had time to build expertise in the new area of products and services. The capital investments into solar panels have typically 8 years of payback period with savings that come from the generated energy.

3.1.2.3.2 CASE 6 RUSZ, Austria: product-service systems

Reparatur und Service Zentrum (R.U.S.Z.) is a service and repair centre that was established in 1998 in Vienna by the Vienna Union for Training with financial support by European Social Funds (Enviros Consulting Ltd. 2004). The organisation partners with the technical university of Vienna to make sure that appropriate knowledge is available. Vienna’s Association for Further Education also sponsors the project. The initiative has both environmental and social objectives:

- to help the community to move towards repair rather than buying new goods. When the project began, Austria was generating 100 000 tonnes of WEEE per year;
- to help people of 45 years old and the long term unemployed to reintegrate into the work market. Austrian labour market politics meant these groups found it impossible to return to the labour market as no support or training was given; and
- give low income households access to quality second hand household electronic items.

A telephone poll conducted in Vienna demonstrated that the majority of people feel manufacture’s repair services aim to sell more goods as opposed to prolonging its life. R.U.S.Z.’s strategy is to genuinely prolong the life of equipment thus saving the householders money and environmental resources. The main activity is thus to repair broken electrical and electronic equipment and sell. Repaired equipment receives 6-month warranty that guarantees service and replacement. If there are problems with the appliance, R.U.S.Z. continue to service the items and replace them if they are under warranty. In addition to repair services, R.U.S.Z. also provides rental service, DIY repair courses, and advice (R.U.S.Z. 2007).

In 1998 the organisation employed 3 permanent and 12 temporary staff. In 2003 this number has risen to 100 permanent and temporary staff. Of the staff that were been employed temporarily by R.U.S.Z., 71% have moved on to be placed in permanent positions (R.U.S.Z. 2007). Key to the success of the project is the development of good working partnerships. The organisation has a good relationship with Vienna’s local authority, who provides selected electronic and electrical goods that have been discarded by households at waste management and collection sites. In this way the
municipality reduces the disposal costs. In addition, the local authority has donated vehicles that would otherwise be scrapped.

Further partnerships are developed through “Reparatur Netzwerk Wien” (Repair Network Vienna), set up by R.U.S.Z. This network is an association of repair firms that verifies the quality of repairs. The companies involved in the network are those, which had wanted to offer repair service, but could not due to the small size of their business. R.U.S.Z has also created a repair hotline. All these initiatives increase the financial turnover of participating companies and therefore generates more vacancies for R.U.S.Z’s temporary workers.

A major strength of the initiative is its flexibility and ability to meet consumers changing demands. This enables the organisation to provide opportunities for the employees to learn how to repair a wide range of equipment, increasing their likelihood of permanent employment.

When the project was initiated, R.U.S.Z.’s sponsors were not convinced that the project would be economically feasible. Manufacturers were opposing the scheme since it takes away the customers from new purchases.

The Ministry of the Environment supports the R.U.S.Z. initiative and would like to see similar schemes in every Austrian province, since they contribute to the goal of becoming “repair society”.

**Environmental evaluation**
Approximately 2000 tonnes of electrical and electronic equipment is handled each year, of which 50% is repaired and sold, and 25% is used as components for replacement (R.U.S.Z. 2007). R.U.S.Z. is continually expanding the items it repairs and resells in order to meet the increasing demand; currently demand for the repaired items outstrips supply. As of January 2000, RUSZ began to repair televisions, video recorders, personal computers etc. The upgrading and repair of computer equipment also seeks to tackle exclusion issues around electronic illiteracy for low budget households.

**Economic evaluation**
When the project began, customers were mainly from poor and deprived households. However, as the reputation of the initiative has grown and more people are uncomfortable with a throw-away culture, R.U.S.Z. has a wide range of customers. This has allowed the project to break even after four years of operation.

### 3.2 Business initiatives in the Mobility domain

In 2000, the transport sector currently accounts for 21.8% of total primary energy consumption worldwide, and will account for approximately 34% in 2050 (OECD countries: 28.1% and 40%, respectively) (IEA and OECD 2003). Road transport is the second largest sector of energy consumption after energy needed for housing (HVAC: heating, ventilation, air conditioning). In the EU, emissions of greenhouse gases from road transport increased by 19% in ten years from 1990 to 2000. CO2 contributes 97% of the total transport-related greenhouse emissions. In its turn, in 2000 road transport contributed 92% to the total CO2 emissions. In recent years, there has been a number of voluntary agreements signed between European car manufacturers and the European Commission aiming at reducing CO2 emissions from new cars (EEA 2002). Although some progress has been reached in terms of reducing emissions per car, the road
transport is still the fastest growing contributor to CO2 emissions stemming from transport. Reducing CO2 emissions related to transport requires changes in the entire system of mobility. The system includes various transportation modes, road infrastructure, communications technology, energy and resources, urban planning, lifestyles and institutions. Therefore, sustainable mobility system should include ways of facilitating the necessary movement of people, goods and information in more environmentally and socially acceptable ways. A more sustainable mobility system could include:

- More efficient transport modes and vehicles that run on alternative fuels
- Mechanisms to facilitate walking, cycling and use of public transport systems through various economic instruments and provision of infrastructure
- Facilitating the use of public transport by improving quality, the level of service and comfort of such systems
- Improving the efficiency of individual car use by using smaller cars that use less fuel, using more environmentally sound types of fuels, eco-driving, and substituting individual car use by sharing cars in car cooperatives and car sharing schemes
- Increasing use of IT to facilitate the substitution of the physical travel for online communication, e.g. video-conferencing, tele-working and online shopping.
- Improve and adjust urban planning to allow for satisfying human need locally without the need to drive, but to take a bicycle or walk.

3.2.1 Greening supply side

3.2.1.1 Green private procurement

Globalisation of business activities and economies allows companies working with many different suppliers of raw materials, components and preliminary products. Such a structure makes it difficult for a company to handle the entire supplier chain and network and thus increases the complexity of purchasing. On the other hand, there is a growing pressure from society, legislators, financial organisations, media and NGOs to ensure manufacturing of products with least environmental impact and following social and ethical standards. Therefore in many sectors companies are taking proactive stand and develop programs to “green” supply chains by setting environmental and social requirements on suppliers, which may include demands on the use or elimination of use of certain chemicals or materials in products and production processes, requirements to fulfil the legal obligations and demonstrate compliance with international treaties and standards and ensuring decent working conditions and social fairness at production sites and in the supply chain.

Many automotive companies have focused their supply chain management activities on suppliers only. For example, a number have developed environmental pre-qualification criteria for suppliers. These very often include a requirement for the supplier to have an environmental management system, according to a recognised standard such as ISO 14001 or EMAS. For instance, Volvo expected its suppliers to have ISO 14001 by the year 2000, Ford by 2002 and GM by 2003. Volvo also assists its largest or strategically important suppliers in attaining Volvo’s goals for reduction of environmental impact in supply chains by facilitating the development of environmental management systems in supplier organisations, by providing technical support and by establishing close contacts
with suppliers. Volvo AB and the German car manufacturers have taken leading positions with respect to environmental management. Whereas Volvo’s environmental programs are somewhat independent, the German product manufacturers have developed more standardized approaches through the German car manufacturers association. They have used this group approach to influence suppliers in Europe over automakers based in other countries (e.g. France, Italy, Spain).

Examples provided so far discuss how automakers cooperate with and integrate suppliers into their new product development processes and related innovative technologies. Another type of activity is to initiate multi-stakeholder initiatives for fulfilling specific goals. One example of such a cooperative effort to green the automotive supply chain is the project Recap - Recycling Car Plastics (van Hoek 2001). It was a seven year project aimed at developing concepts and applications for the recycling of plastics used in cars (van Hoek 2001). The Recap project was conducted by multiple players from three levels in the automotive supply chain, covering the entire sourcing to manufacturing cycle for plastics and including product design initiatives. The first level participants were plastic suppliers Enichem (Italy) and DSM (the Netherlands). The second level participants was a plastic manufacturer Reydel (France) (the client of plastic suppliers). Finally, the clients of plastic manufacturers, the car manufacturers, participated: FIAT Auto (Italy) and PSA Peugeot-Citroen (France), representing 40% of the combined Italian/French automotive market and almost 25% of the entire European market. The partnership across the supply chain was important to the success of the project, given its objective to develop an integrated approach aimed at increasing the overall material recycling of plastic waste arising from the whole car life. This implies that there are multiple reversed flows and operating systems to deal with these flows. It was the aim of Recap to develop environmentally sound solutions and applications, the investment in which should not only be economically feasible, but could even improve revenue. The business reasoning in this case is that saving on natural resources and materials should be able to contribute to savings in purchasing and operating costs. In order to achieve this, both product design of plastic car parts and manufacturing techniques had to be reconsidered. This impacted on operations management methods and practices. Drivers of these initiatives were not only a proactive approach to pre-empting regulatory standards, but also to meet expected customer demands in the final consumer market.

Although car manufacturers are one of the major players in the Mobility domain, other actors are also very important, not least customers who can set demands on suppliers of vehicles or service providers of solutions. They can greatly affect all the players on the market. Such customers can be public sector and other companies that are using mobility services. One example of such an initiative is E.ON UK - an energy company that has started the process of substituting its 250 shared company cars with hybrid vehicles (E.ON 2005). In 2006, the company substituted 70 shared cars with Toyota Prius – at that time one of the most promising and environmentally sound vehicles on the market that ran on both electricity and petrol and had CO2 emissions of 104g/km (CCL 2006). In the following years the company plans to substitute the entire fleet of cars with environmentally sound vehicles. Managing director of services estimated that this strategy could save the company £150 000 in fuel costs and reduce CO2 emissions from the company’s fleet by 526 tons per year.
3.2.1.2  

Green products and technologies: vehicles and fuels

The automotive sector has traditionally received a lot of attention in the context of greening from both regulators and consumers, because of its pollution effects. In order to fulfill the requirements of the Kyoto Protocol, the Association of European Automobile Manufacturers have committed to reducing CO₂ emissions from new vehicles (GCC 2007a).

<table>
<thead>
<tr>
<th>Target average CO₂ emissions</th>
<th>Date required</th>
</tr>
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<tbody>
<tr>
<td>186 grams/km</td>
<td>1995 (starting point)</td>
</tr>
<tr>
<td>140 grams/km</td>
<td>2008 (25% reduction)</td>
</tr>
<tr>
<td>120 grams/km</td>
<td>2012 (35% reduction)</td>
</tr>
</tbody>
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Operational and technological initiatives in mobility area can be found at several levels (van Hoek 2001).

- Recycling of end of life vehicles. BMW is one of the companies that have experimented with a nearly fully recyclable car.
- Use of alternative materials to lower vehicles weight and increase ease of recycling and using alternative fuels. Examples are the use of plastics instead of metal and electricity instead of gas. This lowers emission rates directly and indirectly through lower car weight (plastics).
- Lowering fuel consumption of a vehicles and switching to alternative fuels. This option comprises a range of activities geared towards fuel efficiency, CO₂ reduction and alternative fuels.

In recent years, research and development has brought to the market bi-fuel, electric and hydrogen cars and busses, trams and trolley-buses and other modern means of transportation. European car industry spends annually 4% of its turnover (€20 billion) on R&D, large part of which aims at improving fuel efficiency and other environmental features of cars and mobility (ACEA 2007c). The industry association reports that during the last decade, ACEA members developed and introduced in the car design more than 50 technologies that reduce CO₂ emissions from cars. Below some examples of recent initiatives are presented to provide a feeling for the extent of the on-going work with greening products and technologies in the Mobility domain.

**Greenenergy, UK** is the UK’s largest independent oil company with a 10% share of the UK road fuel market that supplies fuels and energy with a reduced environmental impact (Greenenergy 2007). Greenenergy supplies over half of all biofuel sold in the UK and is establishing a position as a supplier of biomass for power generation. Greenenergy is a leading player in the biofuel industry, with activities spanning from feedstock sourcing through manufacturing and blending to supply of bespoke biofuel blends. Greenenergy has led the oil industry in calculating the carbon benefit of the biofuel, first by creating the first carbon-certified® biodiesel blend in Greenenergy GlobalDiesel and then by declaring the carbon content of all the fuel they sell. Since January 2006 the company has been first on the market with monitoring the reduction of CO₂ emissions from sales of bio-ethanol and biodiesel,. After the in-house monitoring, the figures are verified by the Edinburgh Centre for Carbon Management (ECCM). Over the year long period, Greenenergy supplied its customers with 131.5 million litres of biofuel avoiding 267 348 tonnes CO₂ emissions compared with standard fuels. The same effect could be achieved by taking off the roads 89 000 cars during one year.
Alternative vehicles have been developed by many car manufacturers since mid-1990s. For the near future, hybrid power trains are seen as an alternative in the attempt to reduce fuel consumption of passenger cars (Bitsche and Gutmann 2004). They however had faced difficulties with entering the market and finding their customers. The situation seems to be changing in recent years. The few hybrid car models currently available have increasing sales numbers, and most large car manufacturers in the world have announced hybrid cars for the coming years. All European car manufacturers have been developing hybrid engines in recent years with Audi being the first car manufacturer to produce a hybrid car in 1997 (ACEA 2007c). For example, Volvo, Sweden has a prototype multi-fuel vehicle that can run on up to 5 types of fuel. The V70 could use E85 (85% ethanol and 15% petrol), biogas, natural gas, petrol and hytane (10% hydrogen, 90% methane) (Beazant 2006). The additional attractiveness of this car is that it can go into use before infrastructure for supplying alternative fuels is in place. For many new types of vehicles availability of infrastructure is a clear bottle-neck, while for some this barrier is being already overcome. In April 2003, first hydrogen filling station in the world was open by Shell in Reykjavik (Doyle 2005).

However, European hybrid electric vehicles (HEV) occupied a very small niche market (Rao and Saini 2007), achieving less than 0.5% of the market that is still predominantly occupied by diesel vehicles. Until this year, European vehicle manufacturers were very hesitant to introduce HEV. For example, VW, Opel, Ford had several times delayed their plans to launch HEVs in 2006 and Toyota, PSA Group and Honda were the only car manufacturers with HEV on the European market.

Car manufacturers are joined by other actors in Mobility domain. In 2007, the Eurostar, the high speed train company operating in France, Belgium and the UK announced its new strategy of becoming carbon-neutral (ENDS 2007c). The plan includes a reduction in direct CO2 emissions by 25% by 2012 and investments in carbon offsetting projects. The 2012 target will be achieved through measures that include the purchase of more electricity from greener sources and investments in more energy-efficient trains.

Train companies are joined by aircraft manufacturer Airbus, which in 2007 put in operation the first super jumbo Airbus A380 that has been designed in order to optimise environmental performance at each stage of the aircraft life cycle. In particular, the high passenger capacity with a 2-deck design and the use of new light weight materials has decreased the energy consumption per passenger dramatically. The A380 is expected to use less than 3 litres of fuel per 100 passengers kilometres (UNEP 2007).

Hydrogen buses started operating in the trans-regional triangle Lille-Tournai-Flanders. In their common border area, the Walloon and Flemish Regions, and the Nord/Pas-de-Calais Region use experimental hydrogen fired buses for their inter-urban transports. This new way aims at reaching out to targeted populations of the future eco-technologies and eventually the “Hydrogen society” (“ETAP National Roadmap, Belgium,” 2006). Projects for introducing hydrogen buses were launched in many cities including London, Madrid, Stockholm, Barcelona, Hamburg (Doyle 2005). Iceland perhaps leading the way towards hydrogen economy by setting up an official goal of becoming an oil-free country by 2050 by shifting all vehicles and ships to hydrogen.

In addition to designing new vehicles and developing alternative types of fuels there are also business initiatives for upgrading the current car park. Chemical company, Rhodia, says that in 30 years CO2 emissions from transport will increase 43% even with all best
initiatives in fuel and technology development. It calls on industry and governments to adapt existing vehicles to cut pollution (Beazant 2006). To this end it called for retrofit of particulate filters and additives to diesel vehicles, which could prevent thousands of tonnes of harmful particles being released each year. It also claims that reducing body and engine parts with readily available plastics can reduce weight and fuel consumption by 0.6 litres per kilometre. *Michelin* has also developed tyres with low rolling resistance that reduces fuel consumption and CO2 emissions by 20% compared to leading European competitors (GCC 2007a). **PSA Peugeot Citroen** developed a technology, which will allow the car to go into standby mode once a vehicle comes to a halt at the lights or in a traffic jam. The technology has come to the market in 2007 (Beazant 2006). According to the company, this technology reduces fuel consumption and CO2 emissions by 15% in heavy traffic and by 6% for normal driving.

### 3.2.1.2.1 CASE 7 Toyota Prius: car eco-design

Toyota has been leading the market when it comes to R&D in technologies that use alternative fuels (WBCSD 2005b). One technical solution the company has developed is the combination of the engine and a motor in an internal combustion hybrid system that allows generating electrical energy from deceleration and storing it in a battery. A new engine called the Toyota Hybrid System (THS) was developed already in 1994 and combined a gasoline engine and an electric motor. This system twice as efficient as a conventional gasoline engine and makes cleaner exhaust emissions possible. THS was first installed in Toyota’s Prius passenger vehicle and introduced to the Japanese market in December 1997 as the first mass-produced HEV in the world. In 2000, after further improving THS, marketing of the Prius in USA and Europe began. Since 1997, more than 300,000 Prius cars have been sold worldwide.

Toyota believes that the introduction of hybrid vehicles into popular market segments will help launch other types of environmentally sound vehicles to the mainstream market. The hybrid technology can be used in many combinations with gasoline vehicles, with diesel and alternative fuel engines, and with fuel cell technologies. Once the performance of the hybrid system is improved, the technology can potential become the ultimate eco-car – a car that is both recyclable and has zero emissions during its lifecycle. Toyota set a goal of selling one million HEVs by 2010.

#### Economic evaluation

On average, the Prius costs about $3 000-5 000 more than a similar vehicle (same class, combustion engine only). So the sales people need to provide estimates for how much customers can save on fuel costs to compensate larger investment costs. In the UK, there are additional benefits for Prius owners, as for example exemption from congestion charge in London or free parking spaces. As Paul Philpott, commercial director at Toyota GB, explains: “While some buyers claim that environmental issues are the overriding reason for purchase, others are more upfront that the lower petrol costs make this car attractive” (Anonymous 2005b). While Prius has a large market share and significant growth in sales in the USA, especially in California due to harsh laws and high environmental awareness, it does not necessarily fit the European market where small and diesel cars, public transportation and biking are more common.

#### Environmental evaluation

The hybrid technology of Prius runs on gas and electricity, which leads to reduced CO2 emissions. According to Toyota, Prius generates 80% less smog-forming emissions than
the average new vehicle (Turner 2006). Other studies demonstrate that Prius is 44.5% better than current average cars, which emit 192 g/km, while Prius – 104 g/km (de Haan, Mueller et al. 2006).

3.2.2 Greening demand side

3.2.2.1 Eco-labelling and social labelling

Ecolabelling of cars is gaining grounds. One of the first cars for which eco-labels were developed were Volvo cars. Environmental product declarations (EPD) is a type of eco-labels that provides extended life cycle based information to customers and is certified by a third party. The label provides environmental impact information about the cars and the organisation itself and is certified by Lloyd’s Register Quality Assurance. The company also sets the continuous improvement goals for all products and EPDs are seen as a tool for facilitate the comparison of environmental performance of various Volvo products.

The European Directive 1999/94/EC specifies the requirements on the availability of information on fuel economy and CO2 emissions to consumers at the point of sale. It also demands the publication of national guides on the fuel efficiency of new cars, the display of posters at the dealerships and the inclusion of fuel efficiency information in printed promotional literature (European Commission 1999). The directive came into force in January 2001 and since then countries had to evaluate its effectiveness. However, in the UK, the initial strategy was considered as ineffective due to the complexity of the information and its presentation. Following this evaluation, UK car manufacturers voluntarily agreed to develop own colour-coded label for CO2 emissions and display it on all new cars starting in September 2005 (Snodgrass 2007). Other EU member countries are also working on developing own labels for environmentally sound vehicles.

Some car manufacturers started to develop their own logos for their more environmentally sound cars and solutions. For example, Renault is in the process of developing a new label for its most environmentally sound products - Renault eCO2 (GCC 2007b). The criteria developed by the company include the requirement of having production sites certified in accordance with ISO 14001 standard, having the highest accepted emission level of 140 g/km, being 95% reusable at the end of life stage and having at least 5% of the plastics in the car recycled. The label will be used for a variety of Renault cars.

3.2.2.2 Green Marketing

Communication for sustainable mobility includes marketing research and advertising campaigns of automobile producers who promote fuel efficient or alternative fuel cars; communication campaigns of public transport companies and cities/municipalities, who promote public transportation, bicycling or avoidance of car use; and advertising

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5 The questions is however whether SUVs are also considerate to be the average vehicles.
campaigns of car sharing organisations. Below examples of these campaigns are presented.

In 2007, **Ford of Europe** launched an advertising campaign for bio-ethanol cars (Huliq.com 2007). “We know climate change is real, and we’re committed to doing something about it by bringing a range of sustainable, low CO2 technologies to our customers over the next few years,” said vice president of Marketing, Sales and Service for Ford of Europe. He also added that their “… new campaign uses powerful imagery and is aimed at educating car buyers about the benefits of bio-fuel technology, as well as strengthening Ford’s position as a leader among European volume manufacturers for FFVs”. The campaign kicked off in March 2007 in Sweden, so far the largest flexifuel market in Europe. The campaign included printed and TV ad and an internet site. The campaign will be expanded to the rest Europe where Ford Focus and C-MAX flexifuel models are sold. “We hope to highlight the need for all of us to make changes to our daily lives to preserve the planet for future generations of animals and humans alike,” said Odell. “Ford’s flexifuel technology is one such change that is easy to make.” “The environmental benefits and affordability of this technology and bio-ethanol mean that people can contribute immediately to lower CO2 for the benefit of future generations,” Odell added. “On this occasion, while our customers might not feel the difference, the planet will.”

Another example of how companies may develop their communication strategy is the **Shell Eco-marathon** - an annual event series in France, America and the United Kingdom (Tremayne and Gorodilina 2007). The Shell Eco-marathon is an educational project which invites teams of school pupils, university students and enthusiasts alike from the country and guest teams from abroad to design and build the most energy-efficient vehicle. The winner is determined by the vehicle that travels the farthest distance using the least amount of fuel, measured in terms of miles per gallon. Each team is free to use any conventionally available energy source - including both conventional and alternative fuels, such as biofuels, compressed natural gas, liquid petroleum gas, solar energy and hydrogen. Competitors manage the project in totality, from vehicle design to financing. The challenge provides a context in which the theories and principles of subjects such as technology, science, business studies, and mathematics are applied to a “real” situation.

Another event aiming at raising awareness of population about availability of alternative fuel vehicles was the Challenge Bibendum, the sustainable mobility expo, that took place in 2006 in Paris and that demonstrated the explosion of green cars on the market. The expo was financially supported by **Michelin**. Michel Rollier, Michelin’s managing partner revealed that the company believes “... that there is no single solution. Moreover, there is a range of various solutions that should be developed within the framework of strong synergies between researchers, industrialists, users and legislators” (Beazant 2006).

Advertising and promotional campaigns of more alternative vehicles and mobility are one type of communication strategies. A relatively new, but gaining momentum initiative, is to educate consumers on various issues related to car ownership and use and provide suggestions for how environmental impacts of this activity can be reduced. Several car manufacturers - **VW, GM** and **Scania** - have a comprehensive database and calculator of CO2 emissions from their vehicles on their websites. The **European Automobile Manufacturers Association** on its homepage provides information about
eco-driving and its benefits (ACEA 2007b). It reports that eco-driving reduces fuel consumption by up to 25% with long term effect being 7%. According to the European Climate Change Programme, potential emission savings at the European level from eco-driving could be as high as 50 million tons of CO2 by 2010. In addition to environmental savings, eco-driving is also a cost-effective way to reduce CO2 emissions. For example, some estimates show that eco-driving can be lead to cost savings of 128 € per tonne of saved CO2 (ACEA 2007b).

As a new player on the UK market, Kia Motors took advantage of the public debate on climate change to differentiate from its competitors. It promoted an environmentally sound use of cars that consisted in switching to non motorized transportation for short trips (Kia Motors 2007). To back this positioning, they offered a bike for each Sedona car purchased and supported the “Walking Bus” initiative, which consisted in organizing walking school buses in various cities to avoid car use for school drop-offs. Kia used printed ads and website over the year 1999. The website and the walking bus initiative are still active.

From the beginning of 2007, the Scandinavian Airlines offer its customers the possibility to offset CO$_2$ emissions (SAS 2007a). Passengers can now calculate their environmental impact on the company’s website, either the full impact or through a simplified calculator – only CO$_2$ emissions. This sum corresponds to a reduction in the CO$_2$ emissions caused by passengers’ flights or air transport. The amount of 30 Swedish kronor that passengers pay to compensate 250 kg of CO$_2$ emissions from a trip Stockholm-Paris with Boeing 737-800 is invested in projects for renewable energy in other countries (SAS 2007b). All these projects lead to significant reduction of CO2 emissions and this has been verified by a third party.

3.2.2.3 Product service systems

PSS in mobility sector range from car sharing schemes, after-sale services, call-a-bike schemes and many others. Some examples are provided below.

The German railway company, Deutsche Bahn AG, made an unlimited mobility for their customers their business. They created a system where people can rent a bike only by dealing a number written on the wanted vehicle. In 2002 the initiative was implemented at the first locations. Since August 2007 “Call a bike” is carried out in six cities, namely Munich, Berlin, Frankfurt on the Main, Cologne, Stuttgart and Karlsruhe, throughout Germany. The only thing registered users need for renting the bicycles is a mobile phone. If the bicycle they want to use shows green light this means it is free for use and they can call the number written on it. They then automatically get the code to unlock the vehicle and a “missed call” from which the four last digits also show the code for the bicycle. The charges of the bicycle rental are between 6 and 8 cents and two weeks after the bicycle ride you have to pay the bill. There are also possibilities to just leave the bicycle somewhere for a few minutes (e.g. to go shopping) and use it afterwards again. If the users want to return the bicycle they just have to bring it to the next big crossing and lock the bicycle. On the display of the bike a new code for the bill appears. One has to call the number of the bicycle again and tell the bill code. Now, five years after the project started it can be said that it is very successful. Between March and June 2005 180.000 bicycle rides were counted. In comparison to 2004 this is an increase of 17.4%. In the season of 2005 the system had more than 35.000 members of whom each used the bicycles for around 37.5 minutes in average. All in all in the four
cities of Berlin, Frankfurt, Cologne and Munich 4300 bicycles are available. In Karlsruhe a fleet of 350 vehicles exists.

The Vélo à la Carte, Rennes, France service that started in 1998. The scheme was developed as a common effort of the City of Rennes and the commercial company Clear Channel Adshell to provide a sustainable urban transport system. The system comprises 200 bicycles situated at 25 docking racks in the city centre. In 2002, more than 47 700 trips were made by the system users, who pay once a refundable deposit of 23 €, receive a magnetic card with which bikes are checked out, and thereafter use the bikes free of charge. Bicycle use is limited to 2 hours at a time, but one user can loan a bike several times per day. In case a bicycle is not returned to the rack, it is possible to track who was the last person who was using the bicycle (Wolfram 2005).

Car sharing in Europe has spread from being just a few small cooperatives and service companies in late 1980s to having more than 100 000 members as members in more than 200 professionally run car sharing organisations in the beginning of 2000s. Perhaps the most successful schemes are in Switzerland and Germany, Netherlands and Austria. Other countries are also following car sharing development and various types of car sharing schemes can be found in the UK, Denmark, Sweden, Finland, Italy and France. Car sharing idea is popular among people who do not use car often or among families who want to avoid buying a second car. Members of car sharing organisations typically have access to several types of cars, which they can book through a telephone or Internet booking system and pay for using by receiving a monthly bill.

StattAuto, Germany is a 10-employee, 4,000-member, 150-vehicle car-sharing company in Berlin. The company successfully runs the business and is thinking of expanding to other countries. From the beginning, however, the company had to deal with problems, such as the wishes of most users to drive the cars during weekends, which meant a wasteful car surplus on weekdays. At StattAuto, Carsten Petersen, the owner of the company, dealt with these problems by launching a telemarketing campaign, advertising the fleet of car sharing scheme to services and organisations that needed additional cars during working days and did not use the cars on weekends. In addition to the campaign, the company offered 20% business discounts on cars during the working week and in that way created additional 200 business customers. This move allowed StattAuto to purchase more cars and further develop their services to its original customer group - the weekend drivers. Such services included customer friendly booking and billing services, 24-hour dispatcher, leasing of child-safety seats, roof carriers and bike racks. StattAuto is planning a merger with a car-sharing business in Hamburg and to open a branch in Rome.

Car sharing system in Leiden, the Netherlands can be considered as new forms of entrepreneurial activities promoting an alternative organisational structure for the car system. As an example, in the Netherlands, one of the most proactive European countries dealing with environmentally friendly mobility, there is the car sharing system developed in Leiden, under the name of “Huur-op-Maat”, where a group of car rental companies and car dealers are co-operating with the local government. Within the system, the “fleet manager” provides all its clients with a car whenever they need one. The local government supports the initiative in the field of communication and with parking facilities. Besides the financial advantages for people that travel less than 9,000 km per year, these kinds of initiatives give practical benefits, like no paperwork and no
maintenance for the end user. Furthermore, they also present environmental benefits related to a reduction of car ownership among the participants and in mobility.

**Volkswagen, Germany** has pioneered an area of selling housing services with mobility services. The company created partnerships with several housing companies in Germany and started two programs, “Mietermobil” in Wolfsburg and “Wonhmobil” in Hamburg, offering a fleet of cars of different sizes, including an electric vehicle, to be used by tenants, so that they would not need to own as many cars. The car fleet is in these programmes maintained by a Volkswagen dealer (Volkswagen 2006). The central idea of a sustainable mobility led to the development of this concept. According to Volkswagen the projects offer several advantages to tenants as well as the housing company. Tenants can for example profit from direct access to a car that is parked close to the house, freedom to choose from a variety of cars for different purposes, and the immediate combination of living and mobility. The advantages for the housing company are for instance the decreased need for parking lots and the higher attractiveness of the flats.

3.2.2.3.1 CASE 8 Mobility CarSharing, Switzerland: product-service systems

Mobility CarSharing, Switzerland is a large car-sharing company in Switzerland founded in 1988 that by November 1999 owned 1 200 cars at 700 locations in 330 communities providing mobility service to 30 000 customers (Hockerts 2003). The system allows the users to choose an appropriate vehicle for the purpose of travel: a small car, a family car, a 7-seat van, a lorry or a convertible. There is a 24-hour telephone booking service and Internet-based service. Mobility members can use vehicles in over 80 cities throughout Europe, since Mobility CarSharing Switzerland is a founding member of the European umbrella association ECS.

One of the main success factors of the Mobility CarSharing is the integration of car sharing scheme with public transport system (UITP 2003) that includes local public transport operators and the Swiss Federal Railways. In addition to these actors, Mobility CarSharing collaborates with car rental companies. For example, Hertz gives 30% discount to the members of Mobility, who can book Hertz’s cars via the Mobility call centre. The rental and car sharing systems are complementary. While the car sharing scheme offers short-distance and short-term usage, rental companies offer economically attractive alternative of renting a car for several days or for distances longer than 200 kilometres. Since Hertz’s clients are mostly business people who rent cars during work days and work hours, provision of cars to private people during non-working hours compensates for stand-by time. The Mobility company is very successful and it became the largest car sharing company in Europe with a turnover of CHF 2 million in 2001 (Hockerts 2003).

Apart from aforementioned cooperation, Mobility also established collaboration with SwissEnergy, which allowed the company to invest in a different type of activity (Hockerts 2003). The company for instance obtained support from Energie2000, a programme launched by the Swiss Federal Office of Energy aimed at reducing CO2 emissions by energy efficiency measures and use of renewable energy sources. The contributions from Energie2000 included grants for technological innovation and R&D, public awareness raising, support of specific events and grants for pilot projects, e.g. the development of an on-board computer system.

*Environmental evaluation*
The Mobility car sharing system has led to clear environmental benefits: up to 57% energy is saved and less strain is put on the infrastructure if people use the CarSharing system. These results were reached in several ways.

Firstly, Mobility car sharing system reduced the need for parking lots by increasing the efficiency of using cars and thereby reducing the number of cars serving a given community. This step is of great importance especially for inner city areas. On average, there are 2.2 citizens per one car in Switzerland (Mertens 2002). In Mobility, 57 000 member used 1 700 cars, giving the factor of 34 people per car. Taking into consideration the amount of cars Mobility members still owned, the average figure comes down to 11 people per car, which is still 5 times better than the traditional car ownership patterns.

Secondly, since car sharing schemes own different types of vehicles, its members can pick up the car according to their specific needs at the time – whether they are going for a picnic, going shopping or moving to another house. By adjusting the choice of vehicle, average fuel consumption could be considerably reduced – from the average Swiss of 9.2 litres sown to 7.0 litres per 100 km in Mobility (Hockerts 2003). Another consequence is that Mobility cars had higher occupancy rate – that being 2 people compared to 1.72 Swiss average. All these factors contributed to that the average environmental impact of Mobility members per person/km was 40% lower than the impact of an average Swiss. And the last factor was the replacement rate of shared cars, which was higher than the average rate of replacement. This means that since the shared vehicles are used more intensively, they can be replaced faster and more efficient vehicles are bought instead. This system allows shared cars to always be of the latest technological and cutting edge environmental quality (Schrader 2001).

Finally, car-sharing broke behavioural patterns and initiated learning processes among Mobility users (Belz 2001). The longer people used shared cars, the more they found alternative transport systems acceptable in the level of service and the more people learned to use them efficiency for various trips. This lead to that members of car sharing schemes drive private cars less (by 2000 km) and use public transport more frequently and for longer trips (on average 1600 km more per year) (Muheim 1998). These factors lead to significant reduction of environmental impacts stemming from individual car use.

**Economic evaluation**

The company calculated that if one drives less than 15,000 km per year and combines Mobility CarSharing with public transportation, she/he can save up to US$153 per month, compared to driving a private car. The car sharing also considerably increased the economic effectiveness of public transportation. Typically people perceive public transport to be expensive in comparison to owning a private car (Hockerts 2003). Car-sharing makes the costs of using the private car more visible – not only the cost of fuel, but also all the fixed costs such as initial price, road taxes, maintenance, insurance, and depreciation. In the case of Mobility, the ownership price was included the use fee and amounted to € 0.24-0.53 per kilometre. This made the cost of using public transport - on average € 0.12 per kilometre - more attractive.
3.3 Business initiatives in the Food domain

3.3.1 Greening supply side

3.3.1.1 Green private procurement

Green procurement in food chains is gaining momentum. Many customers, both public and private set demands on suppliers for delivery of organic, ecological, or local foods. Public authorities in Sweden, for example, set the target of 25% of all food purchase should be ecological. The European Environmental Agency also strives for organic and local produce in its canteen. Together with public sector, retailers are the actor who can exercise power in the supply chain. In many countries they rule the food sector, not least because of the continuing shift of the regulation power to the food retailers and away from manufacturers (Jones, Hillier et al. 2005). For example, in the UK, there are five major players, in Switzerland, only two major players (Marsden and Wrigley 1996) and in Germany, the top five food retailers control 70% of the market share (Gagnon and Chu 2005). These shifts have given retailers much more buying power than before and they are starting to increasingly influence markets for sustainable products. For example, in Germany, retailers have fuelled the increase of Fairtrade products on the mass market. Originally only featured in Fairtrade ’s own World Shops, they are now seen in 27,000 supermarkets in Germany (Grefe 2006).

In 2002, Migros supermarket, Switzerland, was one of the first European retailers who discontinued purchasing palm oil from Malaysia and Indonesia due to unsound environmental sources and started auditing environmental practices and compliance with local legislation by its suppliers.

In November 2006 Sainsbury, UK, British supermarket chain switched its entire banana range to 100% Fairtrade certified. As a result of converting to 100% Fairtrade, Sainsbury’s buys five times as many Fairtrade bananas from suppliers – almost doubling the volume of Fairtrade bananas being sold in the UK. Currently, Fairtrade bananas already make up nearly 8% of the UK banana market.

In 2006, Finnish consumers bought 7,3 million kilos of Fairtrade bananas, 46% more than in 2005. One of the major supermarket chains in the country, Siwa, Finland, has been selling only Fairtrade bananas since June 2005. Fairtrade bananas already represent 11% of market share in Finland (7% in 2005). And in Switzerland, which has always been and continues to be the leading market for Fairtrade bananas, the Fairtrade variety represents 55% of the Swiss banana market. Overall, the sales of Fairtrade certified bananas in 2006 grew by 31%, amounting to over 135,000 metric tonnes.

Kesko, Finland is the largest grocery retailer. It is a marketing and logistics company operating 1100 grocery stores and 700 specialty outlets in Finland. In 2003, they were ranked among the highest by StoreBrand Investments’ worldwide analysis of retailers’ sustainability (Storebrand Investments 2003). They have a purchasing policy regarding the sourcing and procurement of environmentally sound goods (Datamonitor 2005).

CO-OP, Switzerland is the second largest grocery retailer in Switzerland. It is known as the Swiss market leader in selling Fairtrade and organic products, with 13% of its sales coming from sustainable products (COOP Switzerland 2007). It has its own product range of organic labelled and fair husbandry labelled products, with over 1700 products

In July 2007, the fast food chain *McDonalds, UK* has switched to milk from organic British cows for tea and coffee sold in its 1,200 outlets in the UK. Up to now, 500,000 litres of milk are sold annually in Happy Meals and in the near future the company will become the largest buyer of organic milk in the UK - 5%. This will make the company one of the biggest buyers of this product. The move is the latest attempt by the US giant to transform its image. However, it also contributes to securing the long-term future of the organic milk market, which equates for just 6% of all the milk sold in the UK. Many farmers stopped producing organic milk after they failed to make enough money and in 2006 some of the leading UK supermarket chains admitted they had to ship in supplies from overseas to meet demand. Thus, the new commitment of McDonald’s is a significant contribution to creating demand and the market drive.

**Tesco, UK** is the largest supermarket and the largest single retailer of milk in the UK, initiated a range of measures in support of farmers producing dairy products (Tesco 2007). Tesco signed contracts with 850 dairy farmers and paid higher price for milk than any other supermarket - about 22 pence per litre, leaving the retailer price for private customers unchanged. In addition, Tesco decided to support local farmers by launching a “localchoice” milk that is sourced from 150 local family owned dairy producing farms. This milk is sold for higher price than standard milk, leaving higher margins to small dairy producers and compensating for higher running costs of small farmers. Customers can therefore choose to pay slightly more to support small local producers. These programmes create closer relationships between Tesco and the local milk producers, where both parties benefit. Farmers join producer clubs where they can share knowledge of processing dairy products, learn about Tesco’s business challenges and better understand customer needs and latest market trends. To further the knowledge sharing Tesco created a sub-section of its webpage dedicated to local farmers where all relevant information is posted.

Developing demands for and assisting suppliers or buying green is not only the business of large companies, but is also practiced by some small companies or even family businesses.

### 3.3.1.1.1 CASE 9 Waitrose, UK: green procurement activities

Waitrose is one of the UK’s most recognised market grocery stores. It has 180 stores that are either in high traffic areas of cities or in more rural areas (Waitrose 2007). Waitrose is part of the John Lewis Partnership, who supplies consumer goods to the fashion, household and food markets (Datamonitor 2006). Waitrose represents a relatively small proportion, just 3.9%, of UK supermarket sales. Overall, it accounts for 16% of the organics market in the UK, with 1400 organic product offerings, 23% of its ground coffee sold at Waitrose is either Fairtrade or organic or both.

The main driver for Waitrose to commit to green procurement is the company’s reputation that is built on the high quality, freshness of its food and ethical production. According to the Local and Regional Food Opportunity survey (IGD 2005), 70% of British consumers want to buy local food and 60% of buyers believe British food is fresher because it has not travelled as far. Waitrose already uses British suppliers wherever possible. For instance, all Waitrose beef, pork and fresh chicken are British, as is 100% of its venison, ducks and geese, and 85% of its bacon. According to Steven
Esom, Managing Director, “Our business is also about localisation, not globalisation, and our pivotal position in the supply chain gives us the opportunity and the responsibility to help customers understand the importance of British agriculture and appreciate the quality of its output”. Another driver was the Organic Targets Bill, which intends to make at least 30% of UK farmland organic by 2010.

Waitrose is committed to green procurement by buying food from local British farmers growers that adopted the LEAF standard. Linking Environment And Farming is a charitable organisation that helps farmers to improve business performance, lower environmental impacts, conserve the British countryside for future generations and strengthen links with the public. Waitrose knows every farm and farmer who supplies food to it. The origin, conditions of production and methods of transporting food have become increasingly important issues to a wide range of stakeholders. Therefore Waitrose placed provenance and traceability as a top priority in its purchasing policy. Waitrose works hard to raise consumer awareness of the facts surrounding food issues by, for example, carefully training its partners, honestly labelling its products, and by offering accessible consumer information, instore and online. On Waitrose.com customers can find out where Waitrose fish comes from and how it is caught, or trace any potatoes bought from a Waitrose shop to the farmer who grew them. Having this traceability of its food and its ingredients is critical, especially when faced with health scares. In 2005, the UK supermarket sector faced its largest-ever product recall and withdrawal when hundreds of foodstuffs were found to contain minute traces of the dyes Sudan 1 and Para Red, both prohibited in food. Waitrose was quick to react, publishing a list of affected products and initiating an immediate recall of all potentially contaminated products.

Buying organic food and requiring organic farming has been at the core of Waitrose business since 1983. Waitrose currently accounts for 16% of the UK organic market, four times its market share. Twice voted ‘Organic Supermarket of the Year’ by the Soil Association, one of the organisations that certify products to organic standards, Waitrose aims to offer the widest possible range of organic food. With the introduction of a new range, Waitrose Organic, in September 2006, Waitrose has 365 own-label organic lines within a total assortment of more than 1,300 products, including pet food, wine, tea, coffee, fruit juice, preserves, bread, biscuits and cheese. Sales of organic chicken and pork increased by 27% and 30% respectively in 2005, and 85% of the baby food it sells – excluding milk – is organic, as is 20% of the milk and 13% of the fruit and vegetables. A 2006 Soil Association survey of 1,500 shoppers revealed that 75% of the organic food in five main supermarket chains comes from the UK. Among these, Waitrose sources 89% of the organic food from UK farmers, including all its fresh organic beef, pork, chicken and dairy products. In addition to local sourcing of organic food, Waitrose prohibits genetically modified crops or food substances in its own brands.

Environmental soundness is not the only criteria Waitrose products are evaluated against. They also need to be Fairtrade. The company started up Waitrose Foundation which aims to improve the quality of life of fruit workers in South Africa who supply their products to Waitrose. This is done through a special agreement between Waitrose, the importers, export agents and fruit workers themselves. In accordance with this agreement a proportion of the profits from the fruit carrying the Foundation logo is used to support health, educational and social projects for the workers, their families and their communities. Raising more than £330,000 in 2005, of which Waitrose contributed
60%, the Foundation has already funded 25 separate community projects at 10 citrus farms, supporting more than 5,000 workers. Waitrose stocks one of the widest ranges of Fairtrade products: over 85 products across 17 food categories, from coffee, tea and cocoa to chocolate, cereals, fruit, biscuits and snacks. Waitrose annually supports Fairtrade Fortnight with price promotions, tastings, posters and magazine coverage.

An important driver for Waitrose to focus on communication activities was the Declaration of The Royal Agricultural Society of England regarding the help that needed to be given to customers by retailers to appreciate the importance and quality of British producers (Waitrose 2006). To that end, Waitrose began promoting British, regional and local food for the first time in early 2006, using a coordinated promotional campaign to illustrate their support for UK suppliers and clarify its message to customers. Product ‘stamps’ now identify the origins of regional and local food, labels carry photos of the producers, and new shelf-edge ticketing helps shoppers to find products from their local area.

### 3.3.1.2 Green products and technologies: organic produce

The global market of organic food produce reached 23.5€ billion in 2004, with the largest share of organic products sold in Europe, Canada and the US. It is expected that the market for organic products and the land where organic food is produced will be increasing in the future (Willer and Yussefi 2006).

Organic food is one of the fastest growing areas of food and drink sales in Europe. In 2003 the European market of organic food accounted for almost half of the global market and reached € 10-11 billion (EEA 2005), growing to € 13-14 billion in 2007 (IFOAM 2007). Organic food for almost half of the global organic food market (Michaels and Lorek 2004). Across the EEA member countries, the area of organic farming increased by around 75% between 1997 and 2000, from 2.4 to 4.4 million ha (EEA 2005) and up to 6.9 ha in 2007 (IFOAM 2007), by still representing only 3.9% of the total agricultural land in EEA member countries. Since 2004, the organic land increased by 8.5% in the EU.

With more than one million hectares of land managed according to organic standard, Italy is the leader in Europe. From 2005 to 2006, the country has experienced an increase of organic land of 7.5%, and the number of operators in the organic sector grew by 2.4%. One of three European organic companies is Italian, and the country is the third most important producer in the world after Australia and Argentina. The average size of an Italian organic company is 20 hectares. The most important products are fodder, pastures, meadows and cereals, which represent 70% of the organic area altogether. There are 839 organic agri-tourism companies in the country, 1,324 on-farm sales, 193 organic farmers’ markets, 658 organic school cafeterias, 1,049 specialized stores and 293 restaurants (Greenplanet 2007). The organic sector in Italy has an estimated turnover of 2.5 billion Euros. Purchases of organic food have increased by 9% within the first months of 2007. The most common categories are milk and dairy products, fresh and processed fruit and vegetables, cookies, sweets and snacks. Purchases of baby food have increased by an incredible 47%, followed by rice and noodles (16%).

Countries where organic products are sold via supermarket chains are generally also those where the organic market share is highest. On average, Denmark and Austria had
by far the highest share of organic food within its total food products in 2000, with 6% and 5% respectively, followed by Switzerland, Finland and Sweden with around 3%, and Germany with 2.2%. The lowest shares were recorded in Spain, Greece and Ireland, all with less than 0.4% (EEA 2005).

In terms of sustainable products, mainstream supermarkets in Europe dominate the market for organics (Datamonitor 2005). This recent breakthrough from the niche markets is expected to cause an increase of 50.8% from 12.9 to 19.5 billion. Grocery retailers have also become a key player in terms of Fairtrade products (Grefe 2006). Despite the recent increase in sales of organic products, organic food remains to be rather expensive for many Europeans.

3.3.1.2.1 CASE 10 Sheepdrove Organic Farm, UK

One of the products with high environmental impacts and adverse health effects, as demonstrated in a recent Swedish study, is industrially produced meat. Industrialised countries dominate production and are the main consumers of meat consuming 85 kg of meat per person per year, compared to 31 kg a year in the developing world. Global meat production increased fivefold since 1970-2005 (WWF 2007). Intensification of meat production is under increasing criticism for its adverse environmental impacts. Vast quantities of grain are produced to feed animals: it takes 7 kg of feed (grain or other cereals) to produce 1 kg of feedlot produced meat. Moreover, the grain is often imported from other countries or continents, contributing to environmental impacts from transportation (Lang and Heasman 2004). Another problem is that animals confined to grain are eating a relatively poor diet. One way to address these problems are farmers initiatives taking steps on turning from quantity to quality of meat and protecting biodiversity of local grazing lands - where the animal feed comes from. For instance when sheep graze on bio-diverse pastures, their meat contains much higher levels of healthy nutrients, which is lowest by far in animals confined to grain (Vines 2007). Therefore, organic meat farming is an alternative way of raising animals and providing meat to the market with least environmental impacts.

Sheepdrove farm sustains animals and crops which are managed in an rotation system by 70 persons. Farming is done on 2150 acres (870 hectares) with some permanent grassland, but most of the fields are ‘in rotation’ between the clover-rich grazing leys which build fertility, and the crop stage growing cereals, field beans and sometimes herbs like borage. The farm also produces chickens and turkeys and is renowned for home delivery fresh organic meat in chilled ice-packed boxes (SOF 2007). Restaurants, organic specialists and supermarkets are also part of the market.

Sheepdrove works closely with researchers and experts to explore more organic farming, mixing the traditional with the new to improve welfare standards, crop management and sustainable farming. Sheepdrove works with Elm Farm Research Centre (EFRC) - the leading P&D organisation for organic agriculture in the UK, to advance and improve the farm, and to develop best practice. The farm is part of the Organic Farms Network and is popular for group farm tour bookings. It holds open day events and hosts conferences. Sheepdrove is keen to promote education and understanding of biodiversity and the organic system (SOF 2007).

The main drivers that motivated farm owners to get engaged in organic farming are as follows. Farm owners’ long-term vision is the main driver for organic and sustainable farming and includes such criteria as supporting wildlife and the environment, investing in its people, and achieving a profit while having high animal welfare standards and
enabling livestock to express natural behaviour. One of the important principles of the farm is closed-loop system. This means that all possible input and output flows are being reduced. This increases the rate of on-site recycling with manure becoming an important resource (SOF 2007). Another driver is scientific research that demonstrates that organic produce has higher levels of important ingredients, e.g. vitamins and fats, and run lower risks of being infested with food pathogens. Recent research demonstrates higher levels of beta-carotene, vitamin E and Omega-3 fat acids, as well as the right balance of Omega-3/Omega-6 acids in animals raised on pasture (Nordström 2007).

Organic certification by the UK Soil Association is another driver for the production of organic meet.

The main barriers for organic farming identified by the Sheepdrove farm are: lack of consumer confidence in labels, organic food critics and lack of organic products suppliers. In order to overcome consumer unawareness and lack of confidence towards organic meat which may not be typically packages, the Sheepdrove farm established a relationship with a local butcher and a farm shop, which are certified to sell organic meat and to buy directly from the producer. Sheepdrove farm also encourages local customers to collect their meat box orders directly from the farm so that they can appreciate where the meat comes from and feel confident that their organic meat is from a source that they can trust.

Environmental performance

The use of manure as a natural fertiliser reduces the use of industrial fertilisers, production and use of which created significant environmental impacts, including energy use in production and soil and ground water contamination. So, the organic crops of Sheepdrove farm seek to largely exclude synthetic pesticides (EFOC 2007).

Sheepdrove does not use any antibiotics to stimulate animal growth or as veterinary medicines. Medicines can be used for ill animals after received permission from authorities and organic certification body. Slaughter takes place at registered organic abattoirs (EFOC 2007).

Moreover, the organic produce is sold locally as much as possible to reduce the amount of miles the food travels and thereby reduce transportation related pollution (EFOC 2007). So, because of the hidden costs to food the Sheepdrove farm encourages consumers to walk or cycle to the supermarket or have the food delivered preferably directly from the farm.

Social performance

Recognised as a leader in its field, Sheepdrove organic farm, is a model of environmentally and socially responsible farming. Sheepdrove’s achievements have consistently brought many awards, such as the Organic Food Awards run the by The Soil Association and Royal Berkshire Show.

The farm has developed a CSR strategy based on different environmental and social principles, including continuous increase of customer awareness. The farm uses different communication channels for exploring new market niches, promoting their activity, products and services and disclosing the information regarding their operation. Traditional media as website, DVD of sustainable farming, publications, primary placement on selected shops, and product information are used. Furthermore, the farm holds open day events in which they invite their current and potential customers to see
how the farm is operated. All of these are part of the added value provided to the customer for increasing their level of confidence in the farm’s products and services. The Sheepdrove organic farm also involves various stakeholders, e.g. local government, soil association, customers and other interested parties, in defining what a socially responsible farm is.

3.3.2 Greening demand side

3.3.2.1 Ecolabelling and social labelling

In response to the recent food scares food stakeholders, such as primary producers, consumer organisations, producers, retailers and farmers associations, have been developing a large number of quality assurance and eco-labelling schemes. The criteria set up by the labels are found to go in many different directions. For example, some monitor the presence of pesticide residues, others the additives and preservatives, and other schemes stress other characteristics, while they are all claiming the products are environmentally friendly (Pretty 1998). The European organic labelling schemes is owned by several private companies such as the Ecocert in France and by state-governed organisations, such as the BioSiegel (Bio Seal) in Germany or the Stats Kontrolleret Økologisk (State Controlled Organic) in Denmark (Tuncer 2001).

The importance of food eco-labelling is increasing in Scandinavia. The most succesfull example is the “KRAV” label for organically grown food that is awarded to 3 200 products. Krav label gives opportunity to set 10-100% higher prices than for not certified by KRAV food products. The KRAV organisation enjoys high degree of credibility, since it is accredited by the International Federation of Organic Agriculture Movements and is controlled by the Swedish Board of Agriculture (Orsato 2006).

Other companies are using third-party labelling to ensure high credibility for their products. For example, Migros, Switzerland was the first European supermarket chain that started selling eco-labelled seafood products and products that received Marine Stewardship Council label in 2007.

In addition to using labels developed by other stakeholders, many food retailers and producers are developing their own labels to communicate with their customers. For example, French supermarket chain Casino is to introduce an environmental labelling scheme for its own-brand products from 2008, according to France’s energy agency, Ademe (ENDS 2007b). Developed by consultancy Bio intelligence service, the label will provide quantitative data on the impact of products in three areas: packaging, waste and transport. It will rate products according to their impact in each of these categories from “very low” to “very significant”.

Tesco, British supermarket chain, is about to start labelling for packaging for its own-brand products according to whether it can be recycled, reused or composted. Other initiatives include a labelling scheme to display the carbon footprint of each product (ENDS 2007e). Since organic does not necessarily guarantee high social standards for producers, other certification schemes have been developed to ensure that products are produced ethically. The Fairtrade movement affirms that products with the label are certified to conform to the Fairtrade Standards and provides development assistance, through a price premium, to disadvantaged farmers and workers. The Fairtrade movement has in fact been an idea for about 50 years, but is recently beginning to blossom (Perez 2006).
In the world markets, the EU accounts for 60-70% of the world marketing for Fairtrade products (Krier 2005). Often Fairtrade and organic labels collaborate. For example, 85% of Fairtrade coffee in the US and 70% in Austria are also certified as organic (Transfair USA 2006).

In 2006, €1.6 billion Fairtrade products were bought globally, which is an increase of 42% compared to the year before (FLOI 2007). For products like coffee and cocoa, the growth was particularly impressive, 53% and 93% respectively. The sales of other major Fairtrade Products – Bananas, with 31% growth, and tea, with 49% – also grew significantly. Fairtrade Cotton Farmers too have seen how the demand for their produce has more than doubled in only one year. Together with increasing product sales, the number of licensees to companies selling Fairtrade products has also increased from 1514 to 1954 in 2006, with some companies making major commitments to supporting Fairtrade. UK supermarket Sainsbury’s changed its banana sourcing to 100% Fairtrade certified in December 2007. Marks & Spencer converted its entire tea and coffee assortment to Fairtrade in April 2006. In September 2006, Insomnia Coffee Company, Ireland announced that all their coffee would be 100% Fairtrade labelled (FLOI 2007).

Albert Heijn, the Netherlands is a member of the Ahold group of retailers, which operate around the globe. Albert Heijn accounts for 62% of the market share of organic products in the Netherlands, the largest provider of organics (Ahold 2004). Albert Heijn stores were the founder of the certification for Utz Kapeh, which now operates as an independent organisation. The Utz Kapeh label can only be applied to coffee that upholds certification standards by abiding by responsibility principles for coffee growing, fair labour practices, and environmentally sustainable agricultural practices. Its ethical code is based on the € Retailer Producer Working Group Standard for Good Agricultural Practice (EurepGAP), but is more detailed (Barrientos and Dolan 2006).

Utz Kapeh’s aim is to integrate social and ethical standards into the mainstream, and thus they often certify the larger brands. Very important to the idea of Utz Kapeh is traceability, so that the customer (mainly the corporations that buy the coffee to sell) knows where the coffee comes from and how it was produced. Utz Kapeh is much younger than organic and Fairtrade, starting only in 1999. Yet, it is the fastest growing coffee certification program in the world with at least 1% of total world coffee production is certified Utz Kapeh (Almaani, Aylwinblanco et al. 2004). Unlike Fairtrade, Utz Kapeh does not guarantee a price minimum nor premium for coffee, thus making it more affordable to the average consumer than Fairtrade, which is generally more expensive (Utz Kapeh 2007). Utz Kapeh has been criticized by FLO for not offering a minimum price to producers. Utz Kapeh’s normal response to the criticism is that it creates opportunity for smaller producers to reach find new markets beyond the traditional niche markets (Barrientos and Dolan 2006).

3.3.2.1.1 CASE 11 Änglamark, Sweden: ecolabelling of food

Food retailing in Sweden is concentrated in hands of three large firms. Coop, ICA and Ax Food together control around 90% of the Swedish food retail. Economic, ecological and social sustainability is the ideology of KF, the 2.8 million owners of Coop Sweden, and the mission is to be a driver behind the sustainable development. Therefore, the position that Coop Sweden is seeking is to be associated with ecology, ethics and health. The role of Änglamark is to sustain this profile. Having a wide assortment of ecological products is a matter of credibility for Coop Konsum and Änglamark has been playing an important role as a driver behind the market for ecological products in the last 15 years (Orsato and Öström 2006). Änglamark was launched in September 1991. It
coincided with the Swedish association for Nature Protection boycott of the detergent Via, and there was a strong focus on ecological products (Öström 2003). In the beginning of 1990s, Coop Sweden was the first organic retailer of food and non-food organic products having 80% of the market. However, rather quickly competitors followed with lower prices for environmentally sound products, because products often fulfilled only basic environmental requirements. Sometimes even own Coops brand Änglamark could not compete with the new organic alternatives of other brands. Since often environmental alternatives are more expensive, this affects the purchasing frequency of organic food. To help its products, Coop initiated aggressive marketing campaigns on TV for Änglamark brand, combining them with in-store labelling and marketing.

In 2002, there were 248 products in the assortment and the sales were 500 million SEK (€450 million). In 2004, the sales have decreased to 336 million SEK (€37 million). Änglamark stands for 25-30% of the total ecological sales of Coop Sverige (food and non-food), and represent 7-8% of the total food sales of the company (Öström 2003).

One of the success factors of Änglamark brand is well functioning collaboration with suppliers. With the increasing requirements on food safety, all new suppliers have to have a risk management plan, HACCP, and undergo revision of the facilities. As an additional requirement, according to the EU law, ecological products must have third party ecological certification. These processes are costly and time consuming and because of this, working with already known suppliers becomes a preferable option and the emphasis is more than ever on long-term relations with suppliers.

Sometimes large suppliers may become a barrier for Coop if they are not committed to the ecological cause or are not interested in selling Änglamark products. The negative attitude towards ecological products has been a problem when it comes to the market leaders. In these cases Coop has had to push the development. An example of this is the issue with the dish washing and detergents in the beginning of the 1990s. It was first after pressure from ICA and Coop, when they launched the ecological brands Skona en Änglamark, and the Swedish Association of Nature Protection official boycott of the detergent Via, that the market leaders, Procter and Gamble and Lever, reacted with launching ecological alternatives. Another example is the ecological milk. When the Consumer Association of Stockholm (KFS) started shipping ecological milk from Värmland, the Stockholm dairy Arla reacted and launched the first ecological milk in 1991 (Terrvik 2001).

Environmental performance
Coop has as a mission to be a driver behind ecological change. To make ecological change requires volume, that many consumers buy ecological products, and the strategy of Coop has been to pull the market by always being a step before the competitors. The secret of the “pull strategy” is to not be too far away so that competitors are not tempted to come along. Being first in strategic product categories has been of crucial importance for the development of Änglamark. These first moves are deliberate strategic decisions and have definitely generated competitive advantage, according to Brand Manager Kjell Eklundh (Öström 2003). The most important driver behind the first moves is the ambition to be first. What has made it possible is also Änglamark’s strong position at all levels of the organisation, not only in management but also among purchasers.

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6 Hazardous Critical Control Points, HACCP
**Economic evaluation**

The development of the brand has been going in waves, depending on the focus of the top management. Since the start, the turnover has multiplied by 20, from 25 Million SEK in 1991 to 500 million SEK in 2002. The increase was strongest in the beginning of the 1990s. The assortment increased from 20 to 180 products in 1996, and the turnover from 25 million to 339 million SEK in 1997 (Öström 2003). Since Ånglamark is a value-based brand promoting sustainable and environmental values, success is related to the attitudes of the target group that Ånglamark aims at, rather than the actual purchasing behaviour. Ongoing daily tracking of consumer attitudes measure the brands association with sustainable development, health and “value for money”. Results show that 90% of the Swedish consumers recognize the Ånglamark brand, 50% of them associate Ånglamark with sustainable development, and 15% of them buy it sometimes (Öström 2003). In total, 90% of the consumers use Coop stores. But consumers switch easily because convenience is a very important factor in the choice of food store.

### 3.3.2.2 Green Marketing

Producers and retailers typically get their message to the private consumers addressed by the eco-labelling, organic or Fairtrade schemes and the promotion efforts via their corporate marketing campaigns. Retailers, for instance, usually have their own special marketing groups for their own brands, which introduce general guidelines for promotions of the schemes at the individual store level.

Improved communication of sustainable products can be important to making consumers more aware of sustainable products and thus influence purchase decision which can create greater demand for these goods. In 2003, *Storebrand Retail Investments* provided an overview of how the larger retailers are performing in terms of sustainability (Storebrand Investments 2003). SRI reports that the UK hosts the most proactive and sustainable retailers, and also influences continental Europe. Advertising is generally seen as an important way to increase sales of sustainable products. However a study of 8 European retailers selling sustainable coffee showed that there is limited advertising (Wallace 2006). *Albert Heijn* does occasionally run corporate commercials about their environmental initiatives, as do a few other retailers. *Waitrose* in the UK uses its commercials to tell about the origins of their coffee and can even be viewed online. For example they run a campaign about the origins of a pineapple. On the corporate homepage Waitrose writes: “*The sugarloaf pineapple grows in the central region of Ghana, but just who was the farmer behind the fruit in your hand? Discover more about Ghana, the Fairtrade projects involved in farming your pineapple and even ideas on ways to eat pineapple at www.waitrose.caretrace.com*”. In addition to campaigns and information on specific products, the company provides access to its organic and agricultural policy.

*Marks & Spencer, UK* is a high end retailer of cloth, shoes, home ware and food. The main driver for Marks & Spencer to carry out communication initiatives about sustainability was the public expectations and belief that Marks & Spencer operates responsibly. The company’s research from 2006 demonstrated the emergence of a new customer (representing 78% of the total number), who needs to know in what conditions Marks & Spencer’s goods are produced, whether standards for animal welfare are fulfilled and whether fair wages are paid to original producers from developing countries. In response to these customer concerns, the company launched a marketing and communications campaign “Look behind the label” to provide such information to both customers and employees. The campaign included media coverage,
advertisements, on-line communication through a special section in the website and in-store information provision through labels and messages. This campaign was the first campaign for Marks & Spencer that targeted both employees and customers and who responded favourably and the campaign that for some time occupied all store windows with information on corporate social responsibility (M&S 2006). The campaign contributed to significant increase in sales. To demonstrate to the customers the origins of their food and ways of production, Marks & Spencer launched another campaign, e.g. Named Farmer. The campaign provided the name of the farmer and the county where the food was produced, increasing customer trust in food freshness and quality. Another campaign - Meet the Farmer - provided customers with possibility to meet farmers, get to know about farming methods and test their products at agricultural shows and in larger stores..

Also, CO-OP in Switzerland runs TV, magazine, and newspaper ads for their Naturplan brand. They have a commercial that shows a “close to nature” approach, by featuring beetles, seedlings, and snails. A few other retailers used local newspapers, but outside of these local ads, advertising is limited. In Finland, Reilukauppa plans to run a large scale advertising campaign, mainly large posters throughout major Finnish cities. They hope that this effort will raise awareness of Fairtrade. Where retail comes in, however, is with planning promotions and making Fairtrade products obvious when Reilukauppa is advertising. Likewise, Andrea Füterer from GEPA in Germany (Fairtrade importer) notes that TV advertising could be a possible means of increasing sales. ICA in Sweden is promoting their ecological food range via commercials that attempt to connect people to farms and the farmers. More specifically, sustainable eggs seemed to be a common theme. Both CO-OP Sweden and Waitrose had sustainable egg advertisements on TV and through other venues. According to Mariska Przyklenk from Transfair Germany, German discount retailer Lidl has added ads to a magazine in Germany and Sweden to announce their added product range of Fairtrade and organic products. While still a new phenomenon, several retailers, such as Albert Heijn, and ICA show the tracing scheme, which is available for Utz Kapeh coffee. At home, a customer can type in the expiry date on the coffee and view supply chain information online.

Personal selling technique is used by some retailers to promote their products. Rosengren at ICA in Malmö, Sweden notes that one of the cheapest ways to do special promotions of Fairtrade and organic coffee is through product demonstration (Wallace 2006). He also finds that asking the farmers for the other organic products to come to the store and explain their products to customers is another good way of increasing sales. This finding is particularly interesting, because personal selling is traditionally thought to be expensive. ISO in Denmark also explains that demonstrations and taste tests are important for allowing the customers to taste and experience the products first hand. Farmer visits, especially for more locally grown organic goods seemed to be rather popular.

Carrefour retailer, France Created in 1959, Carrefour is now the European leader (and the world second) in the retail sector. It operates within 28 countries, employs 430,000 people. For years, Carrefour France has developed an approach based on safety and quality for its own-brand food products, including a voluntary ban of GMOs products. However, along with most of its peers, Carrefour has been criticized by anti-advertising groups and some environmental NGOs for inciting to “over-consumption” through marketing and advertising. In 2002, for the Environmental Day, Carrefour conducted a survey based on a panel of 36,000 customers and 21,000 employees. 90% of them
expressed the feeling that Carrefour had to play an important role in environment protection. In this context, Carrefour France launched in 2004 an advertising campaign entitled “Consuming Better” mixing press ads, billboards, a dedicated section of their website and in-shop communication. It focused on five topics: low prices, best quality-price ratio, product information, commitment to make the shopping faster and more pleasant, respect for people and the environment. Regarding this last point, Carrefour used a motto directly inspired by the anti-advertising movement: “Stop consuming more to consume better”.

In addition to large players, there are also much smaller players in the food supply chain, who however may have a direct contact with customers. For example, farmers’ markets allow farmers and local producers to offer their products from the defined region or even from a single farm directly to the private consumers via their shops, local farmer shops, or via market areas. The levels of goods being sold directly from farms is increasing, in Sweden, for example, companies selling in this way increased between 1999 and 2003 by 45% to nearly 900 companies (Jordbruksutkottet 2005).

Failure to communicate information to consumers may become an expensive endeavour for any company. For example, McDonald’s has become increasingly unpopular with consumers; for example, they have been taken to court for not informing the public that they were using beef extract in the cooking of their fries and have had to change their menu to appear healthier (Egan 2002; McIntosh 2004). McDonald’s predicaments simply follow the current consumer trends to search for healthier food (McIntosh 2004). A company that is well aware of such risks can turn the danger into an opportunity by taking unhealthy product options away and promoting healthier options. Coca-Cola has shown an example by supporting the school beverage guidelines recommended by the American Beverage Association, which strengthen the shifts towards more healthy options (The Coca-Cola Company 2006).

### 3.3.2.3 Product service systems

Product service systems for food produce may include alternative food producing systems, such as integrated pest management or community supported agriculture (CSA), or combinations of environmentally sound food products with delivery services to individuals or institutions. In some cases, retailers organise delivery services complementing on-line shopping; sometimes food is delivered to customers though local specialised shops or farmers markets; sometimes new businesses are being developed that specialise on food sourcing and provision.

Integrated pest management is prevention and management of pest infestation by primarily non-chemical means (Goedkoop, van Halen et al. 1999) that is built on comprehensive the life cycle information about pests. Combined with pest control methods, this information is used to reduce pest damage by economically efficient and natural means. Companies that exercise pest management are, for example, Ciba-Geigy and Koppert. According to some sources, integrated pest management can provide factor 4 reduction in the use of agricultural chemicals (Schmidt-Bleek and Lehner 1998).

**Community supported agriculture** is an alternative way of growing food that deals with environmental and other problems related to industrial agriculture, such as growing use of fertilisers and pesticides, transport and energy per unit of agricultural produce; increasing environmental impacts and consumer distrust in the quality of agricultural
products (Vadovics and Hayes 2007). The approach taken by CSA offers one particular way of solving this problem through bringing together farmers and consumers into a local network. In such a network consumers have a change to meet and get to know the farmers and visits their farms to see in what conditions the food is being produced. Farmers, on the other hand, have a mechanism that ensures that at least part of their produce will be bought, they can better understand the demands and concerns of customers and to strengthen the incentives to produce the food locally (Pretty, Ball et al. 2005). Experiences from the community supported agriculture demonstrate that together with positive social effects, there are also positive environmental effects, such as reduction of pollution from reduced use of fertilisers and pesticides, reduced energy and transportation related impacts and costs.

Apetito AG is a German food company with subsidiaries in Netherlands, United Kingdom and France. It provides: frozen food for retail, institution and consumers at home, support systems (HACCP training, kitchen planning equipment, menu planning and diets advice, financial consulting) and services (e.g. contract catering, full service logistics). Nowadays it has developed new service called Zeitsprung that offers to elderly people at home a wide choice of frozen meals designed for microwave regeneration. The Zeitsprung project started thanks to the personal experience of an Apetito employee whose elderly father has difficulties in using a microwave oven. This employee thought that probably a lot of elderly people have the same problems as his father and started to think how it was possible to solve it. The solution includes a new packaging, a special easy-to-use catalogue with a choice of seven frozen meals a week and a new microwave – hot air combination oven (developed in collaboration with Sharp) with 30 pre-defined programs. Every frozen product has a number on its packaging; the user has only to enter this number in the microwave that automatically knows how to heat the food. The microwave is manufactured by Sharp and sold to end-users by Apetito. It can be used for reheating other products as well. Till now 7000 microwaves have been sold. Zeitsprung is certified by TÜV Rheinland and Deutsche Gesellschaft für Gerontotechnologie, a German association that takes care of elderly people needs. From a PSS point of view, Zeitsprung is a balanced combination of product and service elements. Product elements are frozen meals, the packaging, the microwave for elderly and the product catalogue. Service elements are the delivery service, the coding system and the cooking advice. During the process, the difficulties encountered by Apetito were the high investment needed in time and money, the presence of internal barriers and the difficulties in finding an external partner (the microwave producer) that shared their vision. On the other side, the success factors were the customer benefit driven focus and the presence of a dedicated in-house team with a clear vision. Apetito is not able to answer the question on how has Zeitsprung effected their sales, but they consider the project a complete success because it fits the company vision of serving the customer as much as they can.

3.3.2.3.1 CASE 12 Aarstiderne, Denmark: product-service systems

Aarstiderne is a Danish internet-based company that delivers a wide variety of organic food from its own farms directly to the consumers’ homes mainly in Denmark and in southern Sweden. It started out in 1999 as a small vegetable garden at a farm, supplying vegetables to 100 local households. Nowadays, the company employs 110 people and

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delivers organic food to more than 35 000 Danish households. The initiative came from Thomas Harttung, owner of an organic farm, who conceived the idea of using the Internet to help families order organic vegetables directly from his farm. Later, Aarstiderne has extended its business by attracting other organic growers and farms as co-operation partners. Today the organic products also include a wide assortment of fruits, bread, meat, fish, nuts, as well as organically produced wines and delicatessen products. The weekly wooden returnable boxes are filled with the season’s best organic products and delivered together with recipes created by celebrity cook Ejlersen and information about growers, production methods, farms, the company, food products themselves and their quality. The customers have the option to do their own shopping online, or if they prefer, the company can help in this task via e-mail or phone.

The philosophy of the company is to deliver “organic food products directly to the kitchen door of the customer, who values quality, variety and taste – and thereby creates economic freedom for the development of the company and it’s employees” (Aarstiderne 2007). Furthermore, the company aims to raise awareness on sustainability issues, food quality and energy savings, as well as about fair and ethical trade.

The initiative was driven by the demand of customers to buy organic food, which was not easy to find in traditional stores at the end of 1990s. Danish consumers are well known for being health conscious and environmentally aware. In Denmark, conversion to organic farming took place in the 1960s and 1970s. In 1982 the first organic products were put on the market and in 1993 demand exceeded supply and thus a rapid growth in number of organic farms followed from 1995 to 2001. Denmark was also one of the first countries in the world to introduce legislation on organic production in 1987 and to support organic farming (Frederiksen and Langer 2004).

Environmental evaluation
A continual goal of the company is to be as self-sufficient as possible and to have as large a percent of Danish organic vegetables as possible. In 2006 home grown products accounted for 38% of the vegetables in the delivered boxes and 66% was of Danish origin (home grown included). Environmental impacts associated by mainstream food production are reduced because more organically produced food is bought.

Aarstiderne is a company with high degree of environmental awareness. The company aims to avoid transportation of the products by flight. Some of the internal environmental campaigns include measures to save energy, water and paper, as well as specific programmes to improve the packaging and the efficiency of combustion of worn out wood boxes.

A project was carried out in collaboration with customers on sorting out and returning organic household waste that is picked up when a new box was delivered. Results and a report about the project are posted on the company website, but currently the project is not running.

The company is also experimenting with growing an organic forest. It owns 375 ha forest that is organically grown, FSC certified and appointed as a Natura2000 area under the EU habitat directive.

CO2 emissions have been given special attention by the company, in line with the general increase of public awareness about it. An assessment conducted by Edinburgh Centre for Carbon Management (independent consultant company) has found that the
hotspots of the company’s activities is the end distribution (transport to the customers) with 33% of the total emissions followed by import of products (26%) and utilities, e.g. electricity, heat etc. (21%). The total emission of CO2 in 2005 was 1 602 tonnes of CO2 equivalent pr year, which is 1,5 kg CO2 emissions per box delivered (1,1 million boxes are packed per year).

![CO2 emission of Aarstiderne]

To take responsibility for its emissions the company has set up a CO2 capture programme, which changes the operation of land and forests to capture more CO2 than in the case of conventional management. This makes the company CO2 neutral and extensive information on the project is available on the webpage, where customers also are offered the opportunity to subscribe for carbon offset scheme.

Also a project is on the way in collaboration with researchers from the Danish technical university to find technical solutions to shift the distribution lorries and vans from fossil fuel to cold pressed rape seed fuel.

The company was the first one to make organic consumption trendy and convenient.

**Economic evaluation**

The concept of Aarstiderne was made possible, because it was built on a shared risk between the farmers and the customers through pre-payment. At the beginning, this pre-payment included three months charges to sustain the business. According to the company, Aarstiderne now stands out as an example of business run without subsidies, giving opportunity to other organic farmers and challenging the conventional sector. The company has built up a strong brand in Denmark, distributing to 85% of the area of the country. The company’s success and ability to generate profits has also attracted external investments, for instance Holland’s Triodos Bank, which is a leading investor in green companies in Europe (Oresund Food Excellence 2007).

Aarstiderne differentiates itself from the competitors by cultivating and delivering healthy, organic, high-quality food that more and more people today find attractive and can afford. The agricultural products fulfil both EU and Danish standards for organic products. They are more expensive than conventional products. At first, the company was only producing and selling the products, but once it became clear that a lot of food was wasted, because people for various reasons did not pick up their boxes, they started the delivery service. This meant some initial costs for delivery trucks, but helped abate the problem of wasted food products and most likely helped to keep the customers. Next step to improve the business and grow was going from “mouth-to-mouth method” to start selling over the internet in 1999, which made it easier for customers both to find and to use the company’s services.

Today, Aarstiderne has 35 000 customers in Denmark and is also growing in Sweden. Given the growing interest for organic food, it is even possible that the capacity of the
company and its suppliers will run out before the demand does, even if more and more farms will adhere to the organic concept and start supplying Aarstiderne instead of conventional food companies. The figure below shows the sales of organic food in Danish retail shops pointing at the general trend of increasing demand for organic food.

### 3.4 Other domains

#### 3.4.1 Greening supply side

##### 3.4.1.1 Green private procurement

In many European countries, prominent institutions and companies from other sectors than mobility, food and housing are switching to more environmentally and socially sound practices and purchasing choices.

*B&Q, UK* has revolutionized their supply chain management system by ensuring that suppliers comply with their environmental purchasing criteria (Ytterhus, Arnestad et al. 1999). While supply chain management may seem like a chore, in doing so, they have improved their relationship with suppliers and even decreased distribution costs (Green, Morton et al. 1998).

Some companies, such as *IBM, Hewlett-Packard*, and *Unipart*, include environmental obligations in their supplier contracts. These include reaching environmental targets or supplying specific environmental information over time.

*Ericsson* developed Code of Conduct and environmental requirements that specify supplier performance in the areas of working conditions, social aspects, environment and anti-corruption (Ericsson 2005). In terms of environmental performance, the requirement for suppliers to have an environmental management system developed, but not necessarily certified, in accordance with ISO 14001 has been set already in 2001. If the system is not certified, than suppliers need to fulfil requirements on EMS developed by Ericsson. Environmental supplier requirements also include design for environmental and manufacturing criteria, information on product declaration and transport activities, including environmental impacts associated with transportation of products to Ericsson’s facilities.

One of the sectors that is most recently has been affected by media attention regarding supplier practices is *textile sector*.

Textile companies has seen a great number of focal companies being blamed for unethical sourcing. Yet, this industry has also played a major role in the development of related supplier monitoring schemes. Typical problems reported are illegal child and forced labour, low wages, and discrimination. *Levi Strauss* gained a positive reputation when it became the first apparel company to establish a supplier code of conduct in 1991 (Business for Social Responsibility 2007). After that and other similar actions, Levi Strauss found that it had established respect from a range of stakeholders for its efforts on social and environmental responsibility. This level of credibility means that stakeholders are more willing to collaborate and negotiate on issues, and the company avoids being the target of high profile campaigns. In this way, the company spends less time fighting battles with stakeholders and is held up as a company of choice. This has further led to the establishment of the Social Accountability 8000 (SA 8000) standard, helping suppliers to signal that they fulfil related requirements. (Koplin, Seuring et al. 2007)
**PEOPLE TREE fashion, UK** is a pioneering Fairtrade and ecological mail-order fashion label with operations in Britain. It works with 50 Fairtrade groups in 15 developing countries to produce a stylish collection that respects people and planet. People Tree gives design and technical assistance to help farmers, marginalised artisans and craftspeople overcome the barriers of selling their products. People Tree pays its producers a fair price, advance payments when needed, commit to long term partnerships and support social and environmental projects. People Tree also works to make sure that environmentally innovative production processes are being continuously developed and environmental impacts from production are being continuously reduced. The products are typically certified as Fairtrade and organic products, but also there is ongoing effort to source products locally, to set priority for buying and selling recycled products and natural materials and to make sure that Fairtrade standards and environmental soundness of products is maintained along the entire supply chain.

Wood and timber products have also been under media scrutiny for sourcing of these products from rainforests and other sensitive areas. Most of the existing buyers who are sensitive or concerned with the source of wood products use the Forest Stewardship Council standard, e.g. **IKEA in Sweden, Carrefour in France and B&Q in the UK.**

**IKEA, Sweden** is the international designer, producer and retailer of furniture and household products who develops it reputation as an environmentally and socially conscious company. Since IKEA’s furniture is made of wood, environmental issues associated with forestry are high on the agenda. Already in 1999, IKEA under the pressure from Greenpeace, allowed using only wood that was FSC certified. Since IKEA does not have its own production facilities, but production takes place in 1 600 facilities around the globe, the company set environmental and social requirements for production facilities and practices of its suppliers (UNEP 2007). To facilitate this, in 2000 IKEA developed a code of conduct “The IKEA Way on Purchasing Home Furnishing Products” (IWAY), hired external auditors to verify information on environmental and social performance provided by suppliers and inspectors who visit the suppliers and who suggest measures in case IKEA requirements are not fulfilled. The code explicitly warns suppliers that ‘Repeated violations of IKEA’s requirements will result in the termination of co-operation.’ The code specifies requirements about minimum wages and overtime wages, working condition and explicitly forbids child labour and discrimination, chemical and waste management issues and set limits for emissions to water and air.

**H&M, Sweden** also requires its suppliers to comply with local environmental legislation. Since the largest environmental impact in the life cycle of textiles comes from the dyeing of fabrics and processing of fibres, H&M has started working with suppliers on improving working conditions, reducing and restricting the use of certain chemicals and toxic compounds (lead, cadmium, and mercury, brominated flame retardants, PVC and formaldehyde) and starting or improving wastewater treatment methods (H&M 2006a). The company developed a code called H&M’s Chemical Restrictions that brings together all information and requirements of H&M on chemicals and all the suppliers must sign the code of conduct. In order to ensure the compliance of suppliers, the company makes regular tests and makes sure that suppliers are following the restrictions, which are continuously updated (H&M 2007). The company has also worked with an independent consultant and the Wuppertal Institute in Germany to create tools for identifying areas for potential resource savings (H&M 2006b).
3.4.1.2 Green products, technologies and operations

Greening own operations is becoming more common, even in industries that are not typically associated with large environmental impacts, such as textile industry. However, even in this sector companies have been developing more environmentally and socially sound products. For example, since early 1970s, Patagonia was making functional outdoor clothing that is made with environmental considerations. Since 1993 the company is making fleece products made from post-consumer recycled plastic soda bottles (Patagonia 2007).

More and more people nowadays are finding interest in wearing clothing made of natural fabrics. Fashionistas are choosing fabrics made from soy, bamboo and hemp, so that fabrics are made from natural products, without chemicals, even pesticides or insecticides, and are therefore biodegradable. Clothes made from the natural fabrics have been called eco-couture. A poll of manufacturers conducted by the Organic Trade Association in 2004 showed the growth of organic textiles in 2003 by 22.7% reaching $ 85 millions in sales. However, out of global cotton supply this constitutes 0.5% of the global. The OTA anticipates the increase of demand for organic textiles once the high end consumers will be targeted by organic fashion. "The growing sector of environmentally conscious consumers wants to be able to purchase everything organic, from the food they eat to the clothing they wear," says OTA executive director Katherine DiMatteo. "The organic apparel being made today looks and feels as appealing as the apparel made from conventionally produced fabric" (Anonymous 2005a).

Sophisticated fashion companies are opting for the eco friendly fashion since the past decade. Esprit introduced its E-collection in the early 90’s and became the pioneer in this regard. Patagonia, Seventh Generation and The Gap have joined the band wagon and offered environmentally friendly attire made from organic cotton. C-IN2 is men’s underwear company that developed own bamboo line. Leading Italian fashion house Gucci has presented clutch handbags and sandals made of bamboo in a recent spring collection. This trend indicates that the newer generations who are environment conscious as well as fashion savvy are demanding eco friendly fabrics and leading boutique are shelving these items replacing the conventional pieces. Katharine Hamnett, the British designer who invented the concept of stylish eco-fashion, launched her first ever 100% ethical clothing range. “Organic cotton no longer means dodgy, lumpy scratchy fabric. But it takes technology and investment to start making beautiful materials” she says.

H&M’s focus on clothes containing organic cotton is growing. H&M started using organic cotton a few years ago. Initially the company incorporated organically grown cotton into a selection of garments, which were not given a special label – the idea being to contribute to increased demand, thereby encouraging growers to switch to organic production. From 2005 H&M has labelled its baby wear with EU Flower (H&M 2006b).

3.4.2 Greening demand side

3.4.2.1 Ecolabelling and social labelling

In many sectors companies are developing own labels to communicate environmental and social features of their products to their consumers.
**TENTHOREY textile, France** In response to the latest consumer trends, and being sensitive to the values associated with Fairtrade, Tenthorey was keen to find a raw material produced with respect for man and his environment. This is why Tenthorey has gone into partnership with the Max Havelaar association, which is well known by the general public for its activities in support of small producers in the countries of the South. From now on Tenthorey is able to offer textile products which are certified as coming from a source which is labelled as 100% Fairtrade cotton. Tenthorey is ECOCERT and OEKOTEX Standard 100 certified.

All the garments in the collection of **H&M** that includes organic cotton now have a special label, so that customers can easily distinguish them.

**Noir, Denmark** is the new clothing label set up by Peter Ingwersen in 2005. Noir represents the new face of eco-fashion. It is designed to appeal to 25-plus women who combine a love of luxury with a social conscience. Noir demonstrates that you can be both stylish and eco-friendly. “There’s nothing women like more than finding sexy fabrics and beautiful classic styles and knowing that buying them will help people,” says Ingwersen. “It’s a win-win situation.” Noir’s tougher fabrics (leather, stiff cotton), stronger colours (blacks, reds and whites) and sharper tailoring (crisp masculine shirts and blazers) point to something new. As does their message. Their fifth Ready to Wear Collection, entitled Transparent, “is associated with Corporate Social Responsibility reflecting openness, communication and accountability.” In other words, Noir likes to sit on the ethical side of the fashion fence, and it is this that attracts an international interest. By using organic materials and Fairtrade practices wherever possible, Noir hopes to attract the ever growing ethically-aware customer.

**People Tree fashion, UK** People Tree, that uses Fairtrade and organic cotton, supports 50 Fairtrade producer groups from 15 developing countries (People Tree 2007). Among other activities, People Tree provides education and training to craftsmen and their organisations with the goal of improving their skills and creating new business opportunities and new markets. The company also helps its suppliers financially, making 50% advance payments on all orders. People Tree also contributes financially to local communities helping with education of children and other social tasks.

There are also many companies who join existing schemes for environmentally sound or social products. For example, in 2006, Irish and German airlines, Ryanair and Air Berlin, started offering only Fairtrade Certified Coffee to their passengers (FLOI 2007).

Labels are also penetrating the service industries market. For example, there is an environmental program for hotels in **Denmark - Den Grønne Nøgle** - The Green Key. The objective of the program is to create an environmental certification to be given to hotels that meet a series of requirements regarding environment and health issues. This certification program has a set of criteria based on which it assesses hotels during on-site visit. The certificate and the sign is given for 12 months at a time. A hotel has to appoint an environmental representative who will be responsible for ensuring that the criteria of The Green Key have been maintained at all times (Den Grønne Nøgle 2007).

### 3.4.2.2 Green Marketing

Green marketing is expanding in various sectors. Few examples from textile sector are presented. In 2005, **Nike** was one of the sponsors of the Wear Organic! show collaborating with the Organic Trade Association. The catwalk and trade show
displayed the latest designs made of organic fibres. Already in 2002, Nike started developing a certified organic collection and is estimated to be the largest consumer of organic cotton in the world.

_Earth A'Wear_ is the first shop in Copenhagen, Denmark that sells only cloth from organic raw materials (MiljøDanmark 2000) and actively promotes organic textiles to its customers. The auction house _Sotheby's_ contributed to promoting various types of waste as a potential material for creating glamorous designs by opening in 2003 the Contemporary Decorative Arts and Design selling exhibition that included a designated section “Waste to Taste”.

_Eco fashion show, UK_ dedicated to eco-style at London’s Craft Council aims to demonstrate how outfits made from self-sustaining materials, such as bamboo, can fit easily into our modern lifestyles. It will also feature Ingeo, a patented material made from corn, which has the texture of fine cotton and is currently used by Versace and Armani.

**Diesel, Italy** launched the Global Warming Ready collection widely advertised in many countries through ads. Diesel is one of the companies collaborating with StopGlobalWarming.org that aims at involving people in working against global warming.

3.4.2.3  _Product service systems_

Product service systems can be found in many other sectors than housing, food and mobility. They provide services to people, who pay for using products without owning them and this often comprises sharing schemes, leasing or renting examples and new types of services. Examples include common practices of renting out cottages to several people throughout a year. The same time-sharing principle is applied to the hotel sharing programmes with the difference being that people are buying shares of the hotel. Below two cases are presented.
4 Critical factors for implementation of SCP business initiatives

Based on the effectiveness evaluation, the case studies and overview of strategies provided in Chapter 3 and with contribution of literature analysis that includes evaluation studies, drivers, barriers and success factors of the identified strategies are investigated in this chapter.

4.1 Greening supply side

4.1.1 Green private procurement

This section discusses drivers, barriers and success factors for companies mostly in mobility, food and housing domains to engage in greening own procurement practices and to send demands on environmental and social performance upstream – to the producers of raw materials and energy, to manufacturers of semi-products and final products.

4.1.1.1 Drivers

Economic drivers

One of the main drivers for companies to engage in green private procurement (GPP) is cost avoidance. The procurement of environmentally sound products and services can reduce the cost of waste management, reduce investment in cleaner production, reduce time and cost needed for mandatory reporting. Procurement of more environmentally sound and more efficient products and services can reduce energy, water and fuel consumption and related costs. For example, for some construction companies substituting energy they are using for green energy and buying bio-fuel is a way to reduce costs, and therefore economic efficiency is one of the drivers of greening the supply chain. The higher the demand for bio-energy and bio-fuels the more there are reasons for energy and fuel producers to shift to more sustainable and renewable energy sources.

The awareness of investment community about environmental and social performance of companies and its effect on investments is increasing, together with the expansion of boundaries of product liability and risks associated with product life cycle. This drives companies to employ green private procurement practices to ensure investment community that measures to reduce risks associated with company products and operations along the supply chain are minimised.

Regulatory drivers

In some cases, green private procurement can facilitate compliance with environmental regulations and assist companies with getting permits.

Some regulations set direct demands on green purchasing criteria and the choice of green products. For example, Directive 2003/30/EC of the European Parliament and of the Council of 8 May 2003 directly promotes the use of biofuels and other renewable fuels for transport (OJEU L123 of 17 May 2003). The European Commission also recently proposed new standards for transport fuels that stimulate the development of lower-carbon and biofuels and drive suppliers to reduce the GHG emissions stemming
from the production, transport and use of their fuels by 10% between 2011 and 2020. From 2011, suppliers will have to reduce emissions per unit of energy by 1% a year compared to 2010 levels.

**Market drivers**

One of the most obvious drivers for companies to employ GPP is to *improve image and strengthen the brand name* of the company.

Protecting the *reputation* of companies is also an important driver. For example, construction sector receives increasing attention from stakeholders, such as authorities and potential investors, clients, the public, environmental pressure groups, and communities in all the countries where they operate. With increasing globalisation and by extending supply chains across the globe, the number of stakeholders and the amount of issues they are concerned with is growing.

**Clients and customers** are one of the main drivers for including environmental and social criteria in purchasing practices of construction companies (Sterner 2002). Clients are stipulating their own requirements and criteria for companies and thereby drive the greening process upstream the supply chain. Still, perhaps the most prominent requests about supply chains come in the food domain, where not only environmental issues are in focus, but also social and ethical issues. In order to respond to the growing market of ethical consumers, many retailers of food are moving towards green purchasing of environmentally and socially sound products. The growth in demand for organic food over the past decade has, in part, been triggered by food scares and the desire to buy high quality, healthy food produced in a way that protects the environment and safeguards animal welfare. Another driver are consumers who look for healthier, safer and less fattening foods, especially with increased concerns for obesity, pesticides use, and GMOs (McIntosh 2004), (EEA 2005).

**Societal drivers**

*Communities, citizens, and NGOs* also demand environmentally and socially responsible decision-making from companies and if the latter fail to provide evidence of responsible management company reputation may suffer, as demonstrated by numerous cases, e.g. NIKE and its child labour case, which became a target for consumer boycotts. It takes companies long time and a lot of effort to improve company image and companies are becoming more and more aware of the impact of bad reputation on the bottom line.

**Media** has been named as one of the main drivers to greening the supply chain, especially with regards to social issues that include working conditions and workers’ rights in supplier countries, which are often developing countries with low cost labour and with lacking environmental and social rights legislation or deficient enforceability of thereof.

**Internal drivers**

In many cases green private procurement also includes social criteria and therefore overall sustainability performance of the company can be improved through GPP.

Employees and potential recruits also become a driving force for greening internal operations of companies (New Business 2007). According to the Chartered Institute of
Personnel and Development 46% of employers expect potential recruits to prefer working in ethically and environmentally responsible organisation.

4.1.1.2 Barriers

Economic barriers

*Price.* There is a perception and in many cases the reality that green products are more expensive than conventional alternatives. However, there are many cases where perception of costs is overestimated. This is especially true if the more environmental option has a *higher up-front purchase price*, but costs less over its lifetime. For example, a less toxic product would cost less to transport, store, dispose off. It will probably require fewer licences, less training for staff, and lower risks. Finding or justifying the balance between the economic costs and environmental and social benefits is an intricate task.

One barrier to greening private procurement for many companies is the *global supply chains* that cross national borders. This makes it difficult for companies to exert pressure on the way materials and products are produced in different countries, since legislative requirements are so different. Even in cases when European companies can exert pressure on suppliers in different countries, it becomes a costly enterprise to audit all the suppliers.

Regulatory barriers

In many cases European standards for products are stricter than standards in many developing countries that serve as suppliers to European markets. The companies may comply with local legislation and standards, but may not fulfil the European requirements of quality, environmental soundness and social criteria.

*Seen as trade barrier* Another limitation is that green procurement programs of companies are sometimes perceived as trade barriers by trade organisations.

Market barriers

*Availability:* Often companies report on lack of availability of environmentally sound products on the market either due to the absence of technical solutions, economic reasons or lack of explicit demand for suppliers to provide these alternatives. As noted by ICA in Sweden, there is still lack of organic products produced in Sweden despite the clear demand from consumers. Many places where retailers buy their products do not offer sustainable options (Wallace 2006). Construction companies also expressed the lack of supply of green products to be one of the main issues that prevents them from buying green.

In other domains there is still lack of demand from customers. For example car manufacturers do not experience demand to make sure that all the semi-products or modules used in cars fulfil environmental and social criteria.

Internal company barriers

*Insufficient knowledge:* Many companies are unaware about potential benefits of green procurement and about their role in stimulating the demand and creating market for green products. There is also lack of knowledge about how to create technical specifications for procurement practices, including lack of knowledge about existing and publicly available databases and eco-labelling criteria.
4.1.1.3 Success factors

Regulatory
Authorities may promote green private procurement by assisting with standardisation of green private procurement specifications and by clarifying criteria for green purchasing.

Economic
*Investors* in different parts of the world are increasingly interested in ethically or socially responsible investing and therefore ensuring them that company operations and products are not associated with high environmental or social impacts along supply chain is important.

Internal

Provision of information and development of practical tools for establishing procurement criteria or identifying total life cycle costs is a vital factor for disseminating green procurement practices.

Education of procurers in life cycle cost perspective may provide understanding about more environmentally and socially sound options and how they can compete on equal terms with less sustainable options.

Market

Market demand and specific request for environmental and socially sound options from clients and consumers is the foremost success factor for green private procurement initiatives.

Important for companies is therefore to create awareness and potentially the future market by educating clients, e.g. companies and local authorities and communities, in environmental and social criteria

Availability of environmentally and socially sound products on the market is an important prerequisite for environmental procurement practices of companies.

4.1.2 Green products, technologies and operations

4.1.2.1 Drivers

Regulatory
And finally developing environmentally sound products helps companies to surpass *regulatory compliance* and *reduce risks* and associated costs.

*Regulatory driver* is one of the main drivers for greening buildings and energy using appliances and products. The building sector is usually guided by regulations and standards for how to design, build, operate and demolish buildings, including what energy systems to install in buildings and how to operate them (UNEP 2006). There are many legislative initiatives at the EU level nowadays that stimulate construction of more energy efficient buildings and production of more energy efficient appliances. Examples include: the Directive on energy performance of buildings; the Directive on the promotion of electricity and heat co-generation; the Directives on energy efficiency requirements for ballasts for fluorescent lighting, on refrigerators and freezers, on hot water boilers; Directives on the labelling of electric ovens, air conditioners,
refrigerators, freezers, washing machines, dishwashers, driers, lamps, on information to the public on the fuel consumption of cars; the Regulation on Energy Star labelling for office equipment; the Directive on Eco-design requirements of energy-using products; the Directive on Construction Products; and others; the Directive on Energy Efficiency and Energy Services. It is difficult to measure the influence of this body of legislation, but it is obvious that these Directives and regulations have also been drivers of the current move towards green buildings.

EU regulatory frameworks allow private customers to choose their electricity and gas supplier from 1 July 2007. With increasing energy prices, more sustainable energy sources become more economically feasible and private people and organisations start choosing these alternatives, which creates demand for these products on the market and makes environmental component to become a competitive feature.

Mandatory energy-efficiency standards applied to manufacturers (Commission on Sustainable Development 2006) and eco-labels are important drivers for improving the efficiency of energy-using appliances. For example, the introduction of energy labels in late 1990s had a significant impact on the appliance market in the UK. The proportion of sales of cold appliances meeting the minimum standard from 1995 to 2000 grew from 40% to 93%. (EU 2007).

In the area of mobility the European Commission adopted the Communication (COM(2007) 19) outlining a comprehensive new strategy to reduce CO2 emissions from new cars and vans sold in the European Union and fulfil targets set by the Kyoto Protocol of limiting average CO2 emissions from new cars to 120 grams per km by 2012 - a reduction of around 25% from current levels. To encourage the car industry to compete on the basis of fuel efficiency instead of size and power, the Commission is also inviting manufacturers to sign an EU code of good practice on car marketing and advertising.

Economic

Economic drivers are vital for eco-design practices. A front-runner in eco-design will capitalise on being the market leader and will have higher profits than the followers. The specific benefits of eco-design will depend on the product and situation. For some products there may be eco-labelling or energy labelling schemes and advantage in registration. For others there may be specific customer demands. Even if there is no specific customer requirement, there may be direct materials and energy savings and other benefits at the production stage. There may also be energy and waste reduction or other “added value” benefits to the user, which can be promoted as competitive features of the product.

Since eco-design often focuses on utility to the customer, this creates higher customer acceptance and willingness to pay for perceived quality, especially if it is directly linked to customer value added or health aspects.

For construction companies increasing prices on energy after the restructuring and liberalisation of electricity and gas markets create new conditions for building users, who start putting demands on construction companies (Bertoldi, Rezessy et al. 2006).

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8 which also addresses measures to reduce the standby losses currently estimated at 7% of the electricity consumption in homes for several groups of products such as televisions, VCRs, and computers.
**Financial savings** that can be reached by energy-efficiency management at company level is an important driver for construction companies to green own operations. Financial savings and cost-efficiency are the main drivers for also housing owners and tenants to demand the construction of more energy efficient buildings. Studies demonstrate that low-energy buildings with high level of insulation, high thermal comfort, good indoor air quality and low environmental impact can reduce energy consumption in comparison to residential buildings by 60% (UNEP 2006). Economic savings also drive the retrofitting of existing buildings in accordance with energy efficiency criteria. Retrofitting can also be cost-effective, as was demonstrated by research on apartment blocks in the EU conducted for the IEA. The study showed that up to 80% of energy for heating can be saved in the least efficient buildings. The average level of energy saving reached 28% (IEA 2006).

**Economic instruments** and incentives are very important means for encouraging more energy efficient approaches in design, construction and operation of buildings, e.g. through reduced tax rates, improved loan conditions, or increased rates of return on investments. The purpose of economic instruments and incentives is also to change the market conditions in a way that makes energy efficient buildings more financially attractive than ordinary buildings. Another instrument is for example CO₂-based taxation of cars and of alternative fuels that has a significant CO2 reduction potential by shaping consumer demand and setting economic incentives to which vehicle manufacturers and fuel suppliers will respond. A CO2-based taxation system raises customer awareness and gives a political signal that society attaches a priority to reducing CO2 emissions.

**R&D support** is another driver in the EU that facilitates research and development of new construction technologies, materials and products, enhances their market penetration, and stimulates awareness, exchange of information, and best practice sharing.

**Internal**
Being market leader in eco-design brings about business success, since eco-design reduces costs and improves environmental performance of products, services and processes and thereby improves corporate environmental performance.

**Market**
Eco-design helps companies to achieve product differentiation. In many industries with tough competition eco-designed products and service become an important differentiation strategy.

With raising environmental awareness of population, many companies are shifting towards building their brand identity on environmental and social features of their products and services, thereby enhancing their brand identity and positioning themselves in new market niches.

**Societal**
The increasing overall awareness about the need to address climate change issues in society drives companies to consider measures that can reduce their impact on climate change in the short- and long-term.
4.1.2.2 Barriers

Regulatory

Regulatory support to eco-design or energy efficiency activities differs substantially from sector to sector, ranging from some EU directives on energy use in electronic products and design criteria for such products, to very little regulatory drive for energy efficient housing. There are no specific national or regional green building regulations (Strohmer 2006). Most Member States have national building codes prescribing minimum energy performance for new buildings. Generally speaking, Member States have to communicate measures which implement EU legislation to the European Commission. Most EU legislation in this field has only been adopted over the last 4-5 years, came into force very recently, and thus most national measures are still to be developed and communicated. For example, the Energy Performance of Buildings Directive of 2002 only came into force at the beginning of 2006 and Member States are still developing and implementing measures to comply with this Directive. Therefore, at this stage, there is no overview of regulations at the national/sub-national level.

In recent years, in Europe cars have become heavier and larger within their own different model segments, due to regulations on safety and air quality, and due to consumer preferences (ACEA 2007c).

Economic

High costs of eco-design activities Often, eco-design is a costly endeavour, especially in sectors, where characteristics of products that are affected by eco-design are difficult to directly link to customer value. In order to initiate and sustain eco-design activities, companies need to develop tools and methods for assessment of product-related environmental and social impacts and for product (re)-design, invest in personnel education, and sometimes to change their suppliers and reorganise internal organisational structure. Eco-design activities may also increase time to market, which in turn may increase costs. In a European project, the reasons for choosing or not choosing low energy solutions were researched in municipalities in nine countries. The main barrier for not choosing these solutions was investment costs, even if life-cycle costs are taken into consideration (Thunselle, Erhorn Kluttig et al. 2005).

An additional problem related to energy efficiency is that it is frequently difficult to appreciate the effects of increased efficiency in for example buildings. For example, additional insulation does not necessarily immediately lead to reduced heating bills, for instance in situations with rising energy prices or in cases where consumer behaviour is changed (Rozite 2006).

According to the survey of WBCSD (2007) building professionals tend to underestimate the contribution of buildings’ energy to climate change (e.g. in Germany said it was 23%, while it is about 40%) and to overestimate the cost of saving energy (e.g. in Spain it was estimated to be 19% while it is only 5%).

Another barrier is lack of Life Cycle Costing (LCC) especially in construction and mobility sectors. For example, low construction cost is still the most important factor in selecting the winning project. There is still a myth that high energy efficiency buildings cost much more in investment, are less attractive, difficult to build, etc. despite substantial evidence to the contrary. Property professionals highly overestimate the cost
of constructing energy-efficient buildings, by up to 300%. A recent survey by the World Business Council for Sustainable Development amongst 1,400 individuals active in the property industry reveals that most property professionals assume that energy efficient building means spending around 17% more on materials and construction (WBSCD 2007). This is more than three times the actual extra costs involved, according to the WBSCD.

Profitable opportunities for energy savings are often overlooked because of inadequate cost information. Despite the stated interest of real estate managers in energy efficiency, a study in 2007 found that only two-thirds of the companies tracked energy data and only 60% tracked energy costs (WBSCD 2007). Only 30% of real estate managers or facilities managers claimed to have included energy efficiency requirements in requests for proposals.

Low cost of energy is another barrier. Energy is typically a small proportion of total occupancy costs for buildings - too low to be a driver for energy efficiency (WBSCD 2007). For example, in a high quality office building in Germany, heating and electricity made up less than 5% of the total operating cost of the building, including rent and maintenance (about 1.1 € of out of every 23.3 € spent).

Studies of consumer choice indicate that buyers of buildings are mainly concerned with the purchase cost and are only prepared to pay extra for energy-efficient buildings if the investment is paid back very quickly. Builders therefore have little market incentive to invest in energy-saving features.

Market

In the construction sector, there is a lack of leadership on building sustainably and lack of acceptance by business community. The lack of information on, as well mistrust of, passive technologies prevents the construction of low cost and energy efficient buildings. The building professional industry and architects need to be convinced that there is a market for green buildings. Buyers, including corporate buyers and renters, need to be convinced that it is worth the additional investment, which will be more than paid back after only a limited time (Strohmer 2006). A qualitative research found that people believe financiers and developers are the main barriers to more sustainable approaches in the building value chain (WBSCD 2007).

People and households may fail to buy energy efficient equipment due to lack of information on equipment performance and lack of concern for energy efficiency – consumers tend to be more concerned with criteria such as technical performance, comfort and aesthetic design. In addition, cost difference between standard and energy efficient equipment plays role. For example, there has been relatively low uptake of low-consumption lamps, possibly due to their higher price.

The second most important barrier from the study of Thunselle, Erhorn Kluttig et al. (2005) on the choices regarding low energy solutions was lack of information. The information is needed at the very early pre-design phase of the project when also economical strategies are determined. Information is needed both to the technical department and politicians at the municipal level. The information needed during the decision phase concerns investment costs, energy savings, a general overview of each solution proposed with experience from other projects and its benefits/ limitations. For many, the lack of time is a serious limitation. The information must therefore be easy to
find and retrieve, easy to understand and easy to apply. For most of the countries, the information is preferred in their own language. The best way to provide information seems to be newsletters and internet (Thunselle, Erhorn Kluttig et al. 2005).

The rebound effect – the reduction of energy savings because the saving leads to additional activity through either greater use of the same product or for another energy-using action, such as driving a more efficient car further, or leaving lights on because they are energy-saving bulbs – is widely recognised as a problem, but its magnitude varies, for example (WBCSD 2007): space heating: 10-30%; space cooling: 0-50%; lighting: 5-20%; water heating: 10-40%; automobile: 10-30%.

Lack of hand-on and easy-to-use tools In many European countries, there are no available easy-to-use eco-design tools for companies. In some front-runner countries, tools for swift LCA-based product analysis (for example Eco-indicator in the Netherlands, SPI in Austria, EPS in Sweden) are rather common and are quite broadly applied in industry. In other countries, e.g. Denmark, Greece, Spain, Ireland and United Kingdom, eco-design has not been widely applied in industry (Tukker, Eder et al. 2001).

SMEs lag behind larger companies SMEs rarely set eco-design as a strategic goal for their activities. Some SMEs have participated in eco-design demonstration projects, which however rarely lead to incorporation of eco-design in product development processes and companies routines in the long run. Even in cases when eco-design is employed by SMEs, it is most often redesign solutions that are practiced and not product innovation or design of new products with factor level improvement.

Lack of eco-design application in practice One of the weaknesses of eco-design methods and approaches is that they are often developed by universities or research institutes with little testing in companies. In Denmark, Sweden and the Netherlands methods are often developed in collaboration with or by industry itself and therefore the success rate is much higher than in other countries (Tukker, Haag et al. 2000).

Lack of market acceptance of low-emitting vehicles In line with the 1998 Commitment, new models emitting 120 CO2 g/km or less were marketed by 2000, but a number of highly CO2-efficient cars have met with very low demand (ACEA 2007c). There is a long list of European companies that developed and put on the market low-emitting and fuel-efficient vehicles. However the outcomes of these efforts were less than successful due to the low interest and acceptance of the new vehicles by European consumers.

- **Audi Duo**: In 1997 Audi introduced the hybrid vehicle Audi Duo. Only about 60 vehicles of this plug-in parallel hybrid car with the capability of pure electric driving and zero CO2 emissions could be sold.

- **Fiat** Auto’s Seicento Elettra: In 1998 Fiat launched an electric car, the Seicento Elettra, with zero CO2 emissions. The model suffered from poor market acceptance. Indeed, over the 1998 - 2002 period only 294 were produced. The low number of sales that did occur were mainly to public administrations.

- **General Motor’s** Astra and Corsa Eco: In April 2002, Opel launched the Corsa Eco, a highly economical gasoline car with CO2 emissions of only 118g/km (later: 115g/km). It had a low purchase price and operating costs, and was seen as making advanced fuel-saving technology available to as many customers as possible at an acceptable price. Customers have been reluctant to buy this CO2-
efficient model partly, it seems, because of its transmission, its smaller tyre-width, low rolling resistance tyres, and a more general association of “eco” cars with unsatisfactory driving performance. This is despite the fact that the Corsa Eco was a version of the standard Corsa: its price was the same as for a standard 1.0i Corsa - so customers could save money through lower fuel consumption from day one.

- **Mercedes** A 160: Only about 29,000 vehicles of the low-emitting A 160 were sold overall. Consumers showed a clear preference for the variants with higher power and fuel consumption, despite the higher sales price of these vehicles.

- **PSA’s** Electric Vehicles: Since 1995, PSA has put on the market several electric vehicle models - the 106, Partner & J5 (Peugeot) and the AX, Saxo, C15 & Berlingo (Citroen). Despite real advantages being identified for such electric vehicles during market trials, their large-scale development has been put into question because of difficulties over their market acceptance. In fact since 1995, PSA’s production volume of such vehicles has only been around the 10,000 unit mark.

- **Renault’s** Electric Vehicles: For some years, Renault has designed, mass-produced and sold electric vehicles. However, between 1993 and 1997, only 1287 Renault electric vehicles were registered. In 2002, Renault came-back to the market with the Kangoo, but only 151 units were sold. In 2003 the “Kangoo Electr’road” (with range extender) was launched, but again did not meet with market success, despite high investments in electric vehicles by Renault (approximately € 75 million).

- **Volkswagen** Lupo and Golf CityStromer: The “3-liter Lupo” registered high sales just after the launch, but saw a much more swift and drastic decrease of sales compared to other models, indicating a limited customer base and market potential. In 1995 Volkswagen launched the Golf CityStromer as a pure electric vehicle developed and manufactured under real serial conditions. Nevertheless, sales volume did not exceed 150 vehicles due to lacking customer acceptance related to higher costs and lower performance compared to conventional cars.

**Societal**

*Lack of attention to infrastructure* are that are stuck in traffic jams or have to break for every traffic light simply waste fuel. Infrastructure measures have an enormous potential to reduce CO2 emissions. Reducing road congestion through a variety of measures, including better road design and adoption of intelligent traffic management technologies, is an effective means of reducing CO2. For example, ACEA investigated the yearly CO2 reduction potential and costs of substituting 50% of current traffic lights with modern dynamic traffic lights, which generate an optimal traffic flow by adjusting to traffic conditions. Annual savings of 2.4 million tonnes CO2 are possible, around 16% of the aimed reduction from cars. Differences in road surface can lead to reductions in rolling resistance of up to 40%, corresponding to approximately 5% of CO2 reductions (ACEA 2007c).

**Internal**

According to the Swedish Energy Agency, possible explanations for the limited dissemination of solutions promoting energy efficiency can also be found in *unwillingness to change routines and behaviour*, i.e. social and organisational barriers
have hindered the implementation of technically possible and economically feasible measures (Energimynindiget 2000).

**Lack of communication between eco-designers** There is very limited communication between actors concerned with developing eco-design methods within and among different European countries. There is a very small international eco-design network bridging several universities that exchange state of the art knowledge on eco-design methodologies and strategies. However, most universities and research centres are unaware about activities of other research bodies working in the same field. Another barrier is that expertise is more available in one country than in another and may even differ from region to region within a country (Strohmer 2006).

**Inadequate university education on eco-design** Many design schools and mainstream universities do not include basic eco-design education in their curriculum. This leads to the situation, in which engineers, designers, architects and many other professions that should have basic understanding of eco-design principles and elementary skills in applying them are not appropriately equipped for the future challenges of their life of work.

**Lack of support from authorities** In many European countries authorities play a very insignificant role in promoting eco-design activities. In front-runner countries, they coordinate collaboration between industry and academia and support the development of eco-design tools, dissemination programmes and similar activities. In countries, where the government plays hardly any role, eco-design practices are initiated by other actors, such as companies and universities. However, in the latter cases there arise coordination and information exchange problems among various types of bottom-up activities.

**Know-how and experience are lacking** in construction professions regarding eco-design and energy efficiency improvements (e.g. level of involvement in green buildings projects in France is 8%, Germany - 45% and Spain - 9%), although general awareness is high (e.g. France - 83%, Germany - 98% and Spain - 87%) (WBCSD 2007).

The type of sector or specificity of products greatly affects the dissemination of eco-design practices. For example, one complication in the construction sector is the large numbers of small-scale builders and the diversity of buildings and their elements, where there is little standardisation. In the European Union, 93% of enterprises in the construction sector have fewer than 10 employees and have little capacity for keeping up with new or specialized technical innovations (Commission on Sustainable Development 2006).

Specific for construction sector is the fact that activities are based on rather short term economic considerations that seldom take into account the energy efficiency over the entire life span of the building. Market barriers often restrict the implementation of energy efficiency improvements in the building sector (Neij and Öfverholm 2001). Barriers such as low energy prices, low priority of measures and investments, lack of information and knowledge, high initial cost of technologies, limited access to capital, perception of high risks contribute to limiting the progress towards increased energy efficiency in the society (Silvera 2001). Other factors include short-term perspectives and primary focus on initial costs as opposed to a life-cycle perspective, out-dated construction norms and rules of thumb for dimensioning technical equipment. Specific
barriers can be posed by regulations, for instance taxes that are applied on energy saving equipment, but not on energy use. Furthermore, it may be difficult achieve the economic potential for energy efficiency because market actors have differing approaches and priorities (Janssen 2004). Additional barrier is that building and manufacturing new eco-efficient housing and products may sometimes not be sufficient due to the total stock of products in use. In Finland a study calculated the overall impact of energy-efficient buildings on energy consumption for detached houses (WBCSD 2005a). Assuming that all new houses built from 2006 onwards were to be passive houses with an energy consumption of 30 kWh/m², the total energy saving compared to business as usual would be 15% in year 2030. The relatively low percentage is due to the building stock’s long life cycle. These calculations demonstrate that in order to achieve significant results in the following decades much emphasis needs to be put on the existing building stock and its renovation, at least in the more developed countries.

4.1.2.3 Success factors

Regulatory
Businesses need to be supported by appropriate policies and regulations. Research for UNEP’s Sustainable Buildings and Construction Initiative (SBCI) found that the most effective policy instruments achieve net savings for society and that packages of measures combining different elements are desirable (UNEP 2006a). The study identified policies that were both successful in reducing emissions and cost effective. The table below shows the most successful instruments in each of four categories.

Table 6 Effective policy instruments in construction field (UNEP 2006a)

<table>
<thead>
<tr>
<th>Area of Influence</th>
<th>Effectiveness for Emission Reductions</th>
<th>Cost Effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control and regulatory instruments</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Appliance standards</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Mandatory labeling &amp; certification programs</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Energy efficiency obligations &amp; quotas</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Utility demand-side management programs</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Economic and market-based instruments</td>
<td>High</td>
<td>Medium-high</td>
</tr>
<tr>
<td>Energy performance contracting</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Fiscal instruments and incentives</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Tax exemptions and reductions</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Support, information and voluntary action</td>
<td>Medium-high</td>
<td>High</td>
</tr>
<tr>
<td>Voluntary certification and labeling</td>
<td>Medium-high</td>
<td>High</td>
</tr>
<tr>
<td>Public leadership programs</td>
<td>Medium-high</td>
<td>High</td>
</tr>
</tbody>
</table>

In line with business interests, a more effective policy framework for energy efficiency should include the following (WBCSD 2007):

- Urban planning
- More-effective building codes to enforce minimum required technical standards
- Information and communication to overcome the lack of know-how and to highlight the energy performance of individual buildings; a combination of voluntary and mandatory schemes is already emerging, for example: the building “energy passport” (EU)
- Incentives, including tax incentives, to encourage energy efficiency in building equipment, materials and occupant consumption
- Energy pricing to make energy more valued by users, to decouple utilities’ revenues from the volume of energy supplied and to encourage local and renewable generation. For example, electricity consumers in Germany receive
credit for power fed into the grid from local generation at a rate four times the cost of the electricity they use from the grid.

- Enforcement, measurement and verification to make sure policies and regulations (including building codes) are effective and support market measures such as trading.

Support programmes of governments National building codes can be very effective provided that they are properly enforced. In many Member States there is, as yet, no systematic check on the performance of newly constructed buildings to confirm that the outcome of the building process is in keeping with the submitted building plan.

Policy makers should continue work on improving efficiency of electric appliances, but they should also establish the conditions for supporting the replacement of obsolete appliances and the development of other intelligent energy service packages. In this way, energy efficiency objectives are shared between European manufacturers of energy-using products as well as energy suppliers, transforming the latter into providers of energy-efficiency services. The consumer would then clearly understand the value of updated, more efficient and eco-sound appliances. Innovative solutions for intelligent energy services should be developed and customised for the European energy market, while, in parallel, the appliance industry should continue its efforts to develop ever more efficient and better performing products, offering them at a competitive price.

Policies should aim at a permanent transformation of the market, looking beyond short-term programmes (e.g., rebate schemes experienced in the last years in some member states) which, nevertheless, have shown the way to follow, despite failing to deliver a long-lasting outcome. Policy makers should set clear targets and establish a close synergy among European legislative initiatives: the Energy Label, European eco-design Directives, and the Energy Service Directive.

One of the main success factors for eco-design activities is the dissemination activities of project results. It many cases it is demonstrated that dissemination activities are very much linked to the support of governmental organisations through organising or financially supporting dissemination events or by developing regulations based on the findings and learning of the projects and initiatives. The dissemination activities may also be short- or long-term. For example in Belgium, France and the UK mainly pilot projects were subsidised by the government, while in Germany, Spain and the Netherlands the follow up took shape of local regulation (Tukker, Haag et al. 2000). In other cases, like in the front-runner countries, a separate governmental policy setting long-term goals for eco-design are being currently implemented or defined.

Developing market-based incentives to sustainable development in transport The current situation calls for market-based incentives, which would pave the way for a more sustainable development of transport in an enlarged EU. These market-based incentives necessitate Member States and the EU authorities to act as regulators and financial supporters of cleaner technologies. The adoption of commonly agreed standards, pollution and security requirements represent an appropriate response, as it creates an EU-wide level-playing field, providing the necessary stimulus for suppliers to offer alternative transport solutions. But this new generation of transport policies must unfold while making sure that demand is properly taken into account.
**Combination of policy approaches** directed at different actors along life cycle provides more profound improvements. In cases where the measures have to be different in relation to actors in the production and consumption chain a vertical, top-down, strategy could be effective (Linden, Carlsson-Kanyama et al. 2006). A national aim for energy production and consumption is to lower the level of CO₂ emissions. The energy production companies are addressed from governmental authorities with a policy instrument taxing their CO₂ emissions. The economic measure, taxing, is the message from the government to the actor to bring about a change of decisions and behaviour. However, taxing CO₂ would probably not be the right way to address households as actors in energy consumption. Measures appropriate to the household situation are information, inspection and advice, bonus programs etc., motivating a closer awareness on consequences for energy use from personal behaviour. Other actors in the consumption phase, e.g. owners of dwellings in multi-occupancy blocks could be addressed by voluntary agreements informing and reducing interest rates for introducing new energy-saving technology. Table 7 presents a vertical communication process for lowering residential energy use, including policy measures (Linden, Carlsson-Kanyama et al. 2006).

Table 7 Vertical communication process for lowering residential energy use (Linden, Carlsson-Kanyama et al. 2006)

<table>
<thead>
<tr>
<th>Phase</th>
<th>Actors</th>
<th>Police measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy production</td>
<td>Energy companies</td>
<td>Economic instruments: taxing CO₂</td>
</tr>
<tr>
<td>Distribution</td>
<td>Distributors</td>
<td>Informative instruments: advice, information</td>
</tr>
<tr>
<td>Consumption</td>
<td>Owners of multi-occupancy dwellings</td>
<td>Informative instruments: technical advice, education</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Economic instruments: reducing interest rates</td>
</tr>
<tr>
<td>Consumption</td>
<td>Households</td>
<td>Informative instruments: information, inspection routines;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Economic instruments: bonus programs</td>
</tr>
</tbody>
</table>

**Economic**

*Working on capacity management* Public transport investments are considered an absolutely necessary item for the future. Too often, however, the policy adopted is to force individuals into using public transportation through the introduction of congestion charges and the closing of streets to vehicles. Only after these measures are taken, do local governments turn to investing in public transport. This leads to an overuse of an underdeveloped infrastructure that only aggravates the lack of public support for changes in transport policies. Investment must come first, so that it becomes an individual choice to use public transportation. If, after investment, a metro or rail service is safer and more efficient, there is a higher chance that the choice of this mode of transport will increase consumer welfare. The wise promotion and investment in public transportation may lead to an even greater decline in congestion than penalties alone. This shift in urban transport policy is urgently needed as in some European cities average traffic speeds at peak times are lower than in the days of the horse-drawn carriage (European Commission 2007a).

**Market**

*Changing consumer behaviour* can have as much impact on energy consumption as the efficiency of equipment (WBCSD 2007) in the case of buildings. User behaviour is
influenced by economic, social and psychological factors. Environmental impacts are determined by information, awareness and energy costs, plus social, educational and cultural factors.

**Internal**
In order to be successful with greening own products and technologies companies need to have a clear *top management commitment* to sustainable products, a clear allocation of responsibilities for eco-design activities in written form, they need to develop internal and external procedures and internal capabilities for personal in eco-design issues, as well as adapt to their practices and processes existing material on eco-design or develop own manuals, tools and databases that would support practical implementation of eco-design into company processes, routines and products.

A *holistic design approach* should begin at the neighbourhood or city planning stage (WBCSD 2007) when it comes to designing buildings, mobility or food systems. It must consider environmental and social impacts associated with products over the entire life cycle and not in isolation, but in a system. For example, buildings function as a system, where the different technologies used are integral parts of the whole. The order in which the technologies are introduced into the design appears to be quite important. As a rule of thumb the best economics are achieved if different energy efficiency measures are considered in the following order,: energy-conservation technologies are considered first, passive solar second and active solar third. In most cases all of these technologies are used, often in combined systems. It is therefore wiser to develop whole building concepts rather than to develop specific technologies (UNEP 2006a).

### 4.2 Greening demand side

#### 4.2.1 Ecolabelling and social labelling

**Drivers**
Eco-labelling and social labelling can be divided into voluntary and mandatory. In this study we considered voluntary labels and for them the well-known drivers are the following:

- improved corporate reputation and positive brand impact;
- competitive advantage
- access to new markets
- improvements in product environmental quality
- improved regulatory compliance and possibility to obtain permits and formal licenses to operate.

**Barriers**

**Economic**
The price of applying and maintaining eco-label has often been mentioned as a barrier for companies to apply.

**Market**
Some companies perceive that environmental and social labels might work as a *barrier to trade*. As practice shows, especially eco-labelling programmes that include criteria related to how a product is made have the potential to create trade barriers.
Another barrier to using labels is that they are *available only for a limited number of* product categories, which may not be the most environmentally and socially problematic. This is because the choice of product categories is based on the expression of interest from producers. So if there is no company that is interested in labelling their high-impact product, eco-labelling organisation will not initiate the process of market evaluation and developing criteria for this product category.

Another barrier is the confusion of consumers regarding labels. In the past few years there has been an increase in the number of different eco-labels, like quality assurance schemes established in the European Union. One study identified 110 food related eco-labels in Europe (Nilsson, Tuncer et al. 2004). The sheer number of various labels and the diversity of their criteria undermines the very goal of ecolabelling, i.e. provision of clear information to consumers. To help customers avoid confusion regarding new labels and new brands some retailers package sustainable products in their own retail brand. For example, CO-OP Sweden sells organic and Fairtrade coffee and tea, as well as other products, under its own ecological label, Ånglamark. ICA, CO-OP Switzerland, and Albert Heijn do the same. Mikael Robertsson, Environmental Manager at CO-OP, expressed that, there is a greater sense of awareness of Ånglamark and that since people knew the brand and trust the brand, they buy the brand (Wallace 2006). These companies generally feel that building their brand is an important way of selling sustainable products.

Although the goal of eco-labelling is to provide more information to consumers, type I eco-labels *provide very little factual information* to consumers. If two products are labelled with for example Nordic Swan there is not further information available to consumers, based on which they can distinguish between these products. On the other hand, type III labels provide more information and leave the decision about which product to buy to consumers.

Internal
Some companies have expressed concern that government sponsored Type I seal-of-approval eco-label programmes have *not fulfilled the goals* of either informing consumers or encouraging environmental progress (CBI 1998), (Procter & Gamble 1998). For example, the EU eco-labelling scheme was criticised by the Confederation of British Industry for lack of credibility among companies, retailers and consumers, due to the procedure for selecting products, high cost of applying for the label for both large companies and SMEs, and slow process of awarding the eco-label.

Some companies are critical towards the *criteria* used to select eligible products, implying that they often are *not based on scientific knowledge*, but on political compromises and value judgements. This criticism is partially relevant since even life cycle assessments having being based on large body of data and calculations in the end require expert opinion on prioritisation of the main impact categories.

Eco-labelling criteria have also been seen as creating *barriers to innovation*, because they are based on the evaluation of products that currently exist on the marketplace. This criticism is also true, since criteria are set so as to allow only 5-10% of the existing products to be eligible for eco-label. The primary goal is not to stimulate few individual companies to innovate, but to facilitate improvement of all products in a product category.
There have been cases when eco-labelling was subject to fraud and misrepresentation, when companies provided incorrect information, mislead the eco-labelling organisation regarding features of their products and processes, put labels on other products that were actually awarded the label or when with time the quality of the product stopped confirming to the criteria and the company failed to provide this information to the certification body.

Another barrier is that eco-labelling requires sales personnel of retailers to be educated about main features, criteria and other types of information, so that they can answer consumers’ questions or even educate consumers. An example of the importance of personnel education comes from the UK, where colour-coded fuel efficiency labels were introduced to UK car showrooms in 2005, but the sales personnel was not prepared (CfIT 2007). Recent studies demonstrate that still very few people in France (10%) and the UK (13%) choose their cars based on its level of CO₂ emissions (ACEA 2007a). Interestingly enough, higher percentage of people (22%) in the same survey identified fuel efficiency to play a role in purchasing process. These data support the EC conclusion that existing CO₂ labelling does not provide sufficient stimuli for consumers to take into account emission performance of cars.

There are also problems with measuring the impact of eco-labelling programmes on products and production processes. A report by UNEP that reviewed 5 ecolabelling programmes, comprising the German Blue Angel, organic and fair-trade labelling programmes and labelling of marine and forestry sectors, concluded that there was no sufficient data on their environmental effectiveness (UNEP 2005b). All programmes lacked a monitoring system for evaluating the resulting environmental effectiveness. The report also concluded that this was a problem typical for other eco-labelling programmes as well. One of the problems with measuring the effectiveness of eco-labels is actually to distinguish the influence of eco-labels from other tools employed by companies at the same time.

4.2.1.3 Success factors

Market

The success of labelling schemes critically depends on support and interest from companies and on the consumers’ awareness and expressed demand for more environmentally and socially sound products. In order to improve consumer and general public awareness about more sustainable products, eco-labelling organisations should improve their advertising and marketing activities (OECD 1999a). For example, the success and high recognition of the Nordic Swan label has been ascribed to effective marketing campaign (OECD 1997).

Consumers’ trust and awareness It is often mentioned that many labels may create confusion among consumers. Therefore, a single certification system and one label supported by all market actors is an important factor ensuring the success of eco-labels. For example, a recent survey of organic food labels in Sweden showed that the KRAV label is the best-known label for environmentally sound food despite relatively little consumer information and marketing efforts. About 40% of the consumers surveyed are frequent buyers of organic products. Swedes in general have a relatively high awareness about environment, food quality and animal ethics, which of course is a part of the high consumer demand for organic foods. Apart from the obvious concern that people feel after the series of scandals in the food production in recent years, it is the result of
efficient educational activities from the environmental movement, the Society for Nature Conservation, the Natural Step Foundation and the organic organisations.

4.2.2 Green Marketing

4.2.2.1 Drivers

Market
The main driver for using green marketing strategy by companies is because it helps proactive companies promote their more environmentally and socially sound products and services, facilitate communication about company efforts on greening own operations and processes and to integrate corporate interests with societal needs through educating consumers and stimulating green market demand, thereby creating future markets for own products and services. The direct benefits of green marketing to companies are improved reputation, increased competitiveness, creation of new customer base, which all together improve business profits.

Environmental and social aspects are used by some companies as a differentiation strategy, which in the world of saturated markets with a large product variety, is becoming more and more vital to a company’s survival and competitiveness. If quality and price of two products are the same, 81% of consumers choose the product that is associated with social cause (UNEP 2005b).

Increasing attention to environmental and social performance of companies from financial institutions and insurance companies also drives employment of green marketing by companies, since the perception of financial organisations has a direct effect on insurance premiums and on the level of calculated risk associated with companies’ activities, see for example (HypoVereinsbank 2000). A number of studies demonstrate that investors and lately venture capitalists are also willing to pay a premium for environmentally and socially responsible performance (Toms 2000).

4.2.2.2 Barriers

Internal
One of the main weaknesses and criticisms of green marketing is the fact that it anyway promotes the consumption of more products. Certainly, it is much better to use more environmentally and socially sound products and services, but so far even the front-runners of green marketing rarely use it to promote reduced consumption levels. Examples of the latter, nevertheless, exist, as for example campaigns to raise awareness on health risks associated with over-consumption tobacco and alcohol products at individual level. Other companies advertising reduced consumption are those that can link it with significantly reduced environmental impacts. For example, the Washright campaign is a voluntary initiative of the detergent sector aimed at reducing its product-related environmental footprint, which has been implemented at a time when the European Union was considering introducing a new regulation (AISE 2008). Other examples come from PSS and Demand Side Management programs (see section 2.3.3), which are now widespread in water and energy sectors or in chemical management services.

Market
The barrier to effective green marketing is that it is relatively easy to develop communication campaign on environmental and social claims, which will only lead to increased confusion among customers. Statements, such as “respect human rights” or
recyclable products, are vague and might confuse consumers and therefore render them distrustful, if they perceive the advertisement to be uninformative and dishonest. Sophisticated environmental and social standings are difficult to convey with traditional marketing tools.

Also, brands must be careful when they claiming that they are acting ethically. French retailer Carrefour, for instance, has been criticised for using ethical statements in its advertising without factual support, which resulted in consumer mistrust. A survey from London-based Ethical Corporation found that in general, 70% of people say they do not trust advertising and PR (Ethical Corporation 2007). For many consumers it is difficult to distinguish between traditional advertising and green marketing.

_Lack of commitment from consumers_ Marketing research has shown that consumers are interested in purchasing more sustainable products. In interviews with consumers, studies often show that they are willing to pay more for sustainable products and are interested in purchasing them (Sammer and Wüstehagen, 2006; Tanner and Kast, 2002; Almaani et al, 2005) However, in a combined consumer-retailer analysis, Jensen et al., (2003) find that consumers may over-state their greenness, as electronic retailers in Denmark do not see a consumer demand for green electronics, despite surveys of consumers who stated they wanted more green electronics. Thus, there is an interesting noted discrepancy between consumers and retailers.

_Educating marketing and sales professionals._ Stimulating customer demand for environmentally preferable products is key, but if employees are not actively communicating this information, the opportunity to raise consumer awareness is lost. Therefore, educating sales personnel about the environmental attributes of a product or services is important for companies that are selling and marketing green products and services. Education, however, might be a challenge in itself and an expensive activity.

_Lack of retailers’ commitment_ Retailers influence to a great extent the purchasing decisions of the consumers by what they make available in their stores. 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. So, retailers are potentially a major force in influencing the market for greener and socially sustainable goods (HEC and UNEP 2004). However, retailers’ decisions are affected by a number of factors. At one level, there are the factors that may or may not motivate them to want to take action to green their supply chains. On the negative side, retailers refer to a lack of ‘buzz’ surrounding most product environmental issues, which tends to deter action. There are several interrelated problems:

- _Lack of explicit consumer demand_ for more environmentally and socially sound products, or else negative consumer perceptions that ‘green products’ are inferior in quality, performance or value for money.
- _Wariness of media and NGO interest._ There is sometimes wariness about being seen to take positive action on one front, because of the risk of ‘knocking’ publicity on others.
- _Lack of a robust business case_, often arising from conflicting business priorities between procurement, marketing and environment teams within the company.
- Unconvinced senior management. Support at board level is crucial for creating the interest and willingness to improve environmental performance and to establish it as a core value in the corporate culture.

4.2.2.3 Success factors

Market
Companies that employ communication tools and green marketing of environmental and social issues have easier task with building consumers’ trust mainly due to much more transparent communication, provision of material evidence to support marketing claims and by employing life cycle perspective demonstrating long-term saving potentials for customers. Provision of material evidence and communication of specific aspects of company or product performance through green marketing has been identified as more credible and positive for the company reputation in some studies (Berens 2004).

Engagement of the large retailers and main food chains Besides existing local initiatives with direct distribution, the main market strategy for selling organic products has been to get into the supermarkets of the big chains in order to make organic products available to ordinary consumers at fair prices. The Consumers’ Co-operative, KPH, was the pioneer in introducing organic products with clear objectives to expand the number and range of products. Other food chains such as ICA and Hemköp have followed the example, and today one can find at least some organic foods in all shops. Different methods are used to increase sales. For example, Hemköp sells organic milk at the same price as conventional without cutting the premium price paid to the producer.

Good relationship between the new and conventional organisations or between new lines of activities and products and conventional ones. For example, in Sweden the Farmers Federation was one of the first members of certification and labelling organisation for organic food - KRAV and for several years has had a continuous dialogue with the Ecological Farmers. This contact resulted in different projects aimed at making organic farming better known to conventional farmers and assisting those farmers who are interested in conversion to make the right contacts and find ways to learn more.

Success of organic products on the market to a large degree depends on the position and activities of retailers. Few recommendations can be identified to support fostering retailer’s action in sustainable consumption (HEC and UNEP 2004). Engagement led by retailers would significantly grow only in case of a market driven demand for sustainable products.

Societal
Education and information campaigns funded by governments and international organisations need necessarily to strongly contribute to raising awareness about these issues among consumers, engaging customers to more sustainable choices.

Where possible, case studies should be developed showing that price is not the “only factor” considered in the purchase choice.
There is the need to develop sustainable products that add value to the standard offer justifying the higher price. The case of organic product is emblematic: they are successful not because they are sustainable, but because they are perceived as healthy for the consumer. It would be worth developing similar marketing messages for other categories of products.

4.2.3 Product service systems

4.2.3.1 Drivers

Regulatory drivers
The growing environmental awareness is supported by more stringent regulations, which serve as a coercive driver for companies to change the focus of environmental and quality efforts from process to product orientation. Companies producing durable goods show that legislation becomes the main driver for recycling and reuse initiatives (Mont and Ryan 2000). Chemical producers also reveal that chemical management services are often being developed in response to stringent health & safety regulations (Mont, Singhal et al. 2006). The changing feature of the environmental legislation is the employment of life cycle thinking, which sets the basis for many instruments and approaches and implies the minimisation of the environmental impact throughout the entire life cycle including both the use and the end-of-life phases (Dalhammar 2002).

Economic drivers
For companies facing take back legislation, PSS provide an opportunity to turn this legislation into a competitive advantage (Hart 1997; Agri, Andersson et al. 1999).

Extended producer responsibility is making producers responsible for their products and they are looking for possibilities to assume this responsibility in the most cost-effective way. A good example of this is chemical management services, in which manufacturers are driven by increasing responsibilities and risks associated with chemical handling (Kurdve 2007), while CMS providers are willing to share some of the responsibilities and savings from chemical management.

Societal drivers
One of the important external drivers for companies to engage in functional sales and PSS is the growing environmental awareness of society at large. The general public is increasingly looking for the “world behind the product” (OECD 1999b).

Market drivers
A growing number of stakeholders are concerned with environmental issues and put their demands on producers (IVA 1995; Larsson, Olsson-Tjarnemo et al. 1996). This leads to an increasing pressure on companies to improve the environmental performance of their operational activities, products and services.

Many companies especially stress the growing pressure from business customers for diverse service offers (Källrot 2001).

Market drivers differ considerably from sector to sector. For example, in the European energy market, deregulation led to an increasing number of new players, fiercer competition and consequently lower profit margins. In mature industries, development and standardisation of technology lead to increasing difficulties with product
differentiation, which again leads to fierce price competition and eventually to low profit margins. For example, producers of lawn mowers in Sweden have released to the market the first lawn mower for private users that costs € 50. In order to generate the same profit from this product as from a professional lawn mower, the producer needs to sell 15 or more of such lawn mowers (Carlsson 2003b). Therefore, companies in many sectors point out that it is not sufficient to compete on product quality and to increase efficiency of operational and production processes. Companies are competing for the customer by creating added value and by delivering it through direct relations and intensified contacts with customers (Marquard 2003). Other companies are considering the possibilities of taking over the second-hand market for durable goods. All these arguments can be summed up into one driver – competition – and that compels many Swedish companies to find new opportunities for improvement.

For car manufacturers, the main drivers to engage or support car sharing activities is mainly to improve their corporate image (Herodes and Skinner 2005). There are however other companies, such as Honda, which used car sharing organisations as a testing ground for new types of vehicles, such as electric cars, or who has taken one step further and proposed en entirely new Intelligent Community Vehicle System (Honda 2008).

**Internal drivers**

At the company level resource management, risk reduction and environmental improvements are named as the primary internal drivers. All of these three internal drivers are ultimately related to the possibility of reducing costs associated with managing resources or function provision, with reducing liabilities and risks and consequently with costs of compliance and risk management. This is linked to the opportunity to professionally manage resources or processes that were not the core activities of the customer (Agri, Andersson et al. 1999). Swedish studies show that they provide supporting services to extend product life as a strategy to reduce costs (Enell 2001).

Environmental improvements are, in most cases, initiated in response to external pressures (Zaring 2000), but some companies mention the environmental driver as the internal one, when it is closely linked to economic savings (Sundström 2000). Risk reduction is also pointed out as an important driver as companies appreciate professional handling of hazardous wastes.

Many companies state that PSS help create clearer cost structures and long term planning.

The majority of drivers for private customers to explore service-oriented solutions are found in product features and use patterns. The only external driver is the availability of a suitable service offer that may coerce customers to try service-oriented solutions. Other drivers are more inherent to the nature of products, e.g. people prefer to pay for services when products are expensive and not used very often, when maintenance costs are high and when products take up storage space (Mont 2002).

4.2.3.2 **Barriers**

**Economic barriers**
There are several important barriers for PSS providers to extend their offer with additional services or to develop product-service systems. Currently, the cost of labour in industrialised countries is relatively high, while the cost of materials and energy is comparatively low. This is one of the reasons for the so-called self-service economy (Gershuny 1978), in which customers buy products, because services are prohibitively expensive.

Changing systems and sources of gaining profit could deter producers from employing this concept. Where point-of-sale becomes a point-of-service that operates over an extended period of time, traditional incentives can fail to reflect the real drivers of profit for the firm. A particular problem is the changeover from short-term profit realisation at the point-of-sale to medium- and long-term amortisation periods at the point-of-service. Moreover, another characteristic of PSSs that affect the usual ways of gaining profits is the possibility to raise revenue and get profit not through sales but through efficiency provision (energy services; Demand Side Management and Chemical Management Services).

**Market barriers**
Lack of market demand for PSS is a significant barrier for companies who are willing to explore the new opportunities. Companies experience difficulties in attracting customers, who often lack knowledge of the life cycle costs and for which prices of service-oriented offers may appear to be prohibitively high. Lack of competition among PSS providers in some sectors also contributes to high prices. The ability of companies to secure market for more sophisticated and more environmentally benign technologies through leasing arrangements is a vital asset.

**Corporate culture**
The resistance of companies to extend involvement with a product beyond point-of-sale and historical practice has been identified as a major barrier to increased manufacturer responsibility for environmental impacts of products. The extended involvement leads to intra-organisational and inter-organisational changes, such as closer interaction with other actors in the product-service chain. This happens partially due to inertia and fear of innovations.

The reorientation of companies towards product-service systems requires a fundamental shift in corporate culture and market engagement, which, in turn, requires time and resources to facilitate the shift. Changing the orientation of the company from product to service sale also means changing the traditional marketing concepts. This is often met with psychological barriers in companies.

Business customers often lack a general understanding of the concept and therefore may have difficulties with accepting producers in the role of providers of services and information. Companies operating in customer markets experience similar barriers. Markets of high-volume and low value products are caught in the throwaway mindset and the refurbished products and sharing schemes have a perceived second-class status and are therefore difficult to introduce to the market.

Other barriers include a lack of strong relations along the value chain and a poor sense of the commonly delivered customer value. Many companies find the learning processes to be time consuming and difficult (Swedish EPA 2001). Involvement of new actors is often needed for provision off PSS. However, middlemen also need to be
educated and trained to solicit the customers. If they sign a contract with producers, they may also have to share risks associated with delivering solutions. This may eventually lead to a conflict of interest among different actors.

One barrier is the fear of disclosing sensitive information about companies’ processes and products along the chain or in the network if companies are to collaborate and to jointly find solutions.

A further barrier that is often mentioned by companies that provide service-oriented offers is the reduced care for products that customers exercise if they do not own the products. Experiences of rental companies show that through contractual details specifying the condition in which the products must be returned, it is possible to reduce this problem.

Internal barriers most often mentioned by companies are costs, concept design, and organisational issues. System innovation is a big step for any company. The capabilities and knowledge for producing products are considerably different than that of managing products or serving customers. It may be a daunting task for producers to deliver service-oriented solutions because new competences about customers’ processes may need to be developed, personnel trained and perhaps even additional personnel recruited. The new personnel may be difficult to sustain in the periods of few service contracts and labour costs may become the largest outlay associated with provision of service-oriented solutions.

Since the majority of companies put forward traditional product sales and functional sales, they may face problems related to different markets, customers, design processes and lead-times, various life cycle lengths and different risks, not to mention different cash flows. PSS can create an internal competition between traditional sales and service-oriented solutions, between the sales of new products and sales of second-hand, reused, refurbished or remanufactured products, or between sales of volume vs. efficiency sales. Existing internal company functions may act as implementation barriers for new solutions. For example, many internal accounting systems are based on the number of product units or volume of products sold. Financial functions may need to be restructured to cope with different cash-flow requirements if the function of products is.

There are three main barriers related to the concept itself. The most critical barrier for a producer to start providing functional sales and PSS is the traditional business mindset, which is based on the notion that profit depends on the volume or number of products sold. The second barrier is the fact that their environmental profile depends on how they are designed. Even if these offers are designed with environmental goals in mind, avoiding initial investment of the purchasing scenario may lead customers to spend the money on other activities, which could be even more environmentally burdensome. In B2B cases, e.g. in CMS, if the CMS provider does not have an explicit environmental responsibility and is driven by opportunistic behaviour, environmentally sound options, if they cost more than other products, may not be chosen (Mont 2004a). The third barrier is the problem of pricing the immaterial services, especially those depending on knowledge and experience.
The often mentioned barrier for PSS customers to shift towards buying services rather than products is uncertainties regarding the offer in terms of unclear risks, costs and responsibilities (Källrot, 2001).

Many customers lack total life cycle cost knowledge. This creates a problem of explaining the benefits of service-oriented solutions.

Companies also point to the lack of information about service-oriented offers. However, in order to evaluate an offer, customers need to understand the concept and the contract to make sure that the proposal is beneficial to them and that they do not jeopardise the efficiency and quality of their processes and products.

Some evidence suggests that business customers prefer services to product ownership (Alexander 1997), while private customers are more attached to the ownership idea. Sociologists point out the important status and positioning function of material products. Thus, ownership in itself might not be as large a barrier as its social function as an indicator of assimilation or exclusion from a social group. However, customers also differ in their perceptions and values and there are social groups that will perhaps prefer functional sales and the status of utilisation to ownership and property right. For example, surveys of young people indicate their emerging less-materialistic values (UNEP 2000).

Regulatory barriers
Companies often mention lack of regulatory driver and lack of market demand as the main external barriers for introducing PSS to business activities (Swedish EPA 2002). Legislation and regulation can become a major driver or barrier for shifting towards service-oriented solutions.

Societal barriers
For private customers, shifting to these solutions is also linked to a number of factors external to an individual company or a customer. In both cases, institutions play a significant role in determining whether or not customers will accept certain solutions. Institutions are broad concepts that comprise not only regulation and legislation, but also general societal norms and moral, ethical rules and established behavioural patterns and lifestyles. They are also closely linked to the cultural context. For example, the throwaway mindset affects both business and private customers and even crosses cultural borders, while other phenomena, such as collective living and sharing, may be closely linked to specific cultures and the historical developments of regions.

4.2.3.3 Success factors

Regulation
The most important success factor is regulatory framework comprising various instruments of the Extended Producer Responsibility principle, deregulation, and stringent regulations of waste and resource flows and as well legislative frameworks of economic, administrative and informative instruments that favour less material and energy intensive market offers. The two latter types of regulation create market pressures, either by increasing competition or by creating customer demand for extended services.

Networks
Equally important for provision of PSS is to find partners and establish alliances based on trust. Partnerships allow companies to develop competitive solutions and share revenues, fund the entire enterprise (in case of venture capitalists), while building core competencies and avoiding dangerous diversifications. For example, in the case of car sharing the following networks and partnerships ensure success of new business models in Europe (Britton and World Carshare Associates 2000):

- **Partnerships with public transport.** For example, in Switzerland, car sharing took off in 1997 with the launch of the Zuri-Mobil card. Holders of annual or monthly season tickets in Zurich can use Mobility services and rental cars at favourable rates, and take a companion on Zurich’s public transport free of charge. Within 6 months 3,500 people had joined the scheme. Mobility also offer the Mobility Rail Card in collaboration with the national rail network.
- **Partnerships with car rental companies.** Mobility in Switzerland has an agreement with Hertz: for rentals of two days or more, members benefit from an exclusive 30% reduction off the normal car rental. This service is accessible using the usual Mobility central booking number, and it enables Mobility to meet the fast growing demand for weekend and holiday trips.
- **Partnerships with national government and local authorities** In the Netherlands, co-operation between the authorities, car clubs and public transport suppliers has existed from the beginning. At national level the Ministry of Transport established a policy for promoting car sharing, and their contributions include: Town and country planning: a manual for implementing a car sharing scheme in a municipality Parking: model parking regulations made available to the municipal authorities, including the provision of parking spaces for car club vehicles Guidance: the municipal authorities and the public can consult a body that has been set up for the purpose; workshops are organised for the municipal authorities and awareness campaigns are launched for the general public.
- **Partnerships with international organisations** Access to cars in Europe has now crossed borders: since the founding of ECS (the European car sharing federation), car club members can use vehicles of other car sharing organisations in more than 80 European towns and cities.

**Internal success factors**

*Top management commitment* is a vital success factor. The role of an internal “catalyst” - a person who helps to introduce and disseminate the idea within the company, to obtain support from decision makers and help overcome low receptivity to new ideas – was found to be equally important.

*Clear understanding of costs and benefits* involved in shifting towards provision of PSS is an essential factor, as many companies are not sure whether risks of embarking on the service-oriented journey are surpassed by benefits. There is a clear need for strategies on how to manage different development periods for designing products, services, and software. Equally important is to have precise figures or even estimations of savings and profits that may potentially be generated by new business practices.

*Publicity and information* One example of the impact of publicity was after the launch of Bremen’s Autocard scheme; this encouraged the start of negotiations between car sharing organisations in other towns with their local transport companies. Publicity has also brought the concept of car sharing into public awareness; 70% of people in Switzerland have heard the term ‘car sharing’, and 50% know what it means. In addition, research has also shown that mobility counselling, where people are
encouraged to look at their current travel patterns, and what other options are available, has also been important in increasing the membership of car clubs.
5 Conclusions

1. There is a great diversity of business initiatives across Europe and across various sectors due to various legislative pressures, various cultures, various media and society attention leading to different level of response and pro-activeiness of companies.

2. The uptake of business strategies differs considerably among member states and among the domains:

   • All three domains of food, mobility and housing have international supply chains that contribute to the difficulty of controlling them, both in environmental and social terms. As opposed the global supply chains, in all the domains there are some initiatives to promote local production, for example of food, or use of local construction materials. However, these initiatives are still niche initiatives.

   • Green products are still niche markets in food and housing sector, while in the market of white goods green products are reaching higher level of penetration (30% across Europe), which however differs significantly among different countries. In the housing sector the number of green products and construction materials in the lowest, while organic and fair trade products are gaining market share in the food sector (still contributing only 1-6% of the total food market). The low supply of, for example, energy efficient houses is the result of the low demand; the technology for energy efficient houses has been available for 30 years now.

   • Eco-labelling is used as communication instrument to very different degrees in the three sectors. White goods as a product category contains the largest amounts of eco-labelled products, reaching penetration rate in some product groups, e.g. washing machines or refrigerators, and countries, e.g. Scandinavia, up to 85% of the total market. Food eco-labelling is represented by 110 eco-labels and social labels for food in Europe. However, it is difficult to estimate the level of penetration of eco-labels, because many of them are given by non-governmental organisations, and thus even national data are hard to find. In the housing sector, there are only few examples of businesses applying for labelling their houses, while criteria for eco-labelling of more environmentally sound houses, and especially energy-efficient houses are available at least in some national eco-labelling schemes, e.g. in Sweden.

   • Green marketing is used by companies from all the three sectors, but to a very different degree. In the housing sector, very few proactive companies that build energy-efficient houses and/or that obtain eco-labels for their houses use green marketing strategies for creating future markets and stimulating demand for energy-efficient housing and for retrofitting the existing housing stock. In food sector, green marketing is used by quite a few large retail chains that use eco- and social labels, and different other marketing techniques to promote organic, local or fair trade food products. The green marketing strategies are starting to gain momentum with all largest car manufacturers, who are now competing with low-fuel consuming and low emission cars. This is visible in TV advertising, in the amount of information provided on websites and the increasing level of awareness of sales personnel.
• *Product-service systems* occupy very small niche in each of the three sectors. In the mobility sector, there are only 350 000 car sharing members globally, which is less than 0.07% of the number of cars in the world – around 500 millions. In the food sector, local food production systems with delivery services also present a very small market. And in housing sector, co-housing initiatives or eco-villages with systems of shared use occupy a tiny share of the housing market.

3. Factors that are of major influence for the uptake of business strategies, as well as the effectiveness and efficiency of strategies, are national legislation and its enforceability in each country, public environmental awareness and cultural context and traditions.

4. Sectors that are under considerable pressure from legislation boast many more initiatives than sectors that are typically or rarely under legislative pressure.

5. The legislative pressure can and should be enhanced and complemented by company strategies to increase public awareness to ensure that changes of consumer behaviour lead to more sustainable consumption patterns and levels. Eco-efficiency alone cannot compensate for increases in population and affluence levels.
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