



Invest in Sweden

Packaging
Prevention and Recovery

Roadmap 2005-2010

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1 Executive summary

This study was carried out by the Packaging & Logistics division¹ at STFI-Packforsk in Stockholm under commission from Invest in Sweden Agency (ISA). The overall purpose is to formulate a roadmap for the Packaging area from today to 2010.

Thanks to its high competence and long-time experience, Swedish packaging and recovery industries are well prepared to meet coming increased demands for material recovery and reduced resource consumption.

In Sweden, the awareness that the main objective of packaging is to protect the product and rationalize distribution and handling is widely spread and it is clearly stressed by Swedish industry, research and authorities in many different ways.

Sweden has an international reputation for being clean. Swedish consumers are very environmentally conscious and are since long used to taking care of their used packages. Further, there was in Sweden, even before the EU Packaging and Packaging Waste Directive was introduced, legislation regarding collection and recovery of used packaging.

The engagement and experience of the consumers is manifest in the high collection levels reached in Sweden today. They are often way above the EU requirements. In addition, the quality of the collected fractions is high.

The long experience of Swedish industry of utilizing used materials means that there is a well built-out system for refining different material fractions to usable materials. Further, there is a market for secondary raw materials for various kinds of materials, for instance glass, metal and cellulose based materials (paper, corrugated board and cardboard).

The Swedish system with a common re-use system for beverages should also be held up as a model. The system is old and well established with the consumers. Since all breweries use the same package, return transports are minimized and this saves both money and resources for all parties concerned. As regards beverage cans, Swedish consumers are among the best in the world at returning, with a return rate over 90%.

A well built-out district heating system gives Sweden unique possibilities as compared to other countries in Europe. The heat generated from waste incineration can be used for district heating to 95%. This covers about 15% of the total district heating demand in Sweden, but in some population centers, district heating from waste incineration may cover as much as half the requirement.

Sweden's competitive advantages in the area are:

- Consumers, industry, research and authorities with competence and experience of prevention, collection and recovery
- A tradition of cooperation between industry and authorities enables efficient and rational implementation of new requirements.

¹ This study is written by Ann Lorentzon and Cathrine Löfgren

- A well built-out net of incineration plants and a great demand for their products.
- World-leading manufacturers as well as small entrepreneurial companies.

2 Introduction

This study was carried out during November 2005 by the Packaging & Logistics division², STFI-Packforsk AB, Stockholm, on commission from Invest in Sweden Agency (ISA). The overall purpose is to formulate a roadmap for the Packaging area from today to 2010.

Four strong areas within research and development related to the Swedish packaging industry have been identified. These are:

- Packaging Materials
- Human Product Interaction
- Systems and Processes
- Prevention and Recovery

Each of these areas will be covered in separate roadmaps. Section 2.1 describes the packaging value chain and is common in the four reports.

2.1 Packaging value chain and terminology

The term "value chain" covers all stages from raw material to the finished, packed product, and its use until recycling, including working up or value-adding part-processes.

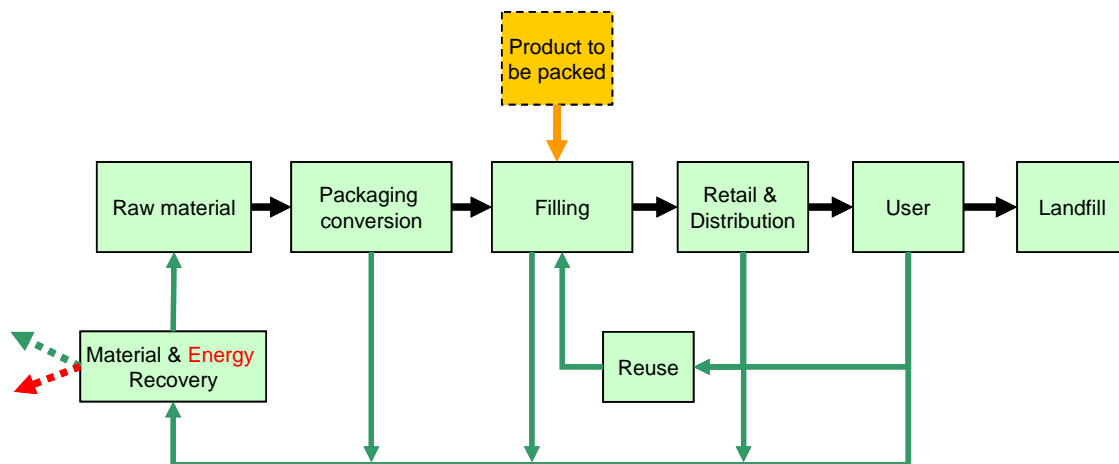


Figure 1. Packaging value chain from raw material to recovery

Directive 94/62/EC, on packaging and packaging waste, contains a very general packaging definition:

“Packaging shall mean all products made of any materials of any nature to be used for the containment, protection, handling, delivery and presentation of goods, from raw materials to processed goods, from the producer to the user or the consumer.

'Non-returnable' items used for the same purposes shall also be considered to constitute packaging.”

² This study is written by Ann Lorentzon and Cathrine Löfgren

Packaging system

Often the terms packaging or package are used when referring to a packaging system containing several levels as described in Figure 2.

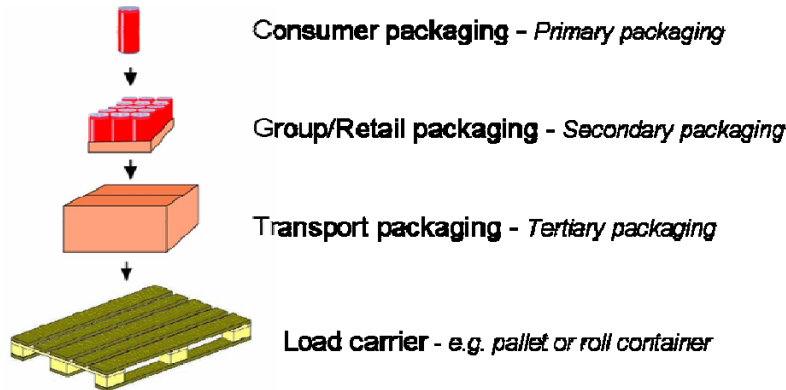


Figure 2. Different levels of the packaging system.

The primary packaging is closest to the product. Examples of primary packaging types are jar, cardboard box, bottle, bag, sack, pail, tube and wrap. The secondary packaging contains a number of primary packages and is also called group or retail packaging. The tertiary packaging is a transport packaging normally containing a number of secondary packages.

Main demands on the packaging system

There are many different types of demands placed on the packaging system. It should protect the product, facilitate handling and be an information carrier, but it must also protect the surrounding world from contact with its contents.

Which of these functions is considered most important depends on where in the value chain the package is to serve. In the distribution stage, for instance, the package makes it possible to reduce product quantities to handle-able units, regardless of contents.

From an overall view, the demands on the packaging system can be divided into three groups; flow demands, market demands and environmental demands (as described in Figure 3)

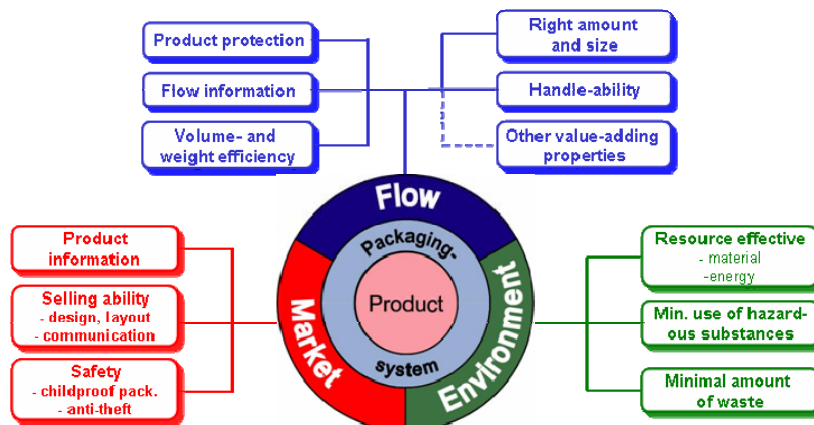


Figure 3. Main demands on the packaging system (Packforsk 2000).

2.2 The assignment

The purpose of this study is to formulate a roadmap for packaging prevention and recovery issues of packaging from today to 2010. More specifically, this report covers:

- Packaging Prevention
- Reuse and Recycling
- Energy recovery

The purpose of the road map is to support a dialogue with both Swedish and international actors in the packaging industry.

The concept of roadmap is interpreted in a broad sense. It is a description of the expected society and business development in this field during the coming years, which also shows in what way Swedish actors may be of importance.

3 Background trends

3.1 General trends in a global perspective

Some general global trends can be identified, i.e. trends pointed out in many international and national foresight studies.

Globalization

Globalization, with increasing global trade liberalization and increasing trade across borders, enhances worldwide competition. Developing countries offer lower labor and production costs to international companies.

Urbanization

According to the UN Habitat report there are approximately 175 million documented international migrants worldwide and the flow of people into the world's cities is fuelling a new multiculturalism that has the potential to broaden the cultural and ethnic dimensions of cities.

Regionalization

Increased regionalization is an important development trend, which will enable development also in regions outside the major cities. With regionalization also follows specialization.

Economic growth

Several international foresights point out the global economy to be strong enough to support a sustained period of dynamism for several decades. The dynamism will be strongest on so-called "emerging markets"- especially in the two Asian giants, China and India - but will be broadly based worldwide, including both industrialized and developing countries.

Technology development

Technology development - especially new applications in the fields of information and communication (ICT) and biotechnology - is pointed out as a key driver in a global perspective.

Population dynamics

The ageing population in industrialized countries puts pressure on the welfare system. In developing countries nativity is still high and the population young.

Knowledgeable society

Upcoming is a society based more on information, knowledge and expertise. Globalization brings increased competition for this knowledge. Globalization and technological development will mean greater importance of and intensified demand for knowledge and expertise. While simple tasks are being sent to low-wage countries, the competition for investments and skilled labor is increasing between nations and regions.

Climate change and other environmental issues

The environmental problems of today will persist and in many instances grow over the next decades. Environmental issues will become mainstream issues in several countries, particularly in the developed world. The consensus on the need to deal with environmental issues will strengthen; however, progress in dealing with them will be uneven. The developing countries will face intensified

environmental problems as a result of population growth, economic development and rapid urbanization.

Issues of security

Regions, countries, and/or groups will be left behind facing deepening economic stagnation, political instability, and cultural alienation. This will nurture political, ethnic, ideological, and/or religious extremism, along with the violence that often accompanies those. The trend away from state-supported political terrorism towards more diverse trans-national networks will probably continue. Terrorist tactics may become increasingly sophisticated and designed to achieve mass casualties; sadly, the trend towards more lethal terrorist attacks is expected to continue.

3.2 Consumer trends and drivers in developed countries

In this section, a number of consumer trends and drivers (from a European perspective) influencing the packaging area are presented.

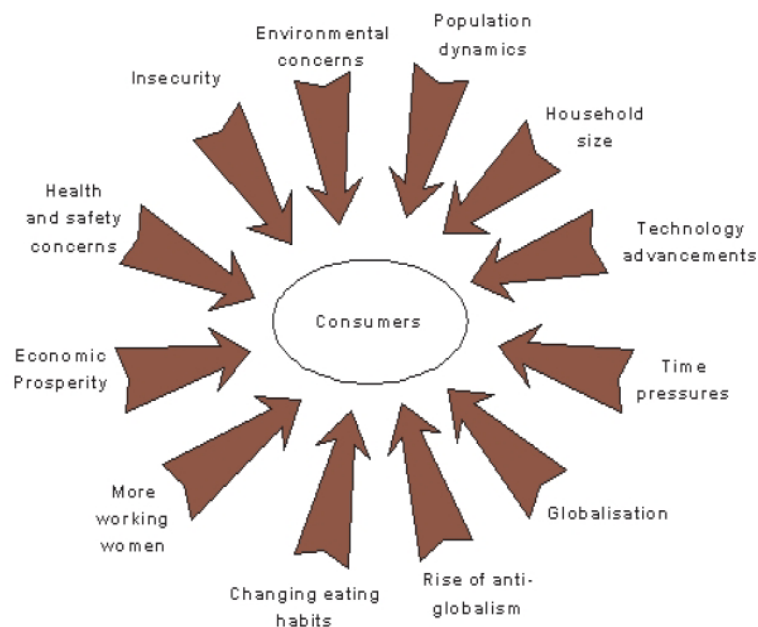


Figure 4. Consumer trends and drivers in Europe (Sustainpack project - Report on future market needs and SWOT analysis - Deliverable 1.7, PIRA, Aug 2005).

Economic Prosperity

Purchasing power mirrors GDP and is the underlying economic fundamental that drives packaging growth. In countries with higher GDP per capita, packaging consumption per capita is higher.

As GDP per capita has grown, so has disposable income, making premium products more widely accessible. However, polarization of wealth is a very real concern in many European countries.

Population dynamics

The population structure in Europe is changing, we are getting older. The average fertility rate per woman has fallen from 2.2 in 1970-75 to 1.5 in 2000-05 and average life expectancy has increased from 71.4 years to 76.9 years. These trends are predicted to continue into the future.

An aging population will further nurture an ongoing trend towards easy-to-handle packaging, i.e. easy opening, emptying and closing.

Household size

Households are becoming smaller. Smaller family sizes mean smaller household sizes. Improving health and support services means there are more single pensioners, furthermore, increasing numbers are able to take care of themselves or live alone with support rather than living in care homes or with family. The trend of marrying later in life means that there are more young people choosing to live alone. Smaller households are also a direct result of falling birth rates in Europe.

One-child families mean that both parents and grandparents are focusing upon fewer children, who therefore have a much greater influence over household consumption. This means that the role of packaging as a salesperson to children is much more important.

Technology advancements

IT development is resulting in faster, smaller and cheaper computers and advanced information management programs. The effect is more information channels and more information availability. The rapid growth of Internet use is a strong force, giving people a new impression of other cultures and opening people's minds to new experiences. Mobile communication technology is also changing our perceptions and expectations as consumers.

Refrigerators and freezers becoming each man's property has facilitated the expansion of the chilled and frozen food markets. Microwaves, too have had a major impact on the consumption of frozen and convenience foods.

Time pressures

The perception that work is taking up a greater proportion of our time is not borne out by available statistics. This contrasts with the general perceptions and feelings expressed by workers.

Research suggests that people generally feel more time-pressured and stressed, not only at work but also in all aspects of their life. Some researchers put this down to the increasing complexity of our lives and our increasing pre-occupation in individualism.

Globalization - A smaller world and borderless society

Travel is increasing and destinations are becoming more exotic. On their travels, consumers develop a taste for the exotic, but they also wish to be able to find their favorite brands in a similar format.

However, the smaller world concept is about more than just increased business and leisure travel. The borders between countries, cultures and companies are successively being erased so that goods, capital, labor and information are moving more freely across borders.

Rise of anti-globalization

In response to the perceived power and influence of multi-nationals, anti-globalization has emerged as a new socio-political movement. Many groups with different agendas are grouped under the anti-globalization banner.

Changing eating habits

The modern diet is significantly different from that of a generation ago. Advances in food and packaging technology, logistics and supply chain management and kitchen appliances combined with time pressures and changing tastes have influenced eating habits. Consumers eat more prepared and convenience food products, and demand more on-the-go food and beverage products. However, on a national level, there are major differences in food consumption patterns.

The increasing demand for transparent packaging (enabling consumers to see the product within) is regarded as having forced a large number of packers and fillers to switch from fiber based materials to plastics.

Individualism

Functional foods appear to be the next big thing in the food industry. These foodstuffs are part of the normal food intake, but have been modified in some way to achieve a certain physiological effect. In the US, functional foods, including low-calorie and low fat products, already represent 54 % of the value of the foodstuff market. Behind this lies the increased health awareness among consumers. Food allergies are also becoming an important influence on the food industry.

More gainfully employed women

The proportion of women working outside the home has been increasing steadily in all EU countries. The increase has now slowed down for most Northern European countries, where this change no longer presents a new driver; however, in the more Southern countries an increasing trend is still being seen.

The fact that there is less time today for household work affects the way we buy and prepare food. It has also led to a blurring of male/female roles and responsibilities in the household.

Health and safety concerns

People are increasingly concerned about how the food they eat and the products they use in their homes affect their health and well-being. This is reflected in the growing markets for organic, locally produced foods, health foods and functional foods.

These concerns generally lead to a need for more product information to be placed on the package, examples of which could include the presence of GMO originating ingredients, product origin or even individual ingredient origin. However, there are concerns that too much information (or information overloading) could disrupt purchase habits, resulting in more impulse purchases as consumers do not take the time to read several paragraphs of text on each pack.

Insecurity

Many people feel insecure of the future in a turbulent world with violence, unemployment, corporate downsizing and government spending cuts. This anxiety factor has been increased by the advent of the war on terror. Insecurity is highest in low and mid levels in society. This gives opportunities for brands to

promote and provide a feeling of safety and security; packaging may be an important communicator of this message.

Environmental concerns

Consumers are aware of environmental issues but are normally not prepared to pay more for an “environmentally friendly” product. However, the consumers’ expectations are rising on the industry to deal with environmental issues, i.e. to develop products with sound environmental profiles.

4 Current issues

4.1 In the EU

Thematic strategy on prevention and recycling of waste

Modified from the Communication paper from the EU-commission: Taking sustainable use of resources forward; A Thematic Strategy on the prevention and recycling of waste (draft 2005:10).

During the autumn of 2005, EU published their Thematic Strategy on prevention and recycling of waste, which is a major review of the existing situation and identification of problems and issues in the area. The purpose is to present proposals for a more comprehensive approach to waste prevention and recycling.

In the EU the waste management and recycling sector has a high growth rate and an estimated turnover of over €100 billion for EU-25. It is labor intensive and provides between 1.2 – 1.5 million jobs. The recycling industry provides increasing amounts of resources to the manufacturing industry: at least 50% of the paper and steel, 43% of the glass and 40% of the non-ferrous metals produced in the EU are currently produced from recycled materials.

Waste has been at the centre of EU environment policy and important progress has been made in the last 30 years. However, despite these successes, waste remains a problem. Waste volumes continue to grow. The unsustainable trends in waste generation and the policy issues are of concern in EU because the generation of waste can be a symptom of environmentally inefficient use of resources. Furthermore, waste management generates emissions to air, water and soil as well as noise and other nuisances, which contribute to environmental problems.

At present, EU municipal waste is disposed of through landfill (49%), incineration (18%) recycling and composting (27%). In the new member states, where major efforts and investments have been made to align with the EU demands, the situation is evolving rapidly, still dominated by landfill. There are wide discrepancies between member states ranging from those which recycle least (90% landfill, 10% recycling and energy recovery) to those which are more environmentally friendly (10% landfill, 25% energy recovery and 65% recycling).

Current EU waste policy is based on a concept known as “The Waste Hierarchy”. This means that, ideally, waste should be prevented and what cannot be prevented should be reused, recycled and recovered as much as is feasible, with landfill being used as little as possible.

Despite important progress that has been made, overall waste volumes are growing and the absolute amount of waste going into landfill is not decreasing. Between 1990 and 1995 total waste generation in the EU and EFTA increased by 10% whilst GDP increased by 6.5%. With anticipated higher levels of economic growth, this trend is predicted to continue and will concern most wastes. For example, the European Environmental Agency predicts that paper/board, glass, and plastic waste will have increased by 40% in 2020 compared to 1990 levels.

While recycling and incineration are increasing, absolute amounts of landfill waste are not decreasing because of the growth of waste generation.

These unsustainable trends are due in part to unsatisfactory implementation of waste laws that, in turn is due in part to certain elements of the policy and legal framework that could be improved. Such elements are e.g. the fact that recycling and recovery cover only a limited proportion of waste.

EU Directive on packaging and packaging waste, 94/62/EC

Directive 94/62/EC on Packaging and Packaging Waste (PPWD) was adopted 1994.

The Directive aims to harmonize national measures aiming at preventing or reducing the impact of packaging and packaging waste on the environment and to ensure functioning of the Internal Market. It contains provisions on prevention of packaging waste, on re-use of packaging and on recovery and recycling of packaging waste.

A tool to reach the prevention provision is the essential requirements of the packaging construction. The directive states that:

“Packaging shall be so manufactured that the packaging volume and weight be limited to the minimum adequate amount to maintain the necessary level of safety, hygiene and acceptance for the packed product and for the consumer.

Packaging shall be designed, produced and commercialized in such a way as to permit its reuse or recovery, including recycling, and to minimize its impact on the environment when packaging waste or residues from packaging waste management operations are disposed of.

Packaging shall be so manufactured that the presence of noxious and other hazardous substances and materials as constituents of the packaging material or of any of the packaging components is minimized with regard to their presence in emissions, ash or leach ate when packaging or residues from management operations or packaging waste are incinerated or land filled.”

In 2004 the Packaging and Packaging Waste Directive was revised and the recovery goals were raised. The following table shows the values that now apply in all member states:

	94/62/EC	2004/12/EC
from	30 Jun 2001	31 Dec 2008
Recovery		
min	50 %	60 %
max	65 %	
Recycling		
min	25 %	55 %
max	45 %	80 %
Differentiated Material recycling targets		
glass	min 15 %	60 %
paper/board	min 15 %	60 %
metals	min 15 %	50 %
plastics	min 15 %	22.5 %
wood	no target	15 %

Harmonized standards

To help manufacturers comply with the construction requirements, six European standards have been developed. They were adopted by the Commission in 1994 and got the status of harmonized standards. The standards describe the requirements which packaging shall fulfill to comply with the essential requirements and they are: User manual, Prevention/ minimization of dangerous substances, Reuse, Material recycling, Energy recovering and Compost able packaging.

Prevention plans

A packaging prevention plan makes it possible to require concrete packaging prevention action at different levels (sectional/national) and consequently can contribute to the achievement of environmental objectives, especially by targets. The success of the measures depends on the quality of the prevention plans, demands for observance (in case of sectional plans – links to licensing etc) and their practical implementation (monitoring of set targets, verifiability, enforcement efforts, learning and improvement cycles, availability of progress reports).

The European Packaging Directive 94/62/EC, postulates on prevention that Member States shall ensure that, in addition to the measures to prevent the formation of packaging waste taken in accordance with the essential requirements, other preventive measures are implemented. Such other measures may consist of national programmes or similar actions adopted, if appropriate in consultation with economic operators, and designed to collect and take advantage of the many initiatives taken within Member States as regards prevention.

Today packaging prevention plans are required for certain businesses in some European countries: Belgium, Italy, Slovakia, Spain, The Czech Republic and in the Netherlands.

4.2 In Sweden

Swedish Ordinance on Producer Responsibility for Packaging

All companies that manufactures, import or sell packaging or packaged goods are legally responsible for any packaging, they place on the Swedish marketplace. Producer responsibility covers all types of packaging – consumer, transport and industrial – and applies to all types of material such as plastic, metal, glass, paper, cardboard, corrugated board and wood. Special legislation applies to aluminum cans and PET bottles for consumer-ready drinks.

Through this ordinance (Swedish Statutes 1997:185), the requirements of the EU Packaging Directive is implemented in Swedish legislation.

The purpose of the Ordinance on Producer Responsibility for Packaging is to influence the design of packaging so that it can be reused or recovered and finally incinerated or land filled, all with minimal environmental impact. Land filling should be avoided.

In brief, the requirements are as follows: The producer shall ensure that the packaging is recoverable, provide suitable collection systems, inform customers and households of their activities, consult with municipalities and report the recovery rates to the Swedish Environmental authority. Households and other consumers shall separate packaging from other waste. The producer shall consult with the municipality in matters concerning a suitable collection system and information.”

In the fall of 2005 the Swedish Environment Protection Agency) published guidelines with more detailed instructions on how the supervision of producer responsibility for packaging should be applied.

Recovery rates

The Ordinance prescribes certain recovery rates for the following materials: glass, metal, cardboard and paperboard, corrugated board and other materials, as well as beverage containers of glass, aluminum and PET. Recovery can take the form of reuse, recycling or energy recovery, or a combination of these. Sweden has adopted higher target rates than those stated in the EU Directive.

The following table illustrates the target rates for the different packaging types:

Packaging types	Recovery target
All packaging waste	Up to and including 2008: 50% of which at least 25 percentage units material recovery From 2009: 60% of which at least 55 percentage units material recovery
Metal, not beverage containers	70% recycling
Cardboard, paper and corrugated board	65 % recycling
Plastic, not PET bottles	70 % recovery, at least 30% recycling
Glass	70 % recycling
Metal beverage containers	90 % recycling
PET bottles	90 % recycling
Wood packaging	70% recovery, at least 15% recycling
Packaging of other material	30% recovery, at least 15% recycling per material

In practice, different packages are recovered in different ways. Certain glass and PET bottles are reused, other glass, metal, cardboard and paperboard, corrugated board and rigid plastic are reclaimed as secondary raw materials, while plastic film and end-of-life paper packages are often incinerated.

Energy recovery takes place in waste incineration plants that make use of the energy. In Sweden, land filling of combustible and compostable waste is now banned.

Packaging statistics

The Swedish Environmental Protection Agency reports national Swedish packaging data annually to the European Commission. The results for 2003 are presented below³. Sweden is above the Directive's maximum rates for recovery and recycling. All material-specific targets have been reached.

Packaging	Placed on the market (tons)	Recycled, (tons)	Energy recovery (tons)	Recycled %	Recovery %
Glass	165,000	151,229	-	92	-
Plastics, not PET	149,095	26,916	75,588	18	69
PET, one-way	13,488	10,652	-	79	-
Paper, cardboard	200,000	75,020	1,482	38	38
Corrugated board	422,000	359,000	-	85	85
Steel	41,700	30,400	-	73	73
Aluminum	9,000	2,500	-	28	28
Reusable beverage cans	15,547	13,266	-	85	85

³ Samla in, återvinn, Uppföljning av producentansvaret för 2003, Report 5380 from the Swedish Environmental Protection Agency, June 2004

Wood	393,131	63,028	328,848	16	100
Total	1,408,961	732,011	405,918	52	81

Recycling companies

In order to comply with the requirements laid down in legislation, the business community has formed joint recycling companies, also called material companies. These are run on a non-profit basis and their purpose is to ensure that producer responsibility is fulfilled. They have thus assumed responsibility on behalf of the producers. There are no statutory requirements that a producer must join a material company; it is possible to remain outside the system if a company sets up its own collection system.

There are recycling companies for:

Glass	Svensk GlasÅtervinning AB
Metal	Svenska Metallkretsen AB
Paper and paperboard, corrugated board	Svensk Returkartong
Plastic	Plastkretsen AB
Wood	Svenskt Returträ AB
Beverage containers	Returpack AB Returpack-PET AB
Plastics used in agriculture	SvepRetur AB

The first four of the above recycling companies have founded a service organization, REPA.

REPA

Today 9 500 companies, accounting for 90% of all packaging on the Swedish market, are affiliated with REPA. Collection levels have increased and in most cases, they exceed Government objectives.

The collection system is nationwide. There are two different collection systems, one for consumers and one for the industry - companies, hospitals, restaurants, etc. There are recycling stations in all municipalities where households can leave their separated packaging waste free of charge. There are currently about 7,700 recycling stations in the country.

Returpack

Beverage containers included in a deposit and return system have their own collection system in the form of reverse vending machines in shops and other places. These beverage containers comprise containers for ready-to-drink beverages such as aluminum cans, glass bottles for beer and soft drinks, and PET bottles. Glass bottles and large PET bottles (1.5 and 2 liters) are reused, while aluminum cans and the smaller PET bottles are recycled. Steel cans are not included in the deposit and return system.

Returpack is the organization responsible for the administration and deposit system for aluminum cans and PET bottles in Sweden. It is owned by the packaging industry Rexam, various trade organizations and the Swedish Brewers' Association. All breweries that can beer and soft drinks or bottle drinks in PET bottles are part of the Swedish recycling system and have current agreements with Returpack. Approved cans and PET bottles are identified by their bar code (EAN code). All importers and breweries must register their bar codes to Returpack. By law, all imported aluminum cans and PET bottles must be part of a recycling system.

Energy recovery

Largely, waste consists of materials that can be used for energy production. In Sweden today, energy is produced from waste mainly in two ways, through incineration and through production and use of biogas. Together these two ways of energy generation add about 5 TWh/year to the Swedish energy system.

The extent of waste incineration is high in Sweden and it is growing. In all, 3.1 million ton waste is incinerated annually. In 2003, 9.3 TWh energy in the form of heat, 8.6 TWh, and electricity, 0.7 TWh, was produced from waste through incineration. About 0.4 million tons of the collected packaging goes to energy recovery.

Slightly less than 5% of the waste incinerated in the Swedish incineration plants is imported. The import consists mainly of return chips, crushed fuel and rubber. Only 1.7% of the imported waste is household waste.

Of the household waste about 45% goes to incineration. This means that in average, each Swede contributes annually with 210 kg household waste to be incinerated.⁴ Household waste consists to the greatest part of so-called renewable material – bio-fuel. It contributes only marginally to increasing the greenhouse effect when it is incinerated. Combustible waste replaces fossil fuels and other bio-fuels.

Several factors have contributed to reducing emissions remarkably over the years: stricter demands as to emissions to air and water, a continuous technical development and not least a considerably improved sorting of the incinerated waste.

Today waste incineration in Sweden is exempt from energy and emission taxes. This means that waste incineration is favored as compared to other fuels and waste treatment methods. The effect hereof could be substantial. If carbon dioxide and energy taxes were imposed on incineration of plastic waste, the tax would be more than SEK 3000/ton of waste (SOU, 2005). Should such taxes be imposed, the competitiveness of plastic recovery would increase considerably.

⁴ The Finnveden report or its references

5 Most impacting trends in 3-5 year perspective

5.1 Packaging Prevention

The basic objectives of current EU waste policy – preventing waste and promoting re-use, recycling and recovery to reduce negative environmental impacts – are expected still to be valid in a 3-5 year perspective.

EU waste policy has the ambition to reduce the overall negative environmental impact of resource use. The prevention of waste generation and promotion of recycling and recovery of waste are expected to increase resource efficiency of European economy and result in a reduction of the negative environmental impacts associated with the use of natural resources. This is considered essential for sustained economic growth.

As regards packaging, this should mean that the legislators continue on the way towards increased demand for reduced resource utilization of virgin materials in packaging. This goal can be reached in several ways.

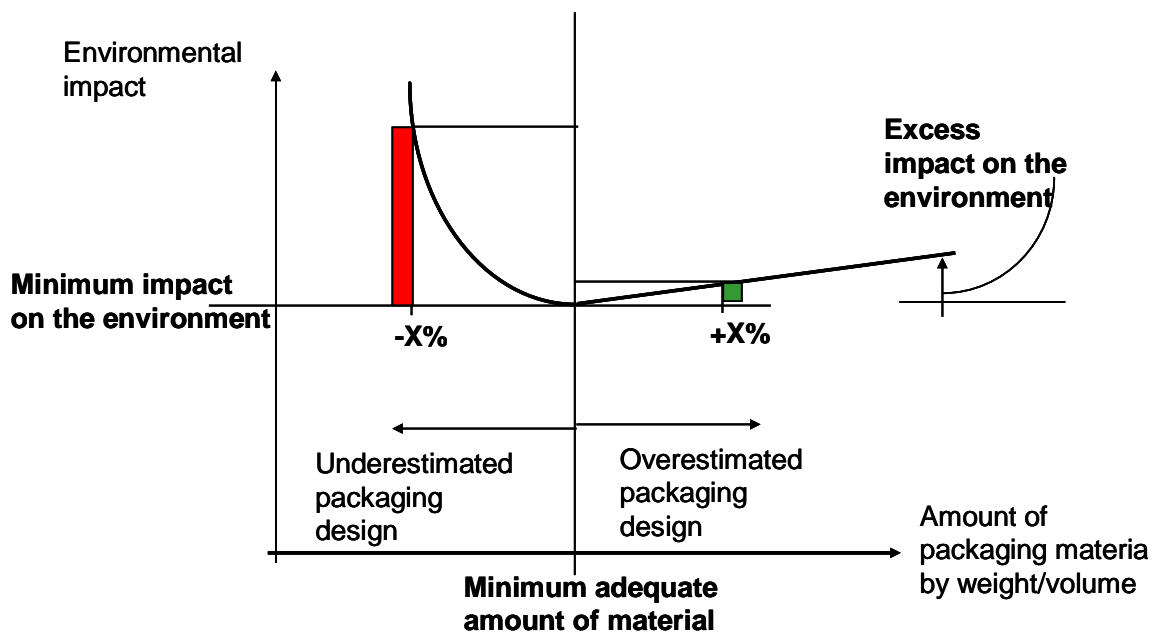


Figure 5. Optimization of packaging design

Sharper focus on the essential requirements in the packaging directive

The recently harmonized standards have provided authorities with the tool for control of the compliance with these requirements. Fulfilling the essential requirements makes it possible to material optimize packaging already at the design stage, considering the functions it is to perform. This is a strategy favored by the industry.

Specific prevention plans

This solution has not been discussed in Sweden and there are for the time being no plans to introduce such prevention plans.

Environment indicator

One idea discussed for a long time in the EU parliament is the introduction of a PEI -Packaging Environmental Indicator. The presented proposal indicates that the PEI would be based on a simplified Life Cycle Assessment, which would be required for all packaging introduced on the inner market.

The directive of 1994 was revised in 2004 and the plans are to revise it again within 5 years. It is very difficult to determine today which one of the strategies that will be promoted then.

5.2 Reuse and Recycling

Material recovery is expected to grow. Both EU and Swedish authorities consider material recovery in general preferable from an environmental point of view as compared to other waste handling methods. This agrees with the view that recovered materials are used in a sustainable society. However, some object that material recovery is more expensive than e.g. incineration. Therefore, there is now an ongoing discussion of how much material recovery may cost.

The EU standards for recycling are expected to be developed, not only for environmental protection but also for business reasons – to promote a level playing field for recycled material. Recycling without standards presents an environmental problem as recycling facilities can cause pollution if badly operated.

During the period, collection systems will be developed and made more efficient in many of the new member states. Sweden, with its geographical location and previous cooperation with these countries, are already participating in this development.

As to Sweden, all indicates that the demand for high collection levels for used packaging will remain. The producer responsibility and the division of responsibility for collection are expected to remain unchanged.

The trend with increasing quality of the collected fractions continues, partly thanks to increasing customer knowledge about the collection. Sorting and collection of used materials from trade and industry is expected to increase.

The Swedish collection system is well functioning and carefully built and can be expected to remain generally in its present form. An additional cost rationalization is said to be implemented during the period.

The use of recovered plastics is expected to grow. The development continues, as regards both better sorting of collected material and increased knowledge about how the material can be used. This trend is fortified by the expected high oil prices. In addition, the recently introduced trade with emission rights for CO₂ will make virgin plastic raw materials more expensive. There is a shortage of collected PET already today in many parts of the world.

5.3 Energy recovery

Incineration with energy recovery is growing in Sweden. However, despite the fact that more incineration plants are built, there will be a lack of such household waste treatment capacity in Sweden in a foreseeable future.

At present, the incineration capacity in Sweden is extended considerably and the importance is stressed that the furnaces be as flexible as possible, i.e. they should be able to burn also other types of solid fuel. In addition, the nets for district heating are extended.

The demand for incineration of waste is expected to grow. The ban on landfill of combustible waste is expected to reach full impact within the next few years. Increased material recovery resulting in rest products also increases the demand for incineration. Further, this waste handling method is needed as recipient in certain waste flows where incineration is the most suitable treatment method.

Studies⁵ have calculated the theoretical potential for waste fuels (household waste, industrial waste, landfill gas and sludge incineration) to 21 TWh/year in Sweden. The practical market potential was estimated to 7-13 TWh/year in the same study.

⁵ SAME-projektet, Långsiktig miljömål med systemlösningar för el och värme. 1999, Naturvårdsverkets rapport 4596

6 Open Questions

Will EU's ambition to create a sustainable society survive increased competition from China, South East Asia and USA?

How far can the "thematic" strategies on waste prevention and recycling and on sustainable use and management of resources really go? How do we find the right balance between environmental considerations and the internal market?

Does existing EU policy meet the needs and expectations for packaging in a sustainable society?

Have legislators concentrated on the right issues; minimizing packaging waste through recycling, reuse and prevention, and encouraging "good packaging" over "bad packaging"? Indeed, is legislation really the answer?

What means of control seem most efficient?

Does consumer demands of economic means of control lead where we want in the best way? How will they direct trade and industry in the future?

Will increased use of active and intelligent packaging create problems in recovery?

From distribution and end-users, an increased demand for value-adding packaging can be expected. This will lead to more complex packaging constructions, which may cause problems in recovery.

Increasing wealth, aging population and reduced household sizes are all trends, which lead to increased packaging consumption today – could and should this be the responsibility of the packaging industry?

We all consume so - as consumers - what do we want from packaging and at what cost to our pockets and to the environment?

7 Packaging beyond 2010

The long-term goal for the EU is to become a recycling society. This will be reached through maximum recovery of materials, where this makes environmental and economic sense, and energy recovery, where this is more efficient. With environmental reference standards, the EU internal market will facilitate recycling and recovery activities.

In 2015, collection of material for recovery should be based on type of material. To reach higher collection levels, sorting has to be made easier for consumers and then to demand that one and the same material be sorted into different fractions for different products is not tenable. Producer responsibility can be expected to live on, however in a slightly changed form.

The collection organizations within EU today have been built nationally which is a result of the varying legislation between individual countries. This means that the cost structures and distribution of responsibility is not the same in all countries. In 2015, this should be more homogenous to facilitate for companies acting on multiple markets.

8 Competitive advantages of the Swedish industry

8.1 Packaging Prevention

In Sweden, there is a firmly established awareness that the main objective of packaging in a sustainable society is to protect the product and make distribution and handling more rational. This is clearly underlined by Swedish industry, research and authorities in various ways.

Sweden is in the forefront in research supporting a holistic view on packaging considering both the resource consumption of packaging and its ability to save resources in the form of reduced product waste and simplified handling. STFI-Packforsk is a European leading research institute in the area.

Sweden played an important and driving role in the development of the material optimization standard that is connected to the essential requirements of the packaging waste directive. This standard is based on this functional view, material utilization should be optimized considering the functions the packaging is to fulfill.

Swedish industry has a long and active tradition regarding packaging use from a holistic perspective as regards the value chain. TetraPak and IKEA are just a few examples of successful Swedish companies that have worked in this tradition.

In Sweden, a number of companies have taken the initiative to create The Trade & Industry Group Miljöpack, an organization in which they work jointly on the implementation of the Essential Requirements of the Packaging Directive. This organization makes it possible for industry to influence coming legislation in this area. Active companies in the group are e.g. Rexam, TetraPak, Stora Enso and Hennes & Mauritz.

In Sweden, there is a tradition of cooperation between authorities and industry. This has resulted in laws and regulation often being implemented and applied in an industrial-adapted way, which makes things easier for both supervising organizations and industry.

8.2 Reuse and Recycling

Internationally, Sweden has a reputation for being a clean country. Swedish consumers are well environmentally aware and have been used since long to take care of their used packaging. As early as in the 1960's nationwide campaigns to "Keep Sweden Clean" were launched, which has led to a far-reaching insight and willingness to take care of one's waste.

In addition, there was in Sweden even before the EU packaging and packaging waste directive was introduced, legislation on collection and recovery of used packaging.

The engagement and experience of Swedish consumers is manifest in the high collection levels reached in Sweden today. These often exceed the EU requirements considerably. In addition, the quality of the collected fractions is very high.

The long experience of industry of utilizing used material has led to there being a built-out system for refining various material fractions to usable materials. There is also a market for secondary raw

materials for different kinds of materials such as glass, metals and cellulose fiber based material (paper, corrugated board and cardboard). Leading companies in the Swedish forest industry have a high competence in recycling materials.

The Swedish common reuse system for beverage packaging should also be pointed out as a strength. The system is old and well established. The fact that all breweries use the same packaging minimizes return transports, which saves both money and resources for all parties involved.

Swedish consumers are among the best in the world at returning used beverage cans. The recovery level for these cans, for which one pays deposit, is above 90% annually.

8.3 Energy recovery

A well built out district heating system gives Sweden a unique situation as compared to many other countries in Europe. The heat generated from waste incineration can be used for district heating to 95%. This covers somewhat more than 15% of the total district heating demand in Sweden, but in some places, as much as half the required district heating can come from waste incineration.

9 Conclusions

This road map of packaging prevention and recovering covers the period 2005 – 2015. Since this area is the subject of a strategic discussion of our future way into a sustainable society, considerable regulation in the form of legislation and standards can be expected. Exactly how these will be designed and their effect cannot for obvious reasons be determined at the present time.

Swedish packaging and recovery industry is well prepared for coming demands for increased material recovery and reduced resource consumption. The demand for low-grade energy in the form of district heating has made incineration a well-established and mature form for handling waste.

Sweden's competitive advantages in the area are:

- Consumers, industry, research and authorities with competence and experience of prevention, collection and recovery.
- Tradition of cooperation between industry and authorities enables efficient and rational implementation of new requirements.
- Well built-out nets of incineration plants and great demand for their products.
- World-leading manufacturers as well as small entrepreneurial companies.

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