Packaging in the Sustainability Agenda:

A Guide for Corporate Decision Makers

EUROPEN

The European Organization for Packaging and the Environment

ECR Europe

Efficient Consumer Response

Disclaimer

This publication has been compiled by ECR Europe, EUROPEN, representatives from their respective memberships and their nominated consultant (CSR). It has been prepared through the active and enthusiastic participation of a working group with participants drawn from these bodies. Particular thanks are due to the two co-chairs of the project and to the chapter chairmen who led the writing of their respective sections.

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This publication has been produced by ECR Europe and The European Organization for Packaging and the Environment (EUROPEN) aisbl with the assistance of G. Richard Inns, CSR Analyst.

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ECR Europe is a voluntary and collaborative retailer-manufacturer platform with a mission to "fulfil consumer wishes better, faster and at less cost". It is a non-profit organisation which aims to help retailers and manufacturers in the consumer goods industry to drive supply chain efficiencies and deliver business growth and consumer value.

EUROPEN – The Voice of Industry for Packaging and the Environment – is an industry and trade organization open to any company with an economic interest in packaging and packaged goods. It presents the opinion of the packaging value chain on issues related to packaging and the environment.

Contents

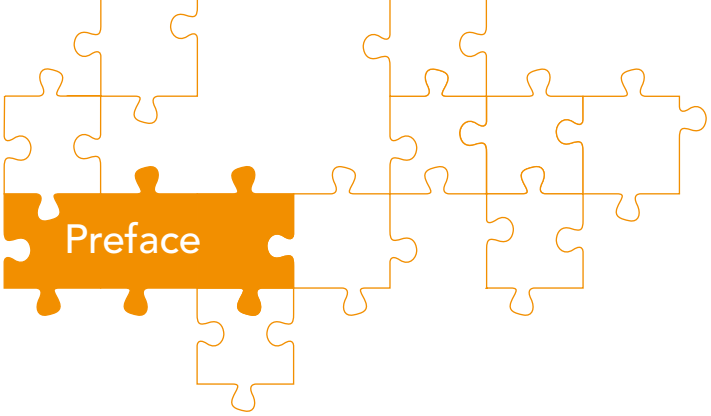
How to Use This Guide

This guide is intended as a reference for corporate decision makers. It is not a packaging design guide, nor a technical document.

Since the impact of packaging on sustainability involves an assessment of the life cycle of the package and of the product it contains, this guide illustrates how designers, manufacturers, and users of packaging should collaborate to optimise the performance of packaging while minimising the risks of supply chain inefficiencies.

Each section or chapter has been structured such that if required it can be read as a unit by readers with a specific interest.

- **Preface:** addresses the rationale behind the production of this guide.
- **Executive Summary:** presents the central arguments of the guide, key conclusions and recommendations for action.
- **Chapter 1:** provides readers with an understanding of the multiple functions and roles of packaging in society.
- **Chapter 2:** contains key definitions related to sustainability. It offers summaries of the tools that can be used to assess the environmental profile of packaging, and reviews the legislation related to its environmental aspects.
- **Chapter 3:** explores how sometimes conflicting needs and obligations interact with packaging, and outlines how to reach sound packaging decisions.
- **Chapter 4:** offers practical advice about developing packaging plans that support a company's overall sustainability goals; choosing the right metric(s); and ensuring decisions interact positively with others along the supply chain.
- **Appendices** include notes on further reading references and a glossary of terms.
- **References**
  – A superscript number [1] refers to a footnote on the same page
  – A number in parentheses **(1)** refers to an entry in the bibliography at the end of the document



Pressure on packaging is not a new phenomenon, but has dramatically increased in the past few years. Consumer perceptions, fuelled by media calls for more 'sustainable' packaging, are making life difficult for companies. Worse, they can lead to misguided legislative pressures.

The key problem is that packaging is usually viewed, by media and consumers alike, as a stand-alone product. This ignores its fundamental role, which is to protect, distribute, and display wares. Without packaging food rots, fragile products get broken, and distribution becomes hazardous. The entire supply chain becomes hugely inefficient.

Packaging is essential, but seldom seen to be. And thus misinformation and confusion rule. Calls for packaging to be 'sustainable' grow, despite the absence of a common understanding as to what 'sustainable' packaging might mean.

As a result, companies end up having to deal with conflicting demands from consumers, regulators and other stakeholders. This is time-consuming, expensive, and a source of friction between companies and the communities in which they operate.

Companies are reacting to this pressure in a myriad of different ways. But if they are not coordinated and harmonised, the different initiatives that result can disrupt the supply chain and undermine packaging's contribution to sustainable development.

This is why ECR Europe decided there was a need for clear guidance about packaging strategy. A team representing the entire packaged goods value chain was established in collaboration with EUROPEN, The European Organization for Packaging and the Environment, to address the subject in a rational, factual and dispassionate way.

This document is designed as a resource to help corporate decision makers form balanced and informed views about the role of packaging in sustainable development. Put into practice, it will help deliver tangible benefits: more efficiency, better cost control, and easier relationships with a multitude of stakeholders.

We would like to extend our sincere gratitude to the companies and industry and trade organisations whose representatives have contributed to this work and especially to our consultant Richard Inns for his tireless work and patience with all of the editorial changes made.

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The FMCG industry needs to serve consumers quickly, safely and efficiently with the most sustainable solutions. Companies are striving to maximise their positive impact and minimise any negative 'footprint' on the environment, economy and society in general. Packaging strategies are being re-assessed to analyse their contribution to this overall impact.

The entire supply chain, from the initial sourcing of raw materials through to consumer product disposal is dependent on packaging. This guide supported by global expert opinion from within and outside the packaging value chain, offers clear recommendations on how to integrate packaging into a company's wider sustainability strategy.

Guide Deliverables

This guide examines the sometimes misunderstood yet fundamental role packaging plays in our industry. It explores the many approaches and tools used to calculate the life cycle impact of a product, stressing the importance of taking a variety of sustainability indicators into account.

The role of packaging in a company's overall sustainability strategy is then explored further, with information on how to optimise the role it plays in each stage of the supply chain.

The final chapters give practical advice on how senior decision makers in a company can implement a packaging sustainability strategy.

Conclusions

Since 1987, sustainable development has been taken to mean activity that takes three elements, or 'pillars' into account: environmental protection, social equity and economic prosperity. Packaging embodies all three. Without it, resource and product wastage would be much worse, health risks would increase dramatically, and the economy would be much less efficient.

Packaging's value lies in its association with products. The methodologies used to measure packaging's environmental impact are often based solely on single criteria. This approach tends to overlook what is by far the biggest environmental benefit of packaging: the role it plays in preventing waste. In Western Europe, at most 3% of food spoils before it reaches the consumer. In developing countries, up to 50% does. Packaging makes a major contribution to this prevention of waste. Similar stories can be told about most classes of goods.

Life cycle thinking, life cycle assessment and footprinting are widely used in analysing product impacts. Understanding how to improve the footprint of your company is vital in the challenge to manage the ramifications of climate change but the temptation to reduce everything to one measure must be resisted. The most suitable package is the one that fulfils the requested function and minimises the total impact per unit of product over the full life cycle. Choosing the right combination of indicators is crucial.

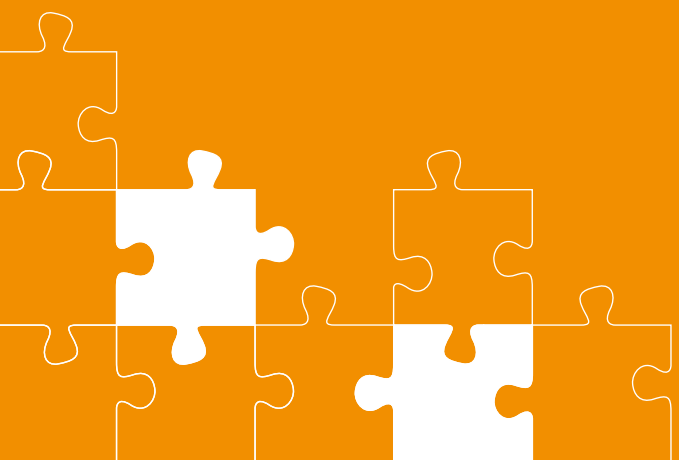
When a company's sustainability strategy looks at packaging in isolation rather than as part of the overall supply chain, it will miss these effects and fail to optimise operations. This reduces sustainability and can needlessly damage the bottom line.

Looking at packaging alone can also negatively influence the regulatory framework. There is a risk in this approach of encouraging legislation that will push companies to pursue strategies that are costly, inefficient and ultimately less sustainable.

Next Steps

This guide suggests practical steps you can take to analyse your company's current packaging sustainability strategy and suggestions on how to optimise it for the future. To achieve this it is vital that you work with partners up and down the supply chain and with industry associations to help everyone see where they can achieve the most sustainable impact.

Optimising packaging may require investment. Over time, however, a positive return can be expected since optimal packaging minimises waste and resource consumption, delivering sustainable improvements for us all. This guide will help your company achieve that.



Chapter 1: The Role of Packaging

1.1 Introduction

The fundamental role of packaging is to deliver the product to the consumer in perfect condition.

Packaging has a number of functions; the fundamental role is to deliver the product to the consumer in perfect condition. Good packaging uses only as much of the right kind of material as necessary to perform this task. As packaging is reduced, the range of scenarios under which product losses occur rises, until eventually a point is reached where the increase in product loss exceeds the savings from the use of less packaging material. Any reduction in packaging beyond that point is a false economy, since it increases the total amount of waste in the system.

Table 1 below lists the most important functions of packaging. Well-designed packaging will meet the requirements of the product while minimising the economic and environmental impacts of both the product and its package.

Table 1: Functions of Packaging

Function	Features
Protection	• Prevent breakage (mechanical protection) • Prevent spoilage (barrier to moisture, gases, light, flavours and aromas) • Prevent contamination, tampering and theft • Increase shelf life
Promotion	• Description of product • List of ingredients • Product features & benefits • Promotional messages and branding
Information	• Product identification • Product preparation and usage • Nutritional and storage data • Safety warnings • Contact information • Opening instructions • End of life management
Convenience	• Product preparation and serving • Product storage • Portioning
Unitisation	• Provision of consumer units • Provision of retail and transport units
Handling	• Transport from producer to retailer • Point of sale display
Waste reduction and recycling and reuse of by-products	• Enables centralised processing and re-use of by-products • Facilitates portioning and storage • Increases shelf life • Reduces transport energy

1.2 Raw Materials for Packaging

There is no such thing as a fundamentally good or bad packaging material: all materials have properties that may present advantages or disadvantages depending on the context within which they are used.

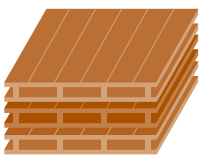
Some common applications and end-of-life options for packaging materials are outlined below. Final packaging choices require a more detailed analysis of the characteristics of each material, as explained later in this Guide.

Glass, produced from sand, limestone and soda ash, makes impermeable containers that are easy to open and reclose. In most countries, bottles and other glass containers are either returned to be refilled or are recycled at a high rate.

Metal is used to make containers, foils and closures. Tinned steel is used for food cans and some beverage cans. Aluminium is used for most beverage cans, foils and closures. Both types of cans are recycled at high levels with significant environmental benefits. Foils are often used in laminates with paper and plastic materials to make flexible packaging and beverage containers.

Paper & board is based on organic fibres from wood and other biomass sources. Paper is readily recycled and high recycling levels are achieved. For product packaging, paper is frequently used in combination with coatings, foil, wax or plastic materials to provide barrier properties and sealability. For secondary and tertiary packaging, corrugated board is commonly used and generally has significant levels of recycled material.

Plastics, made from oil or biomass, come in a number of specialised varieties. Polyester (PET), polyethylene (PE) and polypropylene (PP) are used to make bottles and other lightweight containers as well as flexible packaging. Plastic packaging can be reused, recycled or used for energy recovery. Certain types of plastics can also be composted.



Wood, used mostly for pallets and crates, is also used for some niche products such as wine cases. The wood generally comes from managed forests and is frequently reused for a number of transport cycles.

1.3 Design Considerations

Optimal performance is achieved when product and packaging are designed together from conception.

Figure 1 shows the typical steps in the life cycle of a packaged product. The packaging must meet critical requirements and constraints at each stage of this life cycle.

Typically, any well-designed package-product combination will propose convenient, effective and efficient solutions to all relevant issues listed in **Table 2** on page 11.

Changing consumer preferences and demographics, such as the reduction in household sizes, also have a major influence on product and package design. The sustainability aspects of design are considered in more detail in Chapters 3 and 4.

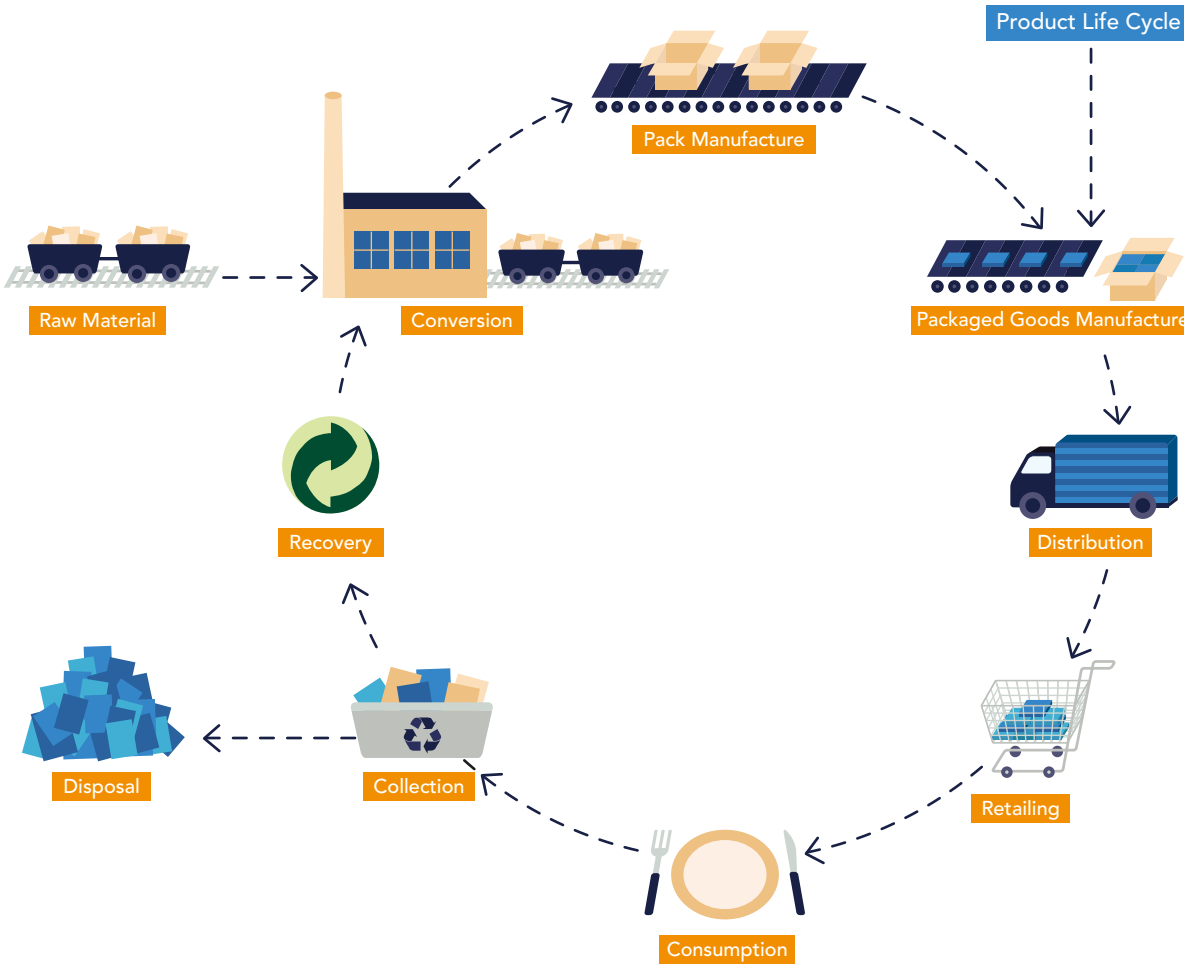
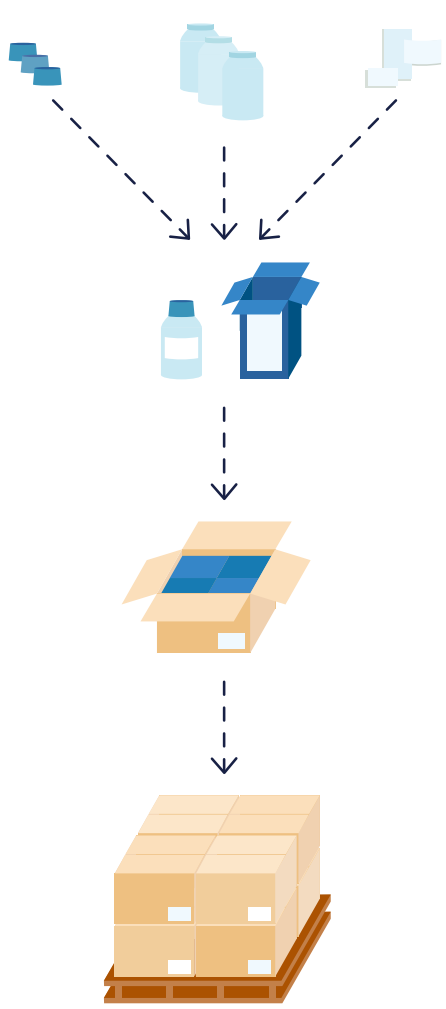


Figure 1: The Packaged Product Life Cycle

Most products leave the production facility with three levels of packaging (the definitions below are based on EU Directive 94/62/EC on packaging and packaging waste):



Sales packaging (or primary packaging) constitutes the sales unit. It's the package the consumer picks up at the point of sale.

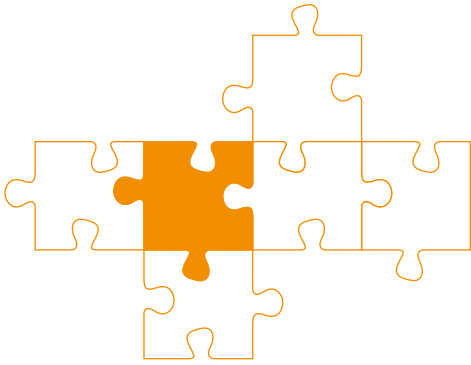
Grouped packaging (or secondary packaging) groups a given number of sales units together into a convenient unit at the point of sale. Grouped packaging typically has one of two roles: it can be a convenient means to replenish the shelves; or it can group sales units into a package for purchase. It can be removed without affecting the product's properties, and generally defines the unit used by the retailer.

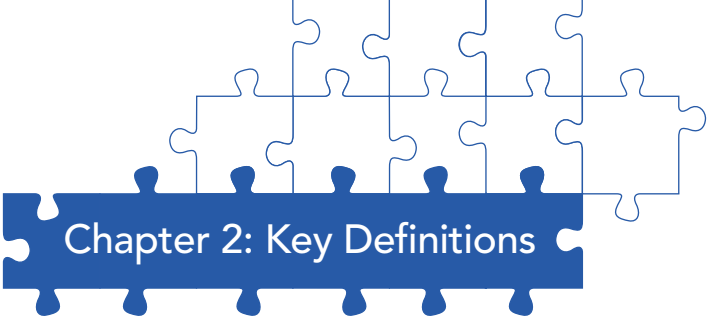
Transport packaging (or tertiary packaging) is designed to ensure damage-free handling and transport of a number of sales or grouped packages. This does not include road, rail, ship or air containers. Transport packaging is normally a shipping unit such as an outer case, a pallet or a crate.

Selecting the optimum balance between these three levels of packaging is a critical element in package design.

Table 2: Packaging Design Considerations (Non-exhaustive list)

Step	Design Considerations
Raw material sourcing	• Use of sustainably managed resources • Economies of scale
Packaging material manufacture and conversion	• Incorporation of recycled materials • Run length for maximum effectiveness • Compliance with food safety requirements • Flexibility to meet promotional needs
Packaged goods manufacture	• Balance between primary, secondary and tertiary packaging • Improved line efficiency and waste reduction • Executing promotional activities
Distribution	• Easy identification • Optimisation of vehicle loading • Stability of handling systems • Efficient picking and packing of mixed loads
Retailing	• Efficient stocking and display • Recovery or reuse of secondary & tertiary packaging • Provision of point of sale information
Consumption	• Provision of information concerning usage and disposal • Easy opening and closing • Portioning • Product waste reduction
Collection of post-use packaging	• Clear identification of material type (when and where it aids recovery) • Ease of separation • Net impact of collection process
Re-use, recycling and recovery	• Utilisation of combination of recovery techniques • Suitability for automated sorting • Generation of high purity secondary materials • Safe disposal of process residues
Disposal	• Progressive reduction of material to landfill • Safety of residual materials for landfill





Chapter 2: Key Definitions

2.1 What is Sustainability?

Any approach to understanding sustainability has to start with the definition of sustainable development.

2.1.1 Sustainable Development

In 1987 the Brundtland Commission developed the most commonly applied definition of Sustainable Development (1); *"Development that meets the needs of the present without compromising the ability of future generations to meet their own needs. This involves addressing economic, social and environmental factors and their interdependence in an organization's decision-making and activities".*

2.1.2 The Three Pillars of Sustainability

The three pillars of sustainability – economic, social and environmental – were already outlined in the first definition of Sustainable Development in 1987. It is recognised that these three pillars are intimately linked and cannot be developed in isolation. They have come to be recognised as the standard approach to considering sustainability. The Renewed Strategy for Sustainable Development adopted by the European Council in June 2006 (2) offers a useful explanation:

- **Planet – Environmental protection**
  "Safeguard the earth's capacity to support life in all its diversity, respect the limits of the planet's natural resources and ensure a high level of protection and improvement of the quality of the environment. Prevent and reduce environmental pollution and promote sustainable consumption and production to break the link between economic growth and environmental degradation".
- **People – Social equity and cohesion**
  "Promote a democratic, socially inclusive, cohesive, healthy, safe and just society with respect for fundamental rights and cultural diversity that creates equal opportunities and combats discrimination in all its forms".
- **Profit – Economic prosperity**
  "Promote a prosperous, innovative, knowledge-rich, competitive and eco-efficient economy which provides high living standards and full and high-quality employment throughout the European Union".

When practical examples of the three pillars are given, environmental aspects including climate change, resource use and biodiversity tend to predominate, followed by social aspects focusing on public health, and labour protection. The economic imperative to maintain living standards keeps the three aspects in balance.

The challenge is to work in a holistic way with these three pillars recognising the tensions between them and respecting the importance of each. A short definition which encapsulates this is *"sustainable development: an enduring, balanced response to economic activity, environmental responsibility and social progress"* (3).

2.1.3 Claims of Sustainability

The term 'sustainable' must not be used for self-declared environmental claims.

The term 'sustainable' does not have a specific definition but is used in its usual (dictionary definition) sense, for instance: *"sustain, to maintain or keep going continuously"*. However there is a strict international requirement (see ISO[1]14021 (4)) on how the term is used for self-declared environmental claims, which is that claims of achieving sustainability shall not be made.

Although this standard was first published in 1999 it is still considered correct to state that self-declared claims of achieving sustainability shall not be made.

The term 'sustainable' is used in conjunction with specific activities; perhaps most notably in the well-established term 'sustainable forestry'. It can be argued that where this term is used in conjunction with third party verified schemes, such as FSC[2] or PEFC[3] , it is not a self-declared claim and hence does not infringe the requirement of ISO 14021.

The underlying principle for sustainability is that it is a continuous process, in essence:

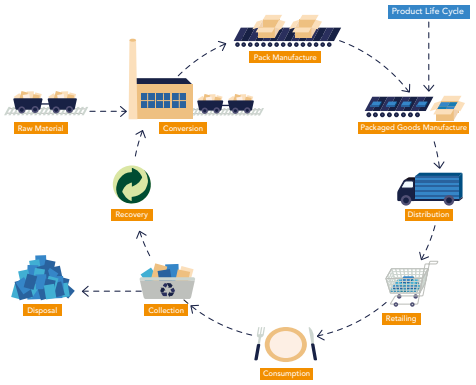
"Sustainability is a journey not a destination".

[1] ISO = International Organisation for Standardisation www.iso.org
[2] FSC = Forest Stewardship Council www.fsc.org
[3] PEFC = Programme for the Endorsement of Forest Certification schemes www.pefc.org

2.2 Life Cycle Definitions

To address Sustainable Development it is important to understand the meaning of a number of 'Life Cycle' terms.

2.2.1 Life Cycle



The ISO 14040 series defines the life cycle as: *"consecutive and interlinked stages of a product system, from raw material acquisition or generation from natural resources to final disposal"* (5). It can usefully be referred to as a 'cradle-to-grave' process and can be visualised as above. Genuine environmental improvements require a life cycle thinking approach to packaging/product systems.

2.2.2 Life Cycle Thinking (LCT)

The United Nations Environmental Programme has proposed that*: "the purpose of life cycle thinking is to prevent piecemeal approaches and avoid problem shifting from one life cycle stage to another, from one geographic area to another, and from one environmental medium to another"* (6).

The life cycle thinking approach assesses conceptually all stages of the life cycle. Conventional approaches tend to regard packaging sustainability issues in isolation from the packed product system of which they are part. This approach is likely to lead to sub-optimal results if improvements in packaging are obtained at the expense of decreased performance of the packed product.

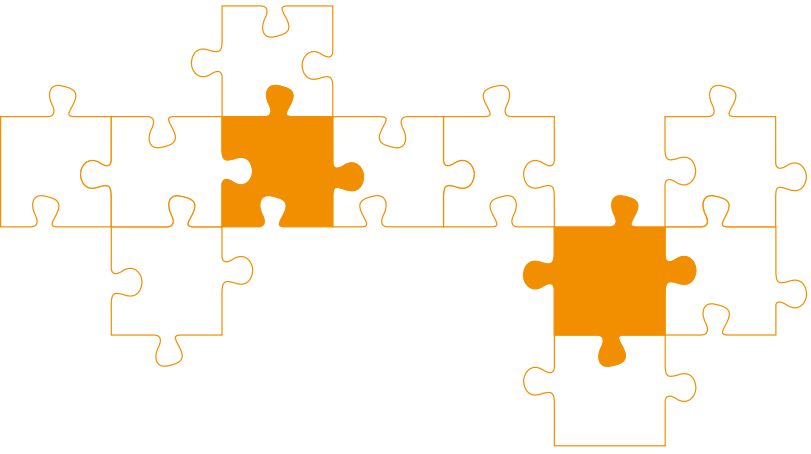
2.2.3 Life Cycle Assessment (LCA)

This involves a more rigorous quantitative process than LCT and is the predominant tool used to substantiate the benefits of LCT for goods and services in terms of environmental impacts. It involves careful *"compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product system throughout its life cycle"* (5) and within a given set of boundary conditions. The ISO 14040 series of standards (5) are the reference source for the life cycle assessment technique and include the requirements for their proper conduct. Impacts assessed include greenhouse gases (see below), acidification, eutrophication, resource depletion, primary energy, waste and toxicity.

Greenhouse Gases / Carbon Footprint
The concept of viewing the environmental impacts described above as a 'footprint' is a popular one. Its use in relation to climate change impacts through a 'carbon footprint' is currently quite widespread. It requires the use of an LCA study.

In relation to a product a 'carbon footprint' is defined as the *"sum of all greenhouse gas emissions occurring at each stage of the product life cycle and within the specified system boundaries of the product"* (7). This includes all emissions that are released as part of all processes involved in obtaining, creating, modifying, transporting, storing, using and disposing of the product.

Carbon footprinting is a way of measuring one of the environmental impact categories which are being assessed during a life cycle assessment. Given the huge potential impact of climate change, it should be seen as a very significant parameter. However it is important to ensure that carbon footprint reductions are not achieved at the expense of other environmental impacts for a product and its packaging in order to avoid simply shifting environmental burdens from one impact category to another as outlined above under 'Life Cycle Thinking'.



2.3 Other Related Definitions

The terms renewable, recovery and recycling are widely used and need to be clearly understood.

2.3.1 Renewable

Work on the definition of this important concept is still in progress. Below is a draft definition which has been proposed as an amendment to ISO Standard 14021 on self-declared environmental claims (4). It should be noted that this text is provided in the form 'Usage of Terms' consistent with ISO 14021, rather than in a strict definition format.

In relation to the provision of materials used as a resource, excluding energy, renewable materials shall meet all of the following requirements:
a) be composed of biomass[4], which can be continually regenerated within a finite timeframe,
b) are replenished at a rate that is equal to or greater than the rate of depletion,
c) from sources that are managed in accordance with the principles of sustainable development, and
d) where a verifiable traceability system is in place.

At the time of writing this draft is going through the ISO development process and may be subject to further revision. The principal source of the ISO proposal is quoted in the Glossary.

2.3.2 Recovery

'Recovery' refers to a variety of waste management operations which divert waste from final disposal (landfill), including recycling, incineration with energy recovery and composting.

The definition from the EU Directive on Waste (2008/98/EC) (8) is:
"'Recovery' means any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy".

2.3.3 Recycling

The definition from the Packaging & Packaging Waste (Directive 94/62/EC) (9) is:
"'Recycling' shall mean the reprocessing in a production process of the waste materials for the original purpose or for other purposes including organic recycling but excluding energy recovery".

The definintion from the EU Directive on Waste (2008/98/EC) (8) is:
"'Recycling' means any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations".

2.3.4 Composting and Biodegradation

These concepts may appear simple at first sight but there are many underlying complex issues associated with each. Before moving forward in any of these areas it is important to seek expert advice.

[4] See Reference (43) for the definition of 'biomass'.

2.4 Legislative Background

EU law now provides a strict framework for packaging.

There is a significant body of European legislation concerning packaging and sustainability and collectively it has a profound impact on the way companies manage packaging. The core legislation is described here and the remainder in the Annex.

2.4.1 Packaging & Packaging Waste (Directive 94/62/EC) (9)

This Directive is a harmonisation measure, meaning that it establishes common rules for packaging to facilitate the free movement of packaging and/or packaged goods throughout the EU. It has twin objectives: to help prevent obstacles to trade and to reduce the environmental impact of packaging.

EU Member States shall:
- Provide the legislative framework to enable and support systems for the collection of waste packaging.
- Ensure that recovery and recycling targets for packaging can be and are met.
- Ensure that packaging meets the 'Essential Requirements' set out in the Directive.
- Permit free movement of packaged goods that comply with the terms of the Directive.

The Essential Requirements of Directive 94/62/EC

The purpose of these can be summarised as:
- to keep packaging weight and volume to the minimum amount needed for the safety, hygiene and consumer acceptance of the packed product;
- to keep noxious or hazardous constituents to a minimum;
- to ensure that packaging can be reused and/or recovered once it has been used.

The monitoring of compliance with these Essential Requirements by EU Member States would provide an effective baseline for demonstrating packaging's contribution to sustainability.

A suite of CEN Standards for demonstrating compliance with the Essential Requirements is published and formally recognised by a European Commission Communication (2005/C 44/13). The standards provide a practical and effective route to compliance. (See the EUROPEN Guide to their use (10)).

Chapter 3: Packaging and Sustainability

Because of its role in protecting products packaging can only be properly evaluated as part of a complete product life cycle.

The issue is not about 'sustainable packaging', but about the role of packaging in sustainability. There is, in fact, no such thing as inherently 'sustainable' packaging. There can only ever be a more sustainable way of manufacturing a certain product.

EUROPEN in its Vision of Packaging's Contribution to Sustainable Development states that packaging should (11):
- be designed holistically with the product in order to optimise overall environmental performance,
- be made from responsibly sourced materials,
- be designed to be effective and safe throughout its life cycle,
- meet market criteria for performance and cost,
- meet consumer choice and expectations, and
- be recovered efficiently after use.

When the above principles are respected, the sustainability impacts of packaging are minimised and the benefits maximised.

The following sections of this Chapter provide detail of how to maximise the contribution of packaging to sustainability along the value chain.

3.1 Packaging's Role in Sustainability

Packaging makes a valuable contribution to economic, environmental and social sustainability through protecting products, preventing waste, enabling efficient business conduct, and by providing consumers with the benefits of the products it contains.

Packaging's contribution to economic, environmental and social sustainability can be illustrated by the fact that in developing countries the lack of packaging or inadequate packaging in distribution causes 30% to 50% of all food to decay before it reaches the consumer (12) (13). In Western Europe, where food is efficiently packed, only 2% to 3% of produced food fails to reach the consumer (14).

Products generally represent far greater resources and have a much higher inherent value than the packaging used to protect them (15) (16) (17). Thus, product losses due to underperforming packaging are likely to cause much greater adverse effects on the environment than the gains made through excessive packaging reduction (16) (17) (18) (19). If in developing countries the average losses in the food supply chain could be reduced through the use of improved packaging from 40% to the European average of 2.5%, the energy consumption associated with food losses would be reduced by more than 50% while also increasing the availability of food.

Improvements to the environmental performance of the packaging must not be allowed to generate larger negative environmental impacts elsewhere in the life cycle of the product.

3.2 Reducing Packaging Environmental Impacts

Attempts to reduce packaging impacts should only be pursued if they maintain or reduce the impacts of the packed product.

Source reduction, reusability and/or recoverability (including recycling) are legal requirements for packaging within the European Union (9). Industry has a long commitment to bring products to consumers at minimal environmental and economic cost (10) (20). A multitude of strategies, including source reduction, material selection and improved compatibility of packaging with existing recycling and recovery schemes are employed to this end. Examples of such improvements and how they were achieved can be found in the INCPEN[5] report 'Packaging Reduction: Doing More with Less' (21).

Such strategies and efforts are a means to optimise the total packed product system and not ends in themselves.

A growing body of scientific evidence, such as the research summarised in **Figure 2** below, shows that a systematic approach that addresses the entire packed product system is essential in order to ensure that individual improvements contribute to overall product sustainability.

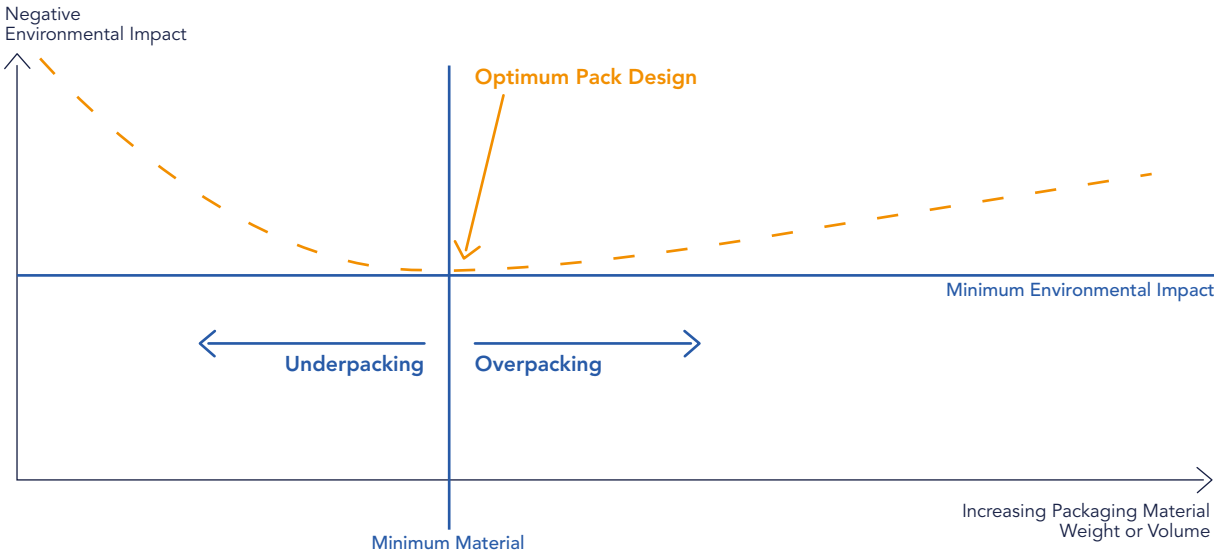


Figure 2: Optimum Packaging

The Innventia AB (formerly STFI Packforsk[6]) model shows that the environmental consequences of product losses caused by excessive packaging reduction are far greater than guaranteeing adequate protection through an incremental excess of packaging (16).

[5] INCPEN = Industry Council for Packaging and the Environment (UK industry body)

[6] Innventia AB is a major Sweden-based R&D company in the fields of pulp, paper, graphics media, packaging and biorefining.

3.3 Sustainability Along the Packaging Value Chain

To make a positive difference a holistic approach along the entire packaging value chain is needed.

The packaging life cycle consists of many steps, from raw materials sourcing to recovery or disposal. A well designed pack is a tool of sustainability which can help prevent waste, optimise the use of resources and contribute to a more sustainable development throughout that cycle. It does that while fulfilling its fundamental functions set out in **Table 1** on page 7. The following sections address each part of the supply chain.

3.3.1 Raw Material Sourcing

Sustainability is about equitable resource management for future generations. Management strategies must be established for the base materials and for the converted stock in the product cycle (22). A growing global population coupled with increased per capita consumption is placing increasing pressure on existing resources. It is therefore becoming increasingly urgent to define efficient resource management strategies adapted to the nature of individual resources based on the common principles for resource management, conservation and restoration. This is equally important for materials from biomass, from fossil reserves, from minerals and from metals.

3.3.2 Packaging Material Manufacture and Conversion

Inefficient production of packaging costs more and causes greater environmental impact, be it for packaging manufacturers or for their customers. Sustainable production can reduce costs (e.g. of energy) and contributes to improving the environmental performance of products (14). Therefore packaging manufacturers have implemented environmental management systems that continuously help to reduce operational costs and the environmental footprint of their production processes[7].

3.3.3 Packaged Goods Manufacturing

The packaging of goods improves operational efficiency, allows faster and more efficient packing and filling operations and reduces product losses. Beyond this, packaged goods manufacturers manage the environmental performance of their operations through environmental management systems and a commitment to continuous improvement.

3.3.4 Distributing

Sustainability in logistics and distribution is primarily about preventing damage to goods and ensuring that use of resources such as trucks, trains, short sea shipping and storage facilities is optimised.

The stability of secondary and tertiary packaging serves to prevent product damage and is linked directly to sustainable consumption through delivering the packaged product in an acceptable condition to retail premises and then to consumers.

Trucks should carry their maximum volume capacity, normally achieved through modifications of pack dimensions so that they closely fit the pallet. That optimisation may be limited by the load carrying capacity of the pallet and truck. The use of modular standards can help improve inefficient cube utilisation caused by irregular height pallets on mixed product shipments[8] (23) (24).

[7] The Essential Requirements of Directive 94/62/EC (see page 16) refer equally to the manufacturing stage of packaging.

[8] For more information on volume efficiency of packaging, see the Phase I Report of the European Shopping Baskets Program, www.europeanshoppingbaskets.org

3.3.5 Retailing

Designing a pack that is robust enough to withstand distribution stresses yet easy to open and easily displayed on shelf while minimising environmental impact represents a significant challenge. There is an increased demand by retailers to optimise retail operations and provide better consumer shopping value. Shelf Ready Packaging (SRP) is one means to this end (for more detail and standards see the report from ECR Europe and Accenture (24)).

A challenge for packaging is to remain attractive and consistent with brand concept and image as well as the retailers' store image while minimizing its environmental impact. The right balance has to be found between the various requirements of marketing and the environmental impact of packaging and promotional items.

3.3.6 Consumption

The impact of consumption on sustainability can be huge and is not always recognized. For example, the trend in developed societies for smaller families and the growth in the number of people living alone have led to a rapid growth in the market for ready-made meals and smaller portions of many packaged goods.

Clearly, smaller portions mean smaller packages – and more packaging per unit of consumption. Yet it would be wrong for this reason to encourage these consumers to buy bigger packages as this could lead to increased product wastage and thus to a much greater environmental impact.

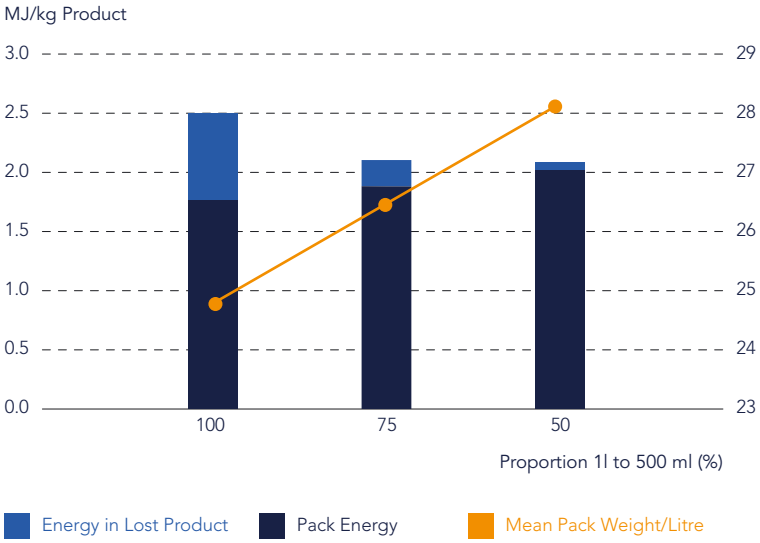


Figure 3: Balancing Pack and Product Loss Impacts (16)

Optimising packaging from a sustainability perspective may result in higher costs (e.g. for necessary research and development activities) and thus have an initial negative effect on the product's price. But as optimisation in many cases means consumers are consuming less and thus throwing away fewer resources, the overall economic and environmental impacts will most likely be reduced.

Leading companies recognise that there is an opportunity for all members of the packaging chain to educate consumers about packaging and to develop a positive platform from which to promote individual competitive interests. For this to succeed, industry will need to agree common messages supported by common measures.

3.3.7 Collection of Post-Use Packaging

To be efficient and environmentally sound, all recovery systems need to achieve high collection rates of packaging waste. But that depends on a range of factors outside the packaging supply chain's control. Consumer awareness, local demographics and the availability of efficient recovery and recycling technologies all influence the final result. That means that the collection and management of packaging waste has to be designed differently in different regions. For example, the separate collection of plastics, paper, glass and metals may be less sustainable than unitary collection in areas where efficient industrial waste sorting facilities exist.

The variations in performance of collection schemes often correlates with complaints of a lack of information or of confusion. Companies in the packaging value chain need to support higher awareness by participating or initiating education campaigns.

Politicians, municipalities, waste management companies, retailers, brandowners and packaging manufacturers must together design the most appropriate solution in any given region.

3.3.8 Reuse, Recovery (25) and Disposal

A central goal of the European Union's Waste Framework Directive (2008/98/EC) is to prevent and reduce the generation of waste. Given that packaging prevents product wastage, it is making a significant contribution to that goal.

Reusing packaging (26) (27) under Article 5 of the Packaging and Packaging Waste Directive means that it is returned to the packing plant and refilled. It should withstand a number of such rotations within its life cycle before being recovered when it can no longer be used. There is no general preference for reusable or non-reusable packaging; the choice depends entirely on the local supply chain and market.

Recycling plays a key role in the environmental performance of many materials. For example recycling aluminium saves up to 95% of the energy required for virgin materials (28), recycling PET[9] saves around 50% of the energy (29). Recycling should be adopted where it results in lower environmental impacts than alternative recovery options and where other requirements, such as safety, are met (30).

Some types of recovered material are also a valuable source of energy (incineration with energy recovery). Therefore recycling needs to be considered within a balanced approach to packaging **recovery**.

The optimal balance between recycling and energy recovery varies enormously with the composition of the waste. For example, the optimal balance for general waste lies at 70% recycling or composting and 25% energy recovery (31). By contrast, for light-weight plastic packaging materials, the optimum balance lies at 15% recycling with 85% energy recovery. This, as it happens, is close to the ratios found in Switzerland, Sweden, Austria, Denmark and the Netherlands (32).

There is no unique solution for managing packaging waste. The best mix of options depends on local conditions, especially the demographics and the degree of investment made in modern processing systems. Determining the best mix of options for managing packaging waste thus requires a detailed case-by-case analysis, where life cycle assessments can give valuable decision support.

[9] PET = polyethylene terephthalate (type of plastic mainly used for bottles and trays)

Chapter 4: Practical Advice

It is important when offering advice to first recognise and publicly communicate the significant and positive contribution that companies have made over the past two decades to improve the environmental performance of packaging. Growth in packaging consumption has now been decoupled from growth in GDP (see Appendix 2.2). The packaged goods supply chain must ensure that this good work continues and that increased pressure to be 'sustainable' does not result in counter-productive responses.

4.1 Corporate Policies and Strategies

Packaging has a unique role in the economy in that its value is only apparent when it is partnered with the product it is designed to pack. Talking of 'sustainable packaging' therefore makes little sense. Packaging is part of a whole and it is that whole, which can be made more sustainable. Despite this, some policies still look at packaging in isolation.

As the net impact of packaging depends on the nature of the product and on the desired functions of the packaging, corporate strategies will vary from company to company. (The following bulleted lists are intended as examples, not best practice.)

A well-designed corporate sustainability strategy should:
- Be part of your overall corporate strategy.
- Be reflective of your vision statement.
- Be part of your mission statement.
- Instil values through the company's culture to deliver this strategy.
- Have leadership commitment and be supported with appropriate resource and processes.
- Focus on areas where the company can have a real impact.

This means:
- Continuous review of current systems, programmes, strategies.
- Avoiding hasty jumps onto fashionable bandwagons, and the temptation to develop illusory 'solutions' which look good but have little real impact.
- Not allowing unfounded perceptions of consumers and others such as the media to dictate how companies respond[10].
- Developing measures relevant to your operations.
- Developing and agreeing measures consistent and relevant to your industry[11].

[10] There is an opportunity here for all members of the packaging chain to be proactive in educating consumers about the true value of packaging in general and in developing a positive platform from which to promote individual competitive interests. For this to succeed, the industry will need to agree common messages supported by common measures.

[11] A collaborative understanding of your industry's impact on sustainability will be critical here, but this is not to say that you cannot lead by example when it is the right thing to do.

4.2 How to Build a Sustainability Strategy for Packaging

The Deming PDCA cycle – Plan, Do, Check, Act (33) (34) – is a valuable tool for promoting change and continuous improvement. This model can guide the process of developing a sustainability strategy. It is intended to be a repeated and continuous cycle.

- **PLAN**. Recognise an opportunity and plan ahead for change. Design or revise business process components to improve results.
- **DO** it. Execute the plan, taking small steps in controlled circumstances and measure its performance.
- **CHECK** (study). Study the results. Assess the measurements and report the results to decision makers.
- **ACT**. Take action to standardise and continually improve process performance. Repeat the cycle.

PLAN – Here are some suggestions of things to consider in the planning phase.

4.2.1 Check Legal Requirements and Ensure Compliance

Whilst many aspects of the strategy are open for companies to develop according to their own views and principles there are certain fundamental principles to be adhered to. These principles have become mandatory and are contained in the following legislation. Any part of the planning phase must specifically refer back to this legislation to ensure that these requirements are being adhered to.

(a) Essential Requirements

The first step must be to ensure that packaging complies with EU Directive 94/62/EC on packaging and packaging waste (as transposed into the national laws of the EU Member States) (48), in particular the Essential Requirements and heavy metals limits (see Chapter 2).

(b) Standards on Packaging and Environment

Companies are free to choose how they demonstrate compliance with the Essential Requirements. However, a suite of European (CEN) Standards (see Chapter 2 and Appendix 1.4) has been developed specifically for this purpose. Use of the Standards is voluntary but a key advantage of using them is that packaging that conforms to the Standards is automatically assumed to comply with the Essential Requirements.

The Standards are designed to be incorporated into a company's management systems and to encourage continuous improvement. Before developing a detailed sustainability strategy for packaging, following the Standards is a valuable first step which will ensure that:

- the minimum amount of packaging necessary is used to protect the product, while ensuring that it still meets consumer expectations;
- packaging is recoverable by recycling, composting and/or energy recovery, and reusable if reuse is intended;
- heavy metals content in packaging is kept to a minimum;
- all steps necessary for compliance with the Essential Requirements are followed.

EUROPEN has published a guide to using the Standards (10).

ACTION:

- Take measures to ensure packaging complies with the Essential Requirements.
- Consider using the European (CEN) Standards for packaging and environment to:
  (a) demonstrate compliance with the Essential Requirements, and
  (b) help you take a first step towards implementing a sustainability strategy.

4.2.2 Measure the Impact of Packaging in your Business

Whilst complying with the law and accepted standards represent the most fundamental principles in strategy development there are other principles that are nearly as fundamental. The most important of these is that targets should measurable against key benchmarks. Only if these targets are properly established will it be possible for an effective strategy cycle to exist.

- It is always tempting to measure what is easiest to measure, and that is usually what is under the company's direct control. However that may not always be the most useful measurement.
- Measures should be taken on metrics where a business has the biggest impact and where a company could make a difference. Since every company is tightly integrated into a complex supply-chain, that may be outside its own areas of operation. The corporate challenge, therefore, will often be to influence or educate suppliers, customers and/or the consumer to change their processes or behaviours.

Take for example a manufacturer whose profitability depends on the number of facings his product is allowed on the supermarket shelf. This may or may not necessarily give him the optimal fit on full truck loads. This could also have an impact on the efficiency of production. To understand where the impact lies, communication and transparency across the value chain are vital.

There may also be different priorities in different regions. Even in a theoretically homogeneous market such as Europe, approaches to matters such as packaging recovery are highly diverse and often heavily influenced by population density. There is no substitute for considering all markets for a product and taking hard decisions over selecting the appropriate sustainability measures.

- Using a single metric can lead to unintended poor outcomes elsewhere, so a comprehensive, justified and consistent selection of a relevant combination of different measures is recommended as best practice (5).

Some possible measures are shown in **Figure 4** below, overlaid on whichever one of the sustainability pillars they affect. Note that some measures are related to more than one of the sustainability pillars, and some overlap. Leading companies will use their data in evaluation tools to determine if they are making improvements and allow them to compare their packaging options.

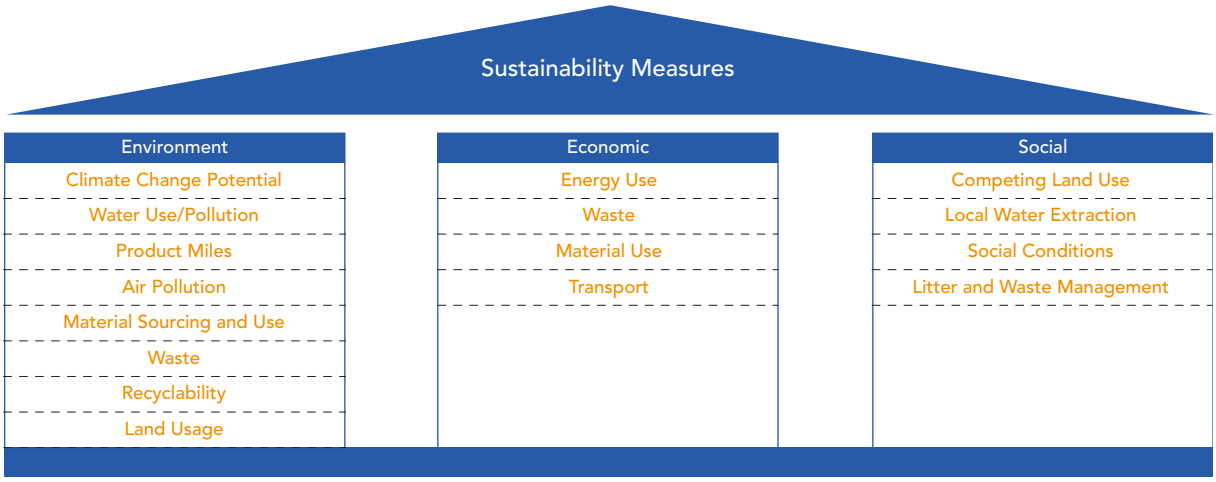
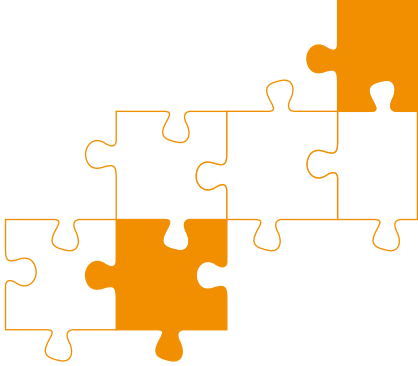


Figure 4: Examples of Measures of Sustainable Development



It should be noted that the Global CEO Forum (an ad-hoc grouping of CEOs of major retailers and brand owners) has called for the establishment of common definitions and a set of principles for measuring sustainability as it relates to packaging. More details of the project will be found on the EUROPEN website www.europen.be and on the ECR Europe website www.ecrnet.org.

ACTION:

- Assess the impact of packaging: understand what should be measured, how it can be measured, and how it relates to those up and down the supply chain.
- Talk up and down the supply chain, work with industry associations, small business associations to remove the barriers to finding the best overall solution.

Below you will find methods specific to measuring environmental, economic and social impacts so that your overall assessment covers the three pillars of sustainable development.

(a) Measure Environmental Impacts – Use of Life Cycle Analysis

Conducting a life cycle analysis (LCA) provides one of most holistic approaches to understanding the environmental impact of your product. Again it should be used to feed back into the strategy cycle to measure and evaluate progress on an ongoing basis.

Life cycle analyses help to structure and understand the complexity of environmental sustainability along the entire life cycle of a product. They allow the user to identify potential environmental burdens at various points and to avoid shifting burden from one life cycle stage or individual process to another. LCA is generally practiced at two levels:

- screening LCAs make use of average data and reasonable estimates to calculate a smaller range of environmental impacts with results available within a matter of weeks;
- detailed LCAs pay great attention to data quality and sensitivity studies and a wider range of impact categories is generally considered. Detailed LCAs can take several months to complete.

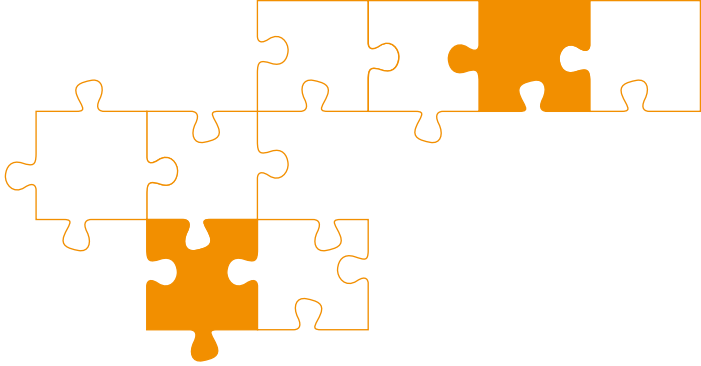
LCAs meeting the requirements of ISO 14044 (51) can support comparative environmental claims.

LCA Tools

Completing an LCA can be resource-intensive and expensive. Effective application of conventional LCA software requires regular use and a great deal of methodological know-how. For these reasons many companies make use of external consultants who offer LCA as a service.
A list can be found at http://lca.jrc.ec.europa.eu/lcainfohub/index.vm.

A growing number of streamlined LCA tools provide indicative input on the 'environmental profile' of a package. These are typically offered by LCA consultants or LCA software providers, and usually feature a simple industry-specific user-interface and reporting based on a limited set of indicators, with results available in real-time after the inputs are provided.

Such tailor made interfaces allow design and manufacturing professionals to perform life cycle assessment without the involvement of an expert but as there is currently little consistency between them, such tools should be used with a clear understanding of their limitations. However, they do represent a good way to obtain initial directional understanding of the environmental impact of one product option versus another and can be useful for raising awareness internally and steering early option analysis.



The future for these tools is for common metrics, common data sets and common LCA methodology to be used such that faster, cheaper and more reliable results will be broadly available at an earlier project phase than at present.

Practical Tips for LCA (35)

1. Consider requesting a screening LCA as a first step. For internal decision-making a screening LCA will often suffice to give a first indication of which component or life cycle step is a major contributor to overall impacts. It is useful for internal understanding and communication. A screening study is also the first step towards a full 'ISO LCA' – a more detailed process with corresponding higher costs and lead time.
2. The primary phase of an LCA defines very clearly the products in question, the study objectives (functional units) and the scope (boundary conditions). This is the area where most LCAs fall down. Time should be spent on getting this right. Products that are compared should have an equivalent function. Ensure the boundary conditions and measures that have been selected are directly related to your corporate objectives, and that you are clear how the results will be used before studies start.
3. Assure yourself that the data employed in the model are the best that can be obtained. Reliable, credible data sources are the basis for reliable credible results. Potential sources of data other than LCA databases[12] and your own data are:
   a. Packaging raw material industry associations: often provide good standard input data for the life cycle assessment of specific materials. Bear in mind however that they represent views and assumptions that may suit the needs of that particular material or industry group.
   b. National government statistics: data on waste, recycling and recovery are published by many countries, as are carbon emissions per unit of national grid electricity.
   c. Official EU statistics: data on recovery and recycling rates are available from Eurostat (www.ec.europa.eu/eurostat) or indirectly from EUROPEN (www.europen.be).
   d. Issue sites and NGO sites: organisations such as the WWF, the Rain Forest Alliance, The Carbon Trust and waterfootprint.org can also be useful sources of data – but be aware that they promote a particular viewpoint.
4. To get meaningful and comparable outputs from a more detailed LCA it is recommended to follow the relevant European and International standards (CEN 13910 and ISO 14040 series) (35) (5).

ACTIONS:

- Consider conducting an LCA to understand the environmental impact of your packaging or packaged product.
- Begin by building an understanding of which LCA screening tools are available and what value they could add to your organisation.
- Consider using them to raise awareness of LCT in your organisation and help you conduct better option analysis early in a project.
- Support industry efforts to consolidate LCA screening tools such that they can be used with confidence and provide better value LCA screening to all stakeholders in the packaging supply chain.
- For a detailed LCA, ensure that boundary conditions, functional units and data are carefully compiled and consider following relevant European and international standards.

Communicating Carbon Footprint Information

Concerns over climate change mean that communicating the carbon footprint of products is increasingly under discussion. As explained in Section 2.2.3, the use of a single indicator raises a number of important concerns.

[12] There are currently many LCA databases compiled on different bases that can make them confusing to use. The EU currently has a working group that is discussing the creation of a standardised European database.

However, if it is decided to communicate a carbon footprint, then a number of rules should be respected:

- The data quoted should be for the product and packaging together, not for the packaging alone.
- The data disclosed should be calculated on the basis of internationally recognised standards, be transparent and be peer reviewed according to ISO 14044 (51).
- It should be made clear to the consumer that the objective of the communication is to show progressive improvement for a given product rather than an isolated, one-off number.
- It should be emphasised that the provision of carbon footprint data is only a first step in providing environmental impact information to consumers and comparison with the carbon footprints of other products may not be meaningful due to differences in methodologies and the statistical margin of error.

When the above rules are followed, the carbon footprint communication can provide consumers with objective information on the producer's commitment to reducing the environmental impact of his products. Ideally, such a communication will fit within the context of a wider programme of consumer education.

(b) Measuring Economic Impacts

Economic metrics for the cost and benefit of incorporating sustainability within your corporate strategy are generally easier to develop, more quantitative and therefore more objectively measurable than social and environmental impacts. Such measures are particularly important at the PLAN phase to ensure that the strategy will be implementable. Examples of economic indicators could include:

- Product profitability
- Changes in insurance cost
- Logistical efficiency
- Product availability
- Your share price

Optimising packaging may require investment. Over time, however, a positive return can be expected since optimal packaging minimises waste and resource consumption. This offers companies a ready guide to evaluate their sustainability decisions.

(c) Measuring Social Impacts

Social measures may need a different and less numerical data approach. An example of a tool for this is the SEDEX Self Assessment Questionnaire[13] which can give both a standardised and detailed audit of aspects for the social pillar. This tool can also be used for assessing the social performance of suppliers.

Examples of other social indicators could include:

- Adherence to labour laws
- Performance of health and safety management systems
- Health and safety impacts
- Impacts on surrounding communities

Again these measures are particularly important at the PLAN phase.

4.2.3 Set Targets

Once you have evaluated the sustainability impact of packaging on your operations and identified where you should concentrate your efforts it is then important to set corporate targets to improve this position. When setting targets consider the following:

- Standing still is falling behind – sustainability is a competitive issue.
- It is best practice to foster improvements though the whole product life cycle.
- Packaging sustainability targets should not be set in isolation – packaging should be part of a product's sustainability profile which in turn contributes to a company's sustainability goals.
- Targets should be SMART – specific, measurable, achievable, realistic and time based.
- Senior management engagement is crucial to support delivery of these targets.

[13] SEDEX = Supplier Ethical Data Exchange. A member based organisation: www.sedex.org.uk

4.2.4 Choose Key Performance Indicators (KPIs)

Ensure that there is a clear understanding of how one KPI might relate to another. For example a KPI based on material weight will often produce a different ranking from a life-cycle based indicator such as energy or climate change; and one based on recycling a different ranking from one embracing all forms of recovery. It is essential to understand how these stand relative to companies' priorities.

Be aware of the cost implications of choosing a given resource-oriented KPI. For the time being at least, our use of resources judged to be most sustainable may result in limited supply giving rise to potential supply security issues.

KPIs are often expressed per unit of consumption, per gram of product or per dose. Before adopting such factors always have them tested against real examples to ensure they promote the type of improvement you seek to achieve.

Follow the guidance set out by this document while allowing packaging technologists to choose the best packaging material and system for purpose (including consumer appeal, function and economics).

DO – The launch of this phase may vary from company to company depending on the changes being minor or radical paradigm shifts. Either way, ensure that appropriate resources, processes and systems are in place to deliver the strategy and to meet the targets which have been set. Support your resources through training and development of systems and introduce the programme.

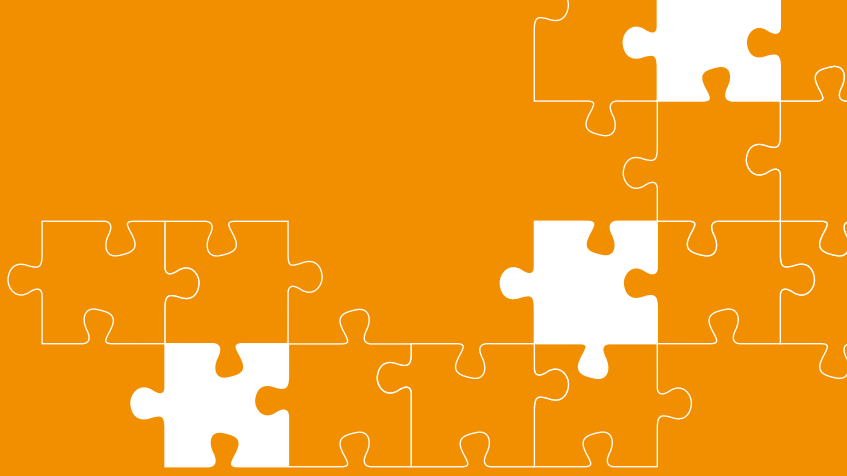
CHECK – Once you have put your strategy in place, ensure regular reviews are conducted to check the validity of your targets. Monitor and measure performance and share this information internally or externally. This will allow greater transparency of objectives and possible improvement during the course of the sustainability journey through shared knowledge.

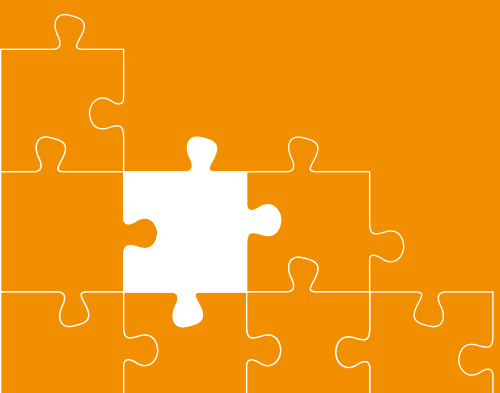
ACT – This phase should take the learnings from the CHECK phase and address the effectiveness of your sustainability systems. During this phase ACT to determine whether your policies, objectives or other systems are relevant to your goals and repeat the cycle for continuous improvement.

4.3 Conclusions

Avoid short term 'sustainability' fads and take a balanced long-term view. Ignoring this advice just to make 'green' claims or to meet single issue KPIs is likely to lead to sub-optimal packaging, consumer disappointment, and to damage your corporate reputation. Strive for continuous improvement and review your strategy and targets periodically to ensure they still drive true sustainability.

Taking the time and effort to develop sustainability will protect the future of your business, enhance the reputation of your company or brands, and build trust with your customers – sustainability is good business.





Appendices

Appendix 1: Further Reading

1.1 Europe Publications (related to packaging)

See: www.ecrnet.org>Publications

- **The ECR Europe sustainable transport roadmap and self assessment tool** by ECR Europe & Boxwood (2008)
- **Shelf Ready Packaging (Retail Ready Packaging) – Addressing the challenge: a comprehensive guide for a collaborative approach** by ECR Europe and Accenture (2006)
- **Optimal Shelf Availability – Increasing shopper satisfaction at the moment of truth** by Roland Berger Strategy Consultants (2003)
- **Reusable Transport Items – Organisational recommendations** by Centrale für Co-organisation – CCG (2003)
- **International Council for RTI – Recommendation for the Compatible Stacking of Crates** by Centrale für Coorganisation (2001)
- **Efficient Unit Loads** by A.T. Kearney (1997)

1.2 EUROPEN Publications

See: www.europen.be

- **European and National Legislation on Packaging and the Environment**, 2007, 95 pages. Printed copy € 135, electronic copy € 125.
- **Essential Requirements for Packaging in Europe – A Practical Guide to Using the CEN Standards**, 2005, 70 pages. Printed copy € 160, electronic copy € 150.
- **Understanding the CEN Standards on Packaging and the Environment: Some Questions and Answers**, 2006, 24 pages. Also available in French and Dutch.
- **Economic Instruments in Packaging and Packaging Waste Policy**, 2007, 52 pages. Printed copy € 25, electronic copy € 20.
- **The Impact of REACH on the Packaging Supply Chain**, 2007, 12 pages. Electronic copy € 25.
- **Life-Cycle Assessment (LCA) – Guidance for Packaging Chain Companies,** 2001, 5 pages.

1.3 EUROPEN Position Papers

- **The EU Packaging and Packaging Waste Directive: Implementation and Impact: Comments and recommendations from EUROPEN based on two studies conducted for the European Commission**. 2006, 8 pages.
- **Reuse Quotas and Product Specific Targets for Packaging**, 2005, 3 pages.
- **A Fair Deal for Packaging**, 2003, 4 pages. Also available in French and German. (A revised version is due out in Autumn 2009).
- **Mandatory Deposits in Germany – economic, environmental and social effects**, 2004, 34 pages. Executive summary available, 3 pages.
- **Effectiveness of Packaging Waste Management Systems in 5 Selected Countries: Comments on EEA Report No. 3/2005**, 2005, 3 pages.
- **A Flexible Approach to the Waste Management Hierarchy: lessons from ten years of packaging waste management**, 2006, 2 pages.
- **Better Regulation**:
  - **Functioning and Improvement of the 98/34 Notification Procedure**, 2006, 4 pages.
  - **Improving the Effectiveness and Transparency of the EU Infringement Procedure**, 2006, 5 pages.
  - **Compliance with Definitions as Key to Better Regulation**, 2006, 1 page.
- **Use of LCA as a Policy Tool in the Field of Sustainable Packaging Waste Management**, 1999, 4 pages.

1.4 CEN Standards and Reports for Packaging and Environment

- EN 13427:2004 Requirements for the use of European Standards in the field of packaging and packaging waste.
- EN 13428:2004 Requirements specific to manufacturing and composition – Prevention by source reduction
- EN 13429:2004 Reuse

- EN 13430:2004 Requirements for packaging recoverable by material recycling
- EN 13431:2004 Requirements for packaging recoverable in the form of energy, including specification of minimum inferior calorific value
- EN 13432:2000 Requirements for packaging recoverable through composting and biodegradation – test scheme and evaluation for the final acceptance of packaging
- CR13695-1:2000 Requirements for measuring and verifying the four heavy metals present in packaging
- TR13695-2:2004 Requirements for measuring and verifying dangerous substances present in packaging, and their release into the environment

1.5 Publications from Other Bodies

Non-exhaustive List of Packaging Design Guides with a Focus on Environmental/Sustainability Elements

- **Packguide: A Guide to Packaging Eco-Design**. Envirowise/INCPEN, August 2008.
- **Packaging design for the environment: reducing costs and quantities**. Envirowise, revised February 2008
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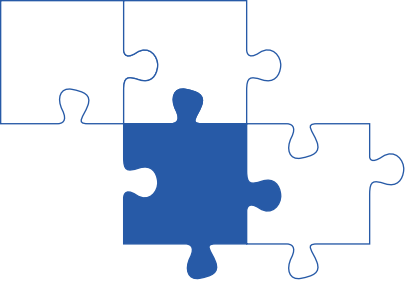


1.6 Additional Relevant Legislation

Waste Framework Directive (Directive 2008/98/EC) (8)
The 'umbrella' law for EU waste legislation. It has been revised and updated in line with the EU Thematic Strategies on prevention and recycling of waste, and on the sustainable use of natural resources. Note, however, that packaging is regulated first and foremost by the Packaging and Packaging Waste Directive, which takes precedence over the Waste Framework Directive.

REACH (Regulation (EC) No. 1907/2006) (44)
REACH came into force in June 2007. It is a European Union Regulation concerning the Registration, Evaluation, Authorisation and restriction of Chemicals, including those contained in packaging materials.

Materials and Articles Intended to Come into Contact with Food (Regulation (EC) No. 1935/2004) (45)
Establishes requirements for any material or article intended to come into contact directly or indirectly with food and seeks to maintain food safety.

Good Manufacturing Practice for Materials and Articles Intended to Come into Contact with Food (Regulation (EC) No. 2023/2006) (46)
Lays down the rules on good manufacturing practice (GMP) for the groups of materials and articles intended to come into contact with food.

General Product Safety (Directive 2001/95/EC) (49)
Intended to ensure a high level of product safety throughout the EU for consumer products that are not covered by specific sector legislation or in instances where such legislation does not cover certain issues.

General Principles and Requirements of Food Law (Regulation (EC) No. 178/2002) (50)
Establishes the European Food Safety Authority and lays down procedures in matters of food safety (14).

EU Sustainable Consumption & Production and Sustainable Industrial Policy (47)
Action Plan containing legislative and non-legislative proposals seeking to minimise the environmental impacts of products by looking at all phases of their life-cycle and taking action where it is most effective. Its core goals are to:
- Improve product energy and environmental performance targets
- Foster their uptake by consumers
- Set standards and incentives and public procurement policy
- Define labelling requirements
- 'Green' and lean supply chains

Other Legislation
As well as European legislation there is a significant body of legislation enacted by individual member states. The EUROPEN publication *European and National Legislation on Packaging and the Environment* covers this in greater depth (48).

1.7 Actions Cited by Major Companies

Most major companies in their reporting put forward examples of actions that are being taken to advance sustainability within the company. The following are examples adapted from the sustainability reports of a number of large FMCG and retail companies:

General actions
- *"Engage employees to build sustainability thinking and practices into their everyday work, foster this environmental awareness and responsibility through training programmes;"*
- *"Set turnover goals for the introduction of sustainable innovation products;"*
- *"Set concrete goals to reduce CO_2 emissions, energy and water consumption, raw materials from sustainable sources and disposed waste per unit of production;"*
- *"Consider environmental impact studies prior to approving major product launches;"*
- *"Share environmental information with governments, local communities, industry, consumers and other*

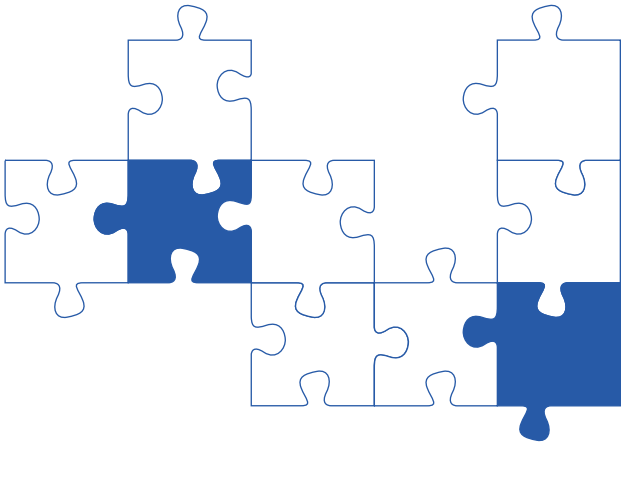
interested stakeholders and work with peers to build wide environmental understanding;"
- *"Set goals to reduce the whole life carbon footprint of products and the other environmental impacts;"*
- *"Institute environmentally sound production techniques and sourcing criteria for raw materials;"*
- *"Utilize best practice information across industries for your organization."*

Packaging-specific actions
- *"Communicate information on packaging and recycling on the package;"*
- *"Eliminate components that add weight or complexity whenever possible;"*
- *"Commit to reducing the environmental impact of packaging, without jeopardising the safety, quality or consumer acceptance of its contents;"*
- *"Minimise headspace within packages;"*
- *"Use the lowest possible weight packaging systems (providing they can be suitably managed when emptied);"*
- *"Decrease packaging waste at all stages, including package manufacturing, utilisation and disposal;"*
- *"Avoid the use of substances that can adversely impact the environment during packaging production and disposal;"*
- *"Develop a holistic approach that considers packaging performance and environmental impact across the supply chain. Select and develop packaging and packaging formats that fulfil the needs of the supply chain and do not create extra waste and environmental impact elsewhere;"*
- *"Maximise the use of recycled material in place of virgin material for secondary and tertiary packaging and where appropriate for primary packaging;"*
- *"Maximise opportunities for recovery through reuse, recycling, energy recovery from waste to avoid disposal to landfill;"*
- *"Increase the recycle-ability and compatibility of packages with existing waste management schemes;"*
- *"Take into account new packaging materials and processes that reduce the impact on the environment;"*
- *"Support industrial and governmental efforts to promote integrated waste management;"*
- *"Develop and track changes in SP for inclusion in CSR reporting;"*
- *"Maximise the use of renewable materials from sustainably managed sources where appropriate."*

Disclaimer

This representative list of further reading material has been compiled from the wide range of publications available on the subject. It is intended solely to assist the reader in further exploring the topics covered within this document. It is not intended to be a comprehensive list and many other valuable documents that exist on the subject are not listed here.

Inclusion in this list does not imply that the views, opinions or advice contained within these documents are endorsed by EUROPEN, ECR Europe, the company representatives or consultant involved in compiling the document. Equally exclusion from the list does not imply that an excluded document is in any way less valuable or authoritative than any included document.



Appendix 2: Fast Facts about Packaging

2.1 Packaging and Waste Management

- According to figures from the EU packaging represents 17% of household waste and 5% of landfill waste (38).
- Between 1998 and 2006 GDP in the EU-15 grew by 40% but the amount of (non-wood) packaging placed on the market grew by only 11% and the amount of this packaging sent to final disposal actually fell by 33% (39). Packaging is less than 3% of solid waste and 60% of it is recovered and recycled each year (32).

Table 3: Packaging and Packaging Waste Data: EU-27 + Norway (2006)

			Overall Rates		Recycling Rates by Material				
	Packaging consumption (kg per person) (1) (2)	Packaging waste (kg per person) (2) (3)	Recovered (%)	Recycled (%)	Glass (%) (4)	Metal (%)	Paper & Board (%)	Plastics (%)	Wood (%) (5)
EU-27 Average	139	41	13	56	60	66	75	26	38
Austria	132	13	19	68	84	59	87	36	16
Belgium	140	9	15	79	100	93	89	39	64
Bulgaria	46	30	0	30	56	4	46	17	0
Cyprus	73	55	0	25	6	80	35	15	29
Czech Republic	78	20	5	63	71	47	91	44	21
Denmark	159	1	38	56	115	63	62	20	34
Estonia	104	54	5	45	48	55	55	33	17
Finland	90	22	28	49	75	58	86	15	8
France	164	44	9	55	60	65	84	19	20
Germany	164	17	23	66	82	89	80	38	29
Greece	90	52	0	43	25	47	70	10	58
Hungary	70	29	2	49	21	64	94	20	20
Ireland	217	104	3	55	62	45	74	20	77
Italy	159	53	10	55	59	64	67	27	53
Latvia	90	51	4	43	32	35	59	28	44
Lithuania	70	41	1	37	30	58	59	26	19
Luxembourg	205	17	33	59	78	83	72	32	33
Malta	96	86	0	11	10	8	13	0	20
Netherlands	177	20	29	60	77	83	72	24	39
Norway	105	12	19	70	105	69	83	30	0
Poland	83	49	11	37	34	44	51	25	16
Portugal	156	71	5	51	46	61	68	15	66

			Overall Rates		Recycling Rates by Material				
Romania	52	32	7	29	8	78	56	17	3
Slovakia	53	31	3	36	14	21	61	40	0
Slovenia	84	43	6	40	39	17	67	38	6
Spain	161	62	7	54	51	62	71	22	50
Sweden	124	30	23	58	91	71	72	44	17
United Kingdom	154	60	5	58	51	53	80	22	73

The above table is produced using data from Eurostat.
(1) Per capita consumption data needs to be treated with caution as Member States do not all use the same methodology to calculate packaging placed on the market.
(2) Excluding wood packaging.
(3) Packaging waste refers to packaging sent to final disposal, i.e. landfill or incineration without energy recovery.
(4) Three Member States have reported glass recycling rates of 100% or more, meaning that more glass packaging was recycled than was placed on the market. This may be partly attributable to free-riding (packaging placed on the market but not reported in official statistics) but also to high levels of personal imports of products in glass packaging from one country to another (meaning it is reported as placed on the market in one country, but reported as being recycled in another).
(5) Member States' data on wood recycling tends to be inconsistent because of the fine distinction between recycling and reuse, especially for wooden pallets. Also, in Northern Europe broken pallets are often incinerated rather than repaired because they are drier than forestry waste and are prefereable as incinerator feedstock, or are burned as a source of domestic fuel in wood-burning stoves.

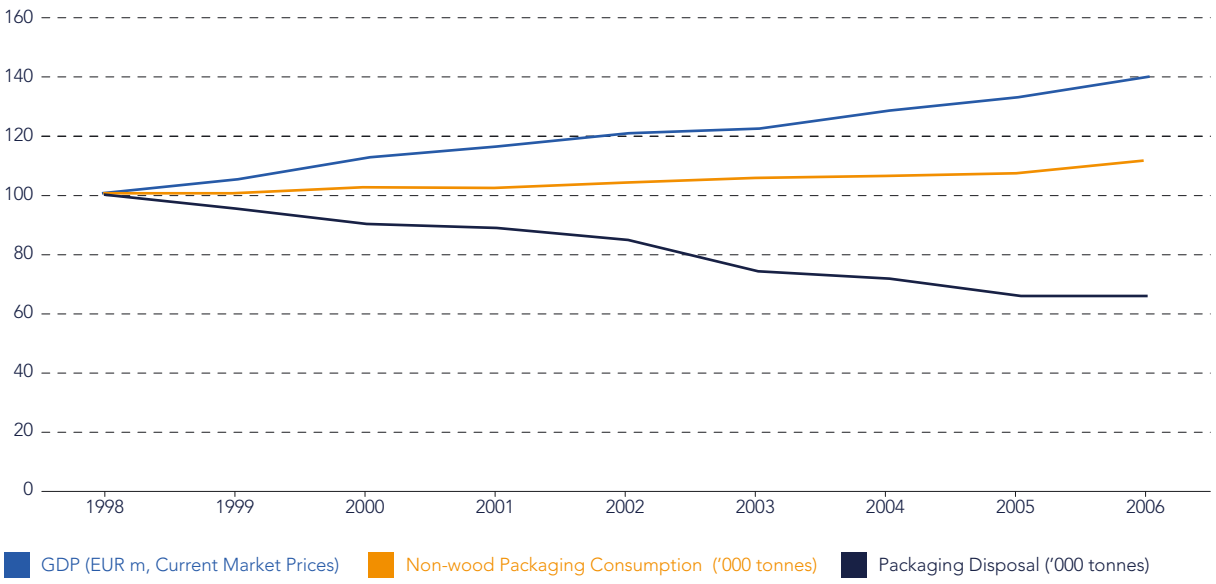


Figure 5: Trends in GDP, packaging consumption and packaging disposal in EU-15, 1998-2006

As the previous figure shows, packaging production and packaging waste disposal have clearly been decoupled from economic growth in EU-15. Despite a 40% increase in GDP between 1998 and 2006, an ageing population and a trend throughout Europe toward smaller households, all of which lead to the purchase of a greater number of packaged goods, the amount of non-wood packaging placed on the market rose by only 11% and the amount of non-wood packaging waste disposed of actually fell by 33%.

2.2 Packaging and Waste Prevention

- According to USDA research (36) processed (packaged) fruit and vegetables suffer only half the waste of that suffered by fresh fruit and vegetables in the retail chain and home environment combined (16% versus 32%).

- An unwrapped cucumber loses moisture and becomes dull and unsaleable within 3 days. Just 1.5 grams of wrapping keeps it fresh for 14 days. Selling grapes in trays or bags has reduced in-store waste of grapes by 20%. In-store wastage of new potatoes reduced from 3% when sold loose to less than 1% after specially designed bags were introduced (37).

Table 4: Packaging Reduction Examples (37)

	1950s	1960s	1970s	1990s	2000	2008	Per cent change
Washing-up liquid bottle (1 litre)	–	–	120g	67g	50g	43g	64%
Soup can (400g)	90g	–	69g	57g	55g	49g	46%
Yoghurt pot (165g)	–	12g	7g	5g	–	4g	67%
Plastics fizzy drinks bottle (2 litre)	–	–	58g		43g	40g	31%
Metal drinks can (330ml)	–	60g	–	21g	15g	14g	77%
Glass beer bottle (275g)	–	–	450g	–	325g	176g	61%
Glass milk bottle (1 pint)	538g	–	397g	230g	–	186g	65%

Source INCPEN

2.3 Packaging, Energy Consumption and Resources

- Packaging typically amounts to no more than 8% to 10% of the resources embedded in packaged foods and beverage used in the household (40).
- Each household's annual purchases of products weigh nearly 3 tonnes, and require 110 Gigajoules of energy to produce. To avoid wastage of these products and the energy used to produce them, they need to be protected so they safely survive the stresses and strains of being transported from farm and factory through to the shops and then to consumers. Less than 200 kg of packaging does this job and the energy used to make the packaging is just 7 Gigajoules – or one fifteenth of the energy used to produce the goods (37).
- Of the total energy used in the food chain, 50% is used in food production, 10% on transport to the shops and retailing, 10% to make the packaging and the remaining 30% is used by shoppers to drive to the shops and store and cook food (37).

2.4 Packaging and Greenhouse Gases

- Greenhouse gas emissions related to packaging consumption in EU-15 amounts to around 2% of total greenhouse gas emissions (41).
- Recycling of packaging reduced total EU greenhouse gas emissions in 2002 by around 0.6% (41).
- 90% of the carbon footprint of shampoos comes from the hot water consumed when the product is used (42).

Appendix 3: European Industry Associations with an Interest in Packaging

ACE

www.beveragecarton.eu

The Alliance for Beverage Cartons and the Environment

AIM

www.aim.be

European Brands Association

APEAL

www.apeal.org

Association of European Producers of Steel for Packaging

BCME

www.bcme.org

Beverage Can Makers Europe

BUSINESSEUROPE

www.businesseurope.eu

The Confederation of European Business

CEPI

www.cepi.org

Confederation of European Paper Industries

CIAA

www.ciaa.eu

Confederation of the Food and Drink Industries of the EU

CITPA

www.citpa-europe.org

International Confederation of Paper and Board Converters in Europe

EAA

www.aluminium.org

European Aluminium Association

EAFA

www.alufoil.org

European Aluminium Foil Association

ETMA

www.etma-online.org

European Tube Manufacturers Association

EFBW

www.efbw.eu

European Federation of Bottled Water

EuPC

www.eupc.org

European Plastics Converters

EuroCommerce

www.eurocommerce.be

The Retail, Wholesale and International Trade Representation to the EU

European Bioplastics

www.european-bioplastics.org

Industrial manufacturers, processors and users of bioplastics and biodegradable polymers and their derivative products.

EUROPEN

www.europen.be

The European Organization for Packaging and the Environment

FEA

www.aerosol.org

European Aerosol Federation

FEAD

www.fead.be

European Federation of Waste Management and Environmental Services

FEFCO

www.fefco.org

European Federation of Corrugated Board Manufacturers

FEFPEB

www.fefpeb.org

European Federation of Wooden Pallet and Packaging Manufacturers

FEVE

www.feve.org

European Container Glass Federation

FPE

www.flexpack-europe.org

Flexible Packaging Europe

Pack2Go Europe

www.pack2go-europe.com

Europe's Convenience Food Packaging Association (formerly EFPA)

PlasticsEurope

www.plasticseurope.org

Association of Plastics Manufacturers

PROCARTON

www.procarton.com

European Association of Carton Manufacturers and Cartonboard Mills

PROEUROPE

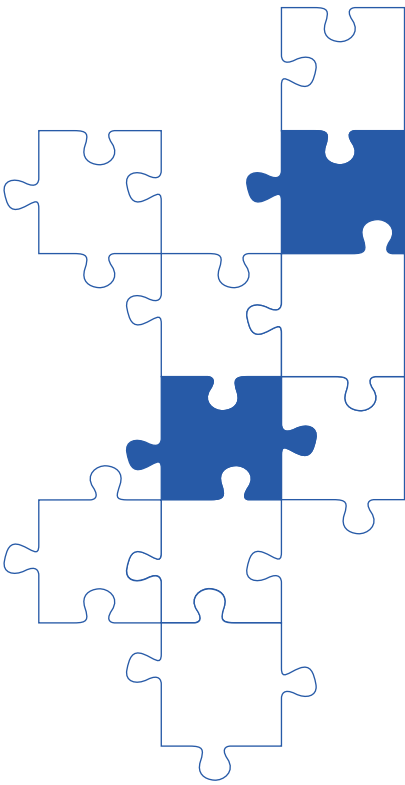
www.pro-e.org

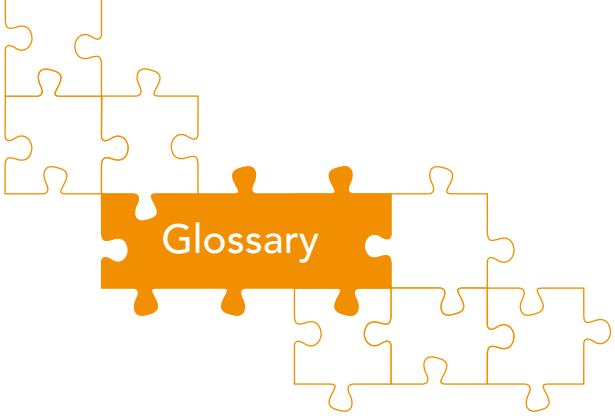
Packaging Recovery Organisation Europe

UNESDA

www.unesda.org

Union of European Beverage Associations





Biodegradation (biodegradability)
Degradation caused by biological activity, especially by enzymatic action leading to a significant change of the chemical structure of a material (CEN/EN 13193:2000).

(Biodegradability is the potential of a material to be biodegraded).

Biomass
Material of biological origin excluding material embedded in geological formations or transformed to fossilised material. (CEN/TR 14980:2004)

Carbon Footprint
In relation to a product a 'carbon footprint' is defined as:
The sum of all greenhouse gas emissions occurring at each stage of the product life cycle and within the specified system boundaries of the product. Including all emissions that are released as part of all processes involved in obtaining, creating, modifying, transporting, storing, use and end of life disposal of the product.

Compost (compostability)
Organic soil conditioner obtained by biodegradation of a mixture principally consisting of various vegetable residues, occasionally with other organic material having a limited mineral content (CEN/EN 13193:2000).

(Compostability is the potential of a material to be biodegraded in a composting process).

Conversion
Going from basic raw materials to finished packaging involves a number of steps referred to as 'conversion processes'. In some instances the raw material may be converted to a finished package in one conversion step, in others several materials may need to be converted individually into sheets or layers before being combined and then shaped into the final complete package. Printing and decoration are also conversion steps.

Degradation
An irreversible process leading to a significant change of the structure of a material, typically characterised by a loss of properties (e.g. integrity, mechanical strength, change of molecular weight or structure) and/ or fragmentation.

Degradation is affected by environmental conditions and proceeds over a period of time comprising one or more steps. (CEN/EN 13193:2000).

There are different types of degradation: biodegradation, chemical degradation, photodegradation, mechanical degradation and thermal degradation.

Essential Requirements
Form an integral part of the Packaging and Packaging Waste Directive setting out fundamental legal requirements that packaging must meet before it may be placed on the EU market.

Greenhouse Gases
Gases, most particularly carbon dioxide and methane, whose gradual accumulation in the atmosphere contributes to raising the Earth's temperature over time.

Life Cycle
Consecutive and interlinked stages of a product system, from raw material acquisition or generation of natural resources to final disposal.

Life Cycle Thinking (LCT)
The Life Cycle Thinking approach assesses conceptually all stages of the life cycle. Conventional approaches tend to regard packaging sustainability issues in isolation from the packed product system of which they are part. This approach is likely to lead to sub-optimum results if improvements in packaging sustainability are obtained at the expense of decreased sustainability indicators for the packed product.

Life Cycle Assessment (LCA)
Life Cycle Assessment is the compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product system throughout its life cycle.

Primary, Secondary and Tertiary Packaging
(Directive 94/62/EC on packaging and packaging waste)
- Sales packaging or primary packaging, i.e. packaging conceived so as to constitute a sales unit to the final user or consumer at the point of purchase;
- Grouped packaging or secondary packaging, i.e. packaging conceived so as to constitute at the point of purchase a grouping of a certain number of sales units whether the latter is sold as such to the final user or consumer or whether it serves only as a means to replenish the shelves at the point of sale; it can be removed from the product without affecting its characteristics. Secondary or collation packaging generally defines the unit used by the retailer;
- Transport packaging or tertiary packaging, i.e. packaging conceived so as to facilitate handling and transport of a number of sales units or grouped packaging in order to prevent physical handling and transport damage. Transport packaging does not include road, rail, ship and air containers. Tertiary or transport packaging is normally the unit used for shipping such as outer case, pallet or crate.

Prevention
(Directive 2008/98/EC on waste)
Means measures taken before a substance, material or product has become waste, that reduce:
(a) The quantity of waste, including through the reuse of products or the extension of the life span of products;
(b) The adverse impacts of the generated waste on the environment and human health; or
(c) The content of harmful substances in materials and products;

Reuse
(Directive 94/62/EC on packaging and packaging waste)
'Reuse' shall mean any operation by which packaging, which has been conceived and designed to accomplish within its life cycle a minimum number of trips or rotations, is refilled or used for the same purpose for which it was conceived, with or without the support of auxiliary products present on the market enabling the packaging to be refilled; such reused packaging will become packaging waste when no longer subject to reuse.

Recovery
(Directive 2008/98/EC on waste)
'Recovery' means any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy.

Recycling
(Directive 94/62/EC on packaging and packaging waste)
'Recycling' shall mean the reprocessing in a production process of the waste materials for the original purpose or for other purposes including organic recycling but excluding energy recovery;

(Directive 2008/98/EC on waste)
'Recycling' means any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations;

Renewable
Ref ISO 14021:1999/PDAM 1, February 2009
Work on the definition of this important concept is still in progress. Below is a draft definition which has been proposed as an amendment to ISO Standard 14021 on self-declared environmental claims.

It should be noted that this text is provided in the form "Usage of Terms" consistent with ISO 14021, rather than in a strict definition format.

In relation to the provision of materials used as a resource, excluding energy, renewable materials shall meet all of the following requirements:
a) Be composed of biomass, which can be continually regenerated within a finite timeframe,
b) Are replenished at a rate that is equal to or greater than the rate of depletion.
c) From sources that are managed in accordance with the principles of sustainable development, and
d) Where a verifiable traceability system is in place.

This draft is currently going through the ISO development process and may be subject to further revision.

CEPI Definition 19th November 2008 (PPCG/025/08)
Renewable materials are composed of or manufactured from biomass that is sustainably managed and continually replenished by natural processes.

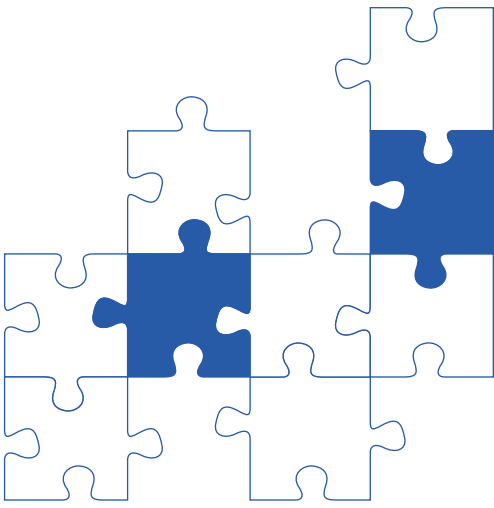
From CEPI – Ref. PPCG/025/08, November 2008

In relation to the provision of materials used as a resource, renewable raw materials are:
- composed of biomass , which can be continually regenerated within a finite timeframe,
- from sources that are managed in accordance with the principles of sustainable management, and
- where a verifiable chain of custody is in place.

Source Reduction
Measures taken in the design or specification of packaging to limit the amount of material entering the supply chain without affecting packaging performance.

Sustainability
The term 'sustainable' does not have a specific definition but is used in its usual (dictionary definition) sense for instance: sustain, "to maintain or keep going continuously".

Sustainable Development
"Development that meets the needs of the present without compromising the ability of future generations to meet their own need. This involves addressing economic, social and environmental factors and their interdependence in an organization's decision-making and activities." (Brundtland Commission, 1987)



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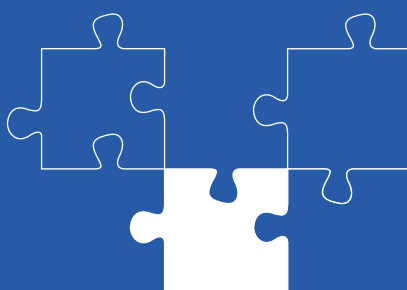

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