HANDeBOOK

ON GREEN PACKAGING

By

CRITT - ERVET - INFO MURCIA - IVACE

PACMAn

Promoting attractiveness, competitiveness and internationalisation of Agro-food Clusters of the Med Area

Med L'Europe en Méditerranée / Europe in the Mediterranean

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HandeBook on agro-food Green Packaging

Pilot Action for green packaging improvement and promotion in the Mediterranean agro-food chains

Synthesis Report

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HandeBook on agro-food Green Packaging

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Contents

Executive Summary 7

Chapter 1 - What is Green Packaging 8

6 key-actions for Green Packaging 10

Chapter 2 – How to measure green packaging 15

The lifecycle approach 16

Web Eco-Tools for environmental packaging assessment 19

Chapter 3 - Who can support 25

R&D on green packaging 25

Education and training bodies, advisory services 29

Chapter 4 - Who already did it 34

Prevention measures to support sustainable packaging 34

Case studies of sustainable companies 35

France (PACA Region) 35

Spain (Murcia and Valencia) 36

Italy (Emilia Romagna) 37

Chapter 5 - Territorial figures in Italy, Spain and France 39

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Promoters and contributors to this document

Ervet – Emilia Romagna Valorizzazione Economica del Territorio. ERVET is an in-house company set up by the Emilia-Romagna Regional Government to bring a focus to economic development. ERVET's key role is to provide active and operating support to the regional policy for social, economic, and territorial development – aiming to increase the economic growth of the region and the value of the regional business system on an international level.

www.ervet.it

Critt - Centre Régional d'Innovation et de Transfert de Technologies Agro-alimentaires. CRITT is a French Innovation and technology Transfer Center dedicated to food processing industry. The CRITT Agroalimentaire Provence Alpes Côte d'Azur is the dedicated tool for innovation and technology transfer on food industry in south east of France.

www.critt-iaa-paca.com

Info Murcia - Instituto de Fomento de la Región de Murcia. The Murcia Regional Development Agency is organically attached to the Regional Ministry of Universities, Business and Research. Its main objective is to boost the development of SMEs in Murcia by means of economic promotion, investment raising, elimination of obstacles and the establishment of an environment favouring competitiveness.

www.institutofomentomurcia.es

Ivace - Instituto Valenciano de Competitividad Empresarial. The Valencian Institute of Business Competitiveness (IVACE) is a public entity of the Valencian givernment attached to the Regional Department of Economy, Industry, Tourism and Employment. The aims of the Institute are managing industrial policy of the Government and business support for innovation, entrepreneurship, internationalization and attracting investment and promoting technological clusters, industrial safety products and industrial facilities

www.ivace.es

National organizations of reference[1]

ITALY (Conai) – www.conai.org

CONAI is a private system, created and designed by companies: with more than 1,400,000 members, between packaging producers and users, CONAI is the largest consortium in Europe. Its task is to manage the recycling and the recovery of packaging in Italy and to pursue the recycling and recovery objectives set by European legislation, first acknowledged in Italy by the Ronchi Decree (legislative Decree 22/97), which was replaced by the legislative Decree "Environment Regulations" in 2006 (legislative Decree 152/06).

CONAI promotes the adoption of environment-friendly packaging at source, and then co-ordinates the recovery and recycling of packaging after use.

FRANCE (Eco-Emballages) - www.ecoemballages.fr

Eco-Emballages and Adelphe were formed on the initiative of the authorities and businesses within the framework of the decree dated 1st April 1992, henceforth codified in the Code of Environment. What was at stake was to achieve compliance with European environmental standards policy in terms of Extended Producer Responsibility. This convergence of economic and political forces gave birth to the first French eco-organization entirely dedicated to sustainable development, both in its conception and implementation. Its precise missions are to organize, maintain and enhance selective collection, sorting, recycling and reuse of household packaging nationwide. Gradually the system has been put in place with the involvement of: responsible consumers, who sort their packaging for recycling purposes; local authorities, which are operationally responsible for implementing selective collection, running waste treatment centres and which keep citizens informed; the recycling industry, which processes waste household packaging to produce new materials

SPAIN (Ecoembes) - www.ecoembes.com

Spain transposed European Directive 94/62/EC into Packaging and Packaging Waste Act 11/97. This law states that there are two options open to packager/fillers, retailers, distributors and handlers of packaged products for domestic consumption: a Deposit and Return System, or joining an Integrated Management System (SIG).

ECOEMBALAJES ESPAÑA, S.A. (ECOEMBES) was founded by Spanish trade and industry in order to develop an Integrated Management System (SIG) to implement this legislation, and already boasts more than 12,000 member companies, having signed agreements with nearly 100 local and regional authorities. The purpose of Ecoembes is to run systems for the selective collection of household packaging waste in order to carry out subsequent treatment and packaging waste recovery and, in this way, to minimize the impact of packaging waste and make a better use of materials.

[1] Source: Pro-Europe (http://pro-e.org/)

Other organizations

Organization	Country
France emballage. The networks of the French packaging was created on the initiative of the regional poles of the packaging to allow the professionals to have a reference of all the actors of the packaging in France: the Bodies, Institutions, Trade associations, Associations, Press, Event planners, Technical Centers and of Training. France-emballage.org is the web tool for the contribution to the creation of dynamics of exchanges among all the actors of the packaging in France. www.france-emballage.org	France
Ademe (French Environment and Energy Management Agency) is a public agency under the joint authority of the Ministry for Ecology, Sustainable Development and Energy and the Ministry for Higher Education and Research. Its mission is encouraging, supervising, coordinating, facilitating and undertaking operations with the aim of protecting the environment and managing energy. Ademe provides companies with the web-based eco-tool "Bilan Produit" (see Chapter 2); it is active in the "Promotion of the recycling and the recovery of packaging", with the press campaign "Réduisons vite nos déchets ça déborde" (Let us reduce our waste that overflow), and organizes education and training courses. http://www.ademe.fr	France
The Italian Institute of Packaging. Founded in 1953 as a meeting point for packaging makers and users, the Institute today counts among its more than 300 members a number of major manufacturers, the leading industrial users groups, packaging machinery makers, industrial designers, and trade associations. www.istitutoimballaggio.it	Italy
The Spanish Club is an association for professionals in packaging, which claims to be the forum where professionals interact Spanish language packaging in all its forms. Packaging The Spanish Club, is a non-profit association that brings together professionals from manufacturers, suppliers and users of packaging in Spanish, as a platform for interaction and networking to share, discuss, and develop knowledge and information for the sector. http://clubespanoldelpackaging.org/	Spain

Executive Summary

This hand eBook is designed to support companies and other actors interested in agrofood packaging sustainability, through setting up a simple and practical user manual, which is intended to provide information about “Key Actions” for green packaging innovation, case studies and contacts of “Actors” that already performed activities in this direction.

The activity is part of the PACMAn project (Promoting attractiveness, competitiveness and internationalisation of Agro-food Clusters of the Med Area – www.pacmanproject.eu) financed by the MED programme. The eBook is meant as the final output of the Pilot Action “Actions for green packaging improvement and promotion in the MED Agro-food chains”, providing a cross country analysis of the initiatives/measures undertaken in Italy (with a focus on Emilia Romagna region), France (focus on PACA region) and Spain (focus on Murcia and Valencia region).

The analysis of the organizations, that have in charge the waste packaging management at national level, provided a framework of the initiatives adopted in the three European countries. Even though they have adopted similar initiatives, some carried out them in different ways, establishing different models of governance.

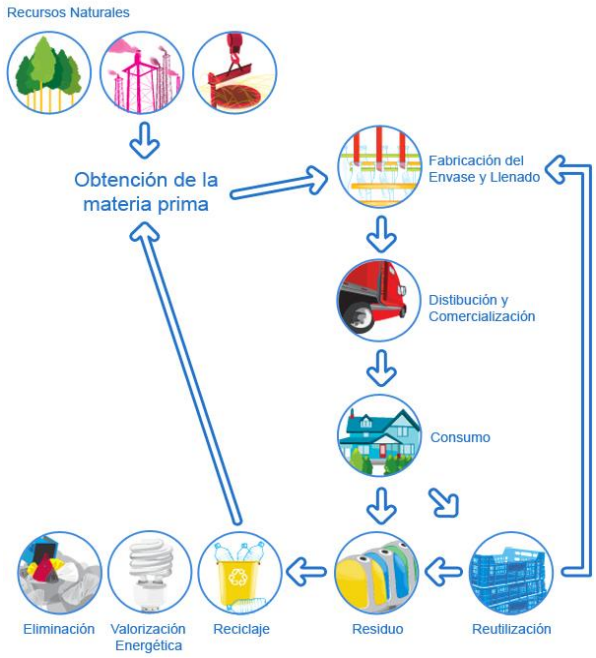
The hand-eBook is committed to bridge the innovation and knowledge gaps among the enabling environment and companies, according to PACMAn project’s main objective of improving R&D and innovation capacity of the agro-food sector in MED Regions, by strengthening the links among research bodies, institutions and food enterprises.

For each step, Ervet (IT), Critt (FR), Ivace and Info Murcia (ES) collected the specific experiences of the regional community network, providing also list of case studies on sustainable packaging innovation, promoted by companies.

Detailed contacts on green packaging actors are listed in each session of the handbook.

Chapter 1 - What is Green Packaging

Packaging can give a valuable contribution to economic, environmental and social sustainability through protecting products, preventing waste, enabling efficient business conduct, and delivering the afro-food product to the consumers keeping its properties and benefits[2].

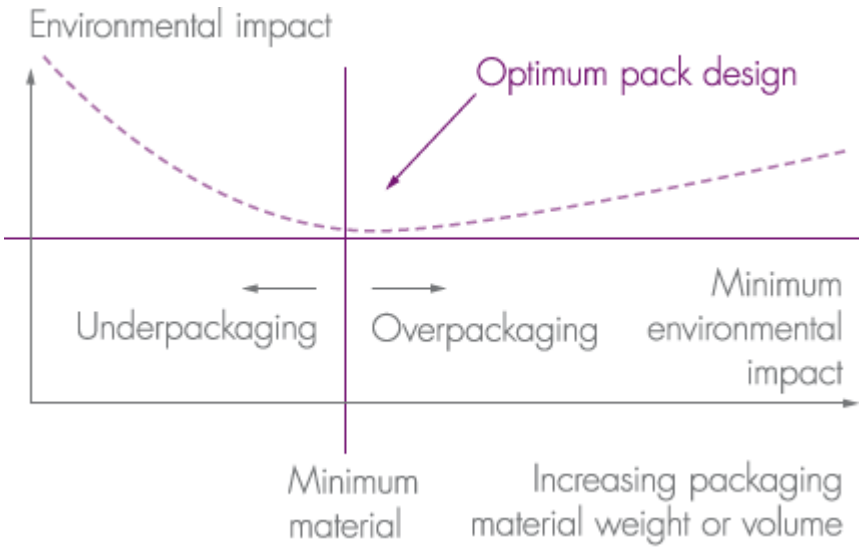
Packaging production process Packaging production implies many steps strictly connected with the environmental impact. The lower is this impact, the more that product can be said green. Main critical stages of this process are the following: • Design • Manufacturing process of the container and filling • Distribution and marketing • Waste management phase	

3 types of packaging: primary, secondary and tertiary packaging	**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.

Source: Packaging in the sustainability agenda, A guide for corporate decision makers, ECR Europe / Europen, 2009

[2] Source: Packaging in the sustainability agenda, A guide for corporate decision makers, ECR Europe / Europen, 2009

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.



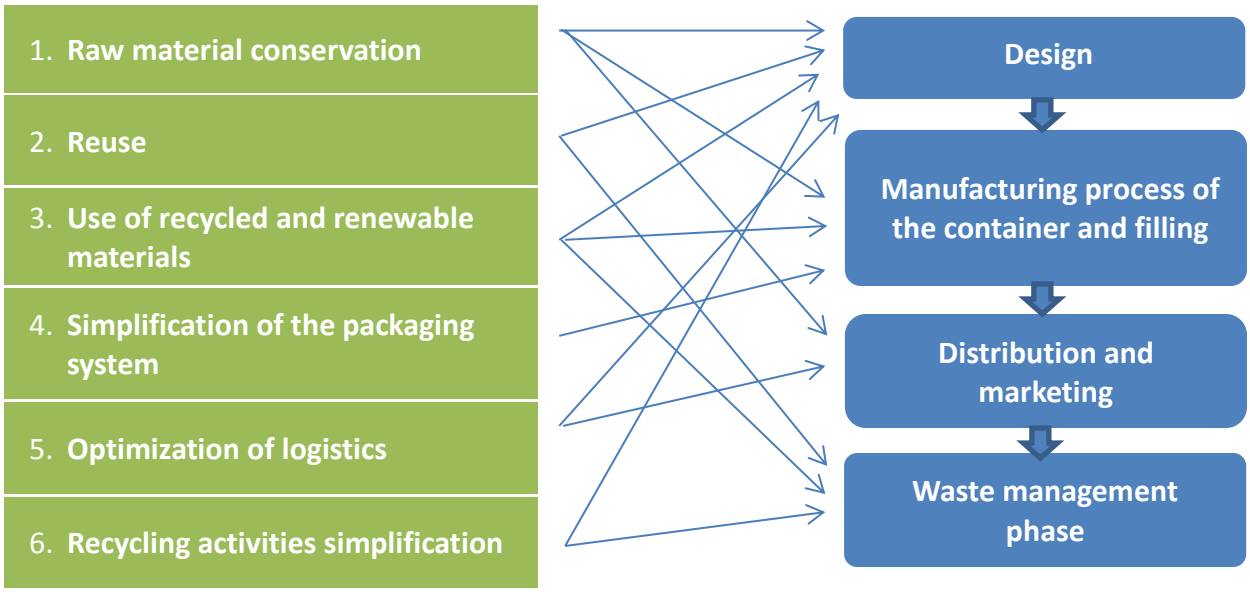
Source: INCPEN

The list below summarizes the **most important ecodesign criteria 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 .

- The packaging must meet its primary functions of containment, protection and preservation of the product under conditions of distribution, storage, sale and use;
- The package must reach its goal with the least possible amount of material;
- The Life Cycle Approach implies a shift from the design of the product itself, to the design of the product-system (from cradle to cradle);
- The choice of materials is a fundamental issue;
- Reference to the 'Waste Hierarchy';
- When the above rules are followed, the environmental communication can provide consumers with objective information on the producer's commitment to reducing the (environmental) impact of his products .

To make packaging green the following **6 criteria** have to be considered[3]. Every criteria is connected to critical stages of the packaging supply chain.

[3] This six criteria correspond to the classification of the Dossier CONAI, and are compatible with the concept of green packaging adopted in other countries



6 key-actions for Green Packaging

The following summary is designed to provide companies with an accurate, easy-to-understand overview of this topic by integrating contributions from Italian, French and Spanish experiences, according to "Essential Requirements" set out by Directive 94/62/EC[4].

1. Raw material conservation

It can be achieved in different phases of the packaging life cycle (Design; Production; Distribution), by improving the design and the material properties of the container.

Activities included:

- Increase quantity of product in the container by improving the design of the container (eliminating empty volumes).
- Modify product features to reduce the quantity of material use in the container and improving the ratio quantity of packaging material / product unit packaging (e.g.: Reducing the thickness of the packaging material used, eliminating components of the container; containers of greater capacity commercialized; etc.).
- Assess the suitability of the raw materials used in the manufacture of container and the existence of alternatives that generate less impact and are technically and economically feasible.

[4] The "Essential Requirements" of Directive 94/62/EC are a set of minimum mandatory legal requirements designed to reduce the environmental impact of packaging and avoid 'over-packaging'. The Directive also sets limits for heavy metals content in packaging. The European Standardisation Committee has developed Standards specifically designed to help companies comply with these legal requirements.

- Purchasing Management and Storage: avoid inappropriate materials purchases, with defects or a short endurance, minimize amount of stored material, inventory control and reduce or simplify type of materials used.

2. Reuse

Packaging is designed and produced in order to bear handling and rotation beyond the normal conditions and is filled or reused several times to the same purpose it was designed for.

Activities included:

- Selling the product in reusable container.
- Improve the properties of reusable packaging to extend his life.
- Substitution of new packaging for other packaging that has been thrown away. (e.g. reuse of cardboard boxes from the supplier for a new other use).

3. Use of recycled and renewable materials

It means to replace as much as possible pure materials with recycled and renewable ones. Find more details in the following definitions.

Recycling
The definition from the Packaging & Packaging Waste (Directive 94/62/EC) 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 definition 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".

Renewable materials requirements
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.

At the time of writing this draft is going through the ISO development process and may be subject to further revisions.

4. Packaging system simplification

It is achieved by analysing the functions of each component of the system.

Activities included:

Simplifying the packaging

- Improve physic properties of the container to make easier his waste management (e.g.: reduce the presence of heavy metals in packaging: lead, cadmium, mercury and hexavalent chromium).

Simplifying manufacturing process of the container and filling

- Improving energy efficiency and use of renewable energy.
- Source Reduction: control equipment resource consumption, recirculation flow, reducing wastage and incorporation of the same process materials or to other applications.
- Reduction of the stages of the production process: simplify the process to avoid storage of semi-finished product, reduce the number of components and sequences of operations (e.g.: PET bottle blowing and filling immediately to avoid storage of containers and packaging of finished before filling thereof).
- Emission reductions: avoiding the generation of byproducts or finding an application, improve the flow of pollution management avoiding difficult or more expensive final treatment, emission reduction equipment, containment systems to prevent leaks, etc.
- Improved maintenance: planning the sequence of production to minimize cleaning operations, avoid unnecessary stops and starts, etc.

Waste management phase

- Minimizing emissions in energy recovery plants of non-recyclable waste

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) 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".

5. Optimisation of logistics

Activities included:

- In primary packaging it is possible to produce containers with better capacity to compactness ratio.
- In secondary packaging, capacity can be increased, augmenting the number of sale units within the transport packaging, or it is possible to use a display tray.
- In tertiary packaging, loads and assortment on pallets can be optimised (Optimization palletizing mosaic)

Optimisation of logistics can be obtained also by:

- Reducing the transport distance of the feedstock from the extraction site to the manufacturing of the container.

- Selecting the most appropriate means of transport, reducing distance between supplier and customer, optimal occupancy of transport vehicles, route optimization avoiding congested areas, avoid trips back with empty vehicles, etc.
- Presentation of goods on the shelf: number of packages per cluster, using refillable exhibitors, etc.

6. Recycling activities simplification

All those activities aimed at making the post-consumption exploitation activities simpler and more efficient.

Design phase of the container can consider features that have a positive impact on the processes of separation, collection and recycling. For instance:

- Improving chemical composition of the container in order to reduce his environmental impact.
- Unify the material of the packaging to improve his recyclability.
- Reduce or eliminate print surfaces in the packaging.

Distribution and marketing can include:

- Implement a system of reverse logistics: recovery, reuse and recycling of packaging, customer returns, seasonal products and inventory obsolete

Waste management phase can include:

- Separate waste properly and deliver them to the collection in the case of household waste or an authorized agent in the case of industrial or commercial waste.
- Recycling of packaging waste for the same or other purposes.
- Separate components of different materials, e.g. bottle and cap.
- Sale of bulk

Waste prevention

The waste hierarchy (as defined in Article 3 of the Waste Framework Directive[5]) ranks waste management options in terms of their environmental impact. Waste prevention is the first tenet of the hierarchy and represents the most efficient and sustainable use of resources.

[5] Directive 2008/98/EC sets the basic concepts and definitions related to waste management, such as definitions of waste, recycling, recovery.

Guidelines to support packaging

National Packaging Organizations carry out several measures concerning guidelines to support green packaging in their country. Some examples are provided in the following table.

Measures to support enterprises to optimize packaging	Country	Organization
Eco-design partnerships. Eco design experts support companies wanting to implement a first eco-design project on one of their product.	France	Eco-Emballages
Packaging Corporate Social Responsibility (CSR) reporting rules. A guidance manual presenting 5 golden rules to include packaging in a company CSR strategy and sustainability report, in line with CSR reporting standards.	France	Eco-Emballages
Guidelines for the simplification of the packaging system. Issuing of an UNI (National Standards Boby) based document designed to help companies dealing with the essential requirements for packaging, as defined by Directive 94/62/EC. The guidelines are based on a set of questions and answers that allows companies to address packaging design that meets the environmental impact of the production and use of packaging materials.	Italy	The Italian Institute of Packaging
Guidelines for environmental labelling of packaging. The Italian Packaging Institute's Environment Commission published in 2008 the guidelines on the environmental labelling of packaging, based on the existing and new legislation. The 70-page guidelines contain information about the labelling used to demonstrate the environmental performance of packaging (e.g. the EU eco-label, Blue Angel label, ISO references, FSC mark).	Italy	The Italian Institute of Packaging
CONAI has issued **guidelines to facilitate collection, reuse, recovery and recycling** so to inform final consumers about the final destination of the packaging.	Italy	Conai
Guidelines Design for Recycling: What aspects have influence on the recyclability of my packaging? This project was created to know the Influence of the packaging design on recycling processes and to promote the practical integration of the aspects related to the packaging management in the design stage.	Spain	Ecoembes

Chapter 2 – How to measure green packaging

In the following table there is a list of indicators related to the environmental impact of the green packaging.

Indicator (name and description)	Type
Packaging weight and optimization (includes Primary, Secondary and Tertiary packaging)	Quantitative (weight/ weight reduction), possibly by material category.
Packaging to Product weight ratio - The ratio of the weight of all packaging material used to the weight of the product or functional unit delvered	Quantitative (% packaging weight/ total weight)
Material waste – The mass of material waste generated during the production and transport of packaging (comprising materials, constituents, components)	Quantitative (Kg /FU - Material destined for landfill and final disposal)
Recycled Content – The ratio of recycled material (post consumer and pre-consumer as defined by OSP 14021) to toal material used in packaging constituent, component or systems.	Quantitative (%)
Renewable Content – The ratio of renewable material used to total material used in packaging	Quantitative (%) Percentage by weight on material lever (ISO 14021) or on carbon level (ASTM D6866)
Packaging reuse rate – The number of times packaging accomplishes the same use, rotation or trip for which it was conceived and designed within its life cycle (according to EN 13429 – ISO/CD18603)	Quantitative (can be used for primary, secondary and tertiary packaging)
Packaging recovery rate – The mass fraction or absolute mass of packaging recovered from all sources based on relevant waste management statistics	Qualitative: recoverable (yes/no) Quantitative: recovery rate (%)
Cube Utilization – The overall volumetric measurement of packaging design efficiency for the packaging system. Concerns only tertiary packaging.	Quantitative (% - percent of volume in a transport unit occupied by the product)

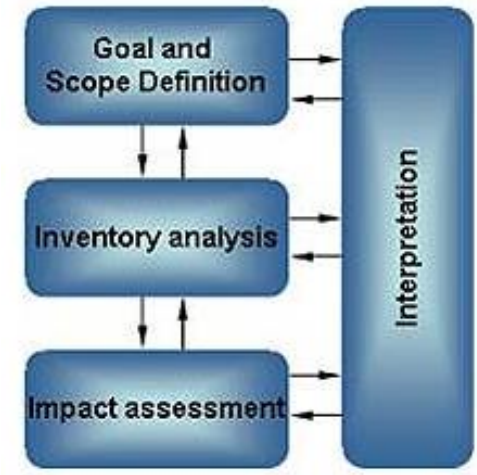
The lifecycle approach

Genuine environmental improvements require a life cycle thinking approach to packaging/product systems. 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.

Definition of LCA

The **International Organisation for Standardisation (ISO)** defines the Life Cycle Analysis (LCA) as "*a technique for assessing the environmental aspects and potential impacts associated with a product or service by: collecting an inventory of relevant inputs and outputs system and the evaluation of potential environmental impacts associated with those inputs and outputs, and interpreting the results of the phases of analysis and impact assessment in accordance with the objectives of the study*" (EN ISO 14040:2006).

The ISO standards identify **four phases for conducting a LCA**:

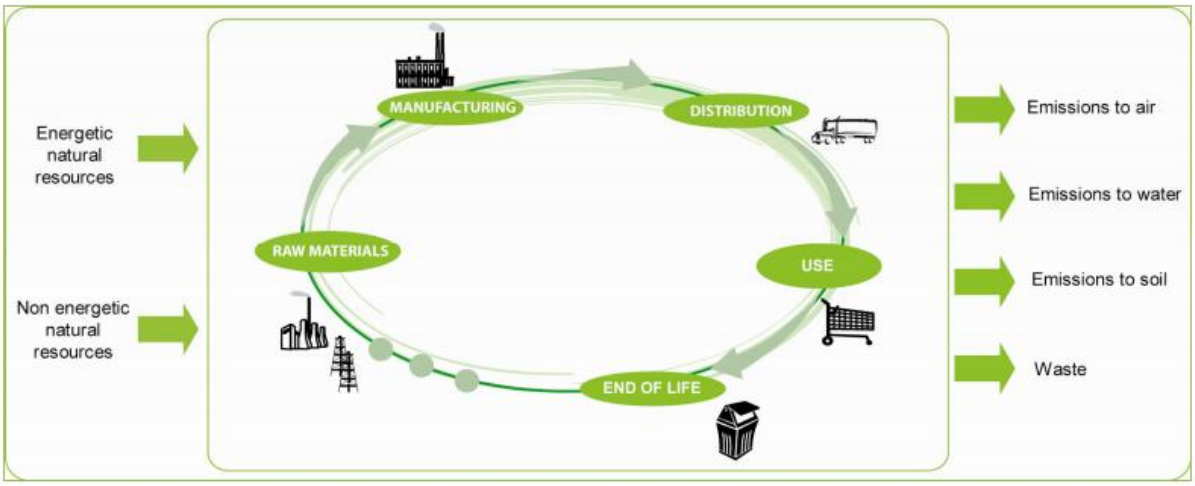


1. **Goal and Scope Definition**, the product(s) or service(s) to be assessed are defined, a functional basis for comparison is chosen and the required level of detail is defined.
2. **Life Cycle Inventory (LCI),** Inventory Analysis of extractions and emissions, the energy and raw materials used, and emissions to the atmosphere, water and land, are quantified for each process, then combined in the process flow chart and related to the functional basis.
3. **Life Cycle Impact Assessment (LCIA),** the effects of the resource use and emissions generated are grouped and quantified into a limited number of impact categories which may then be weighted for importance.
4. **Life Cycle Interpretation**, the results are reported in the most informative way possible and the need and opportunities to reduce the impact of the product(s) or service(s) on the environment are systematically evaluated

Why doing LCA

- is a **global analysis of the environmental impacts**
- is a **decision support** tool giving feedback to the designer on the environmental consequences of decisions taken in the production process over its entire life cycle. LCA **can be used for comparisons of alternative options**
- LCA is also used to study **market strategies, policies or regulations (**EU has accepted LCA as a state-of-the-art methodology)
- Reliable LCA performance is crucial to achieve a **life-cycle economy.**

LCA Representation by Ademe



Source Ademe – Study for a simplified methodology adapted to bioproducts

Two main approaches

There are two main different categories of LCA in terms of level of detail:

a) **simplified**, streamlined or screening LCAs (ecodesign)

b) **comprehensive**, detailed or full LCA (conventional)

LCA tools can also be separated into two major classes: highly flexible conventional LCA software and tailored and rapid Ecodesign tools with a lower degree of flexibility (Table).

Table - Types of LCA tools and area of application as a function of strength and weakness.

Type of LCA tool	Strengths	Weaknesses	Application
Ecodesign	Quick, low cost, consistent, can be used by non-experts	Low flexibility No capacity to capture specificities Limited possibility to support environmental claims	Design process, environmental information, well suited for non-expert in a well-framed process
Conventional	Robustness, flexibility Can support marketing claims after external peer review	More costly and long, requires expert knowledge	Internal evaluation of a product and comparison with alternatives To support marketing claims about the environmental impact of a product

Source: The consumer goods forum (2011), Global Protocol on Packaging Sustainability 2.0

Ecodesign Tools

Simplified and tailored LCA-based tools open LCA to non-experts, allowing rapid assessment of environmental consequences of design decisions already at the concept stage. This understanding lays the foundation for efficient streamlining and automation of LCA.

Comprehensive LCA Tools

Comprehensive LCA's are performed using **conventional software** packages where the user will go through the full procedure of goal and scope definition, inventory assessment, impact assessment and interpretation. Conventional LCA tools allow for **flexibility** on all levels of a LCA.

This flexibility also contributes to some of their draw-backs: they require considerable expertise and are laborious and costly.

Examples of software:

- **GaBi 4.3** - http://www.gabi-software.com - Developed by: Institute for Polymer Testing and Polymer Science
- **SimaPro 7.3** - http://www.simapro.es/ - Developed by: Pre Product Ecology Consultants
- **AGROLCA Manager** http://www.agrolcamanager.com - Developed by: Instituto Vasco de Investigación y Desarrollo Agrario NeikerTecnalia

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Web Eco-Tools for environmental packaging assessment

by Conai (IT), Ademe (FR), Ecoemballages (ES), Ihobe (ES)

Eco Tool CONAI

by Conai, IT

The Eco Tool CONAI (National Packaging Consortium - http://www.ecotoolconai.org/) allows member companies, wishing to participate in the "Prevention Dossier", to evaluate the environmental efficiency (eco-efficiency) of their packaging, through a comparison of the environmental impact BEFORE and AFTER the interventions adopted. The tool is based on the "cradle to cradle" concept and allows to calculate, through a simplified LCA (streamline), the effects of the preventive actions implemented by companies on their packaging.

How it works

The improvements in eco-efficiency, generated by preventive actions implemented on the packaging, are measured using three indicators of environmental impact.

GWP (Global Warming Potential): - As defined by the Intergovernmental Panel on Climate Change (IPCC), GWP is an indicator that reflects the relative effect of carbon dioxide (CO2) and other greenhouse gas (GHG) emissions (e.g. methane, nitrous oxide, etc.) in terms of climate change associated with a product along its supply-chain. In the analysis of the life cycle, the GWP measures the Carbon footprint (CF) or Carbon profile.

GER (Gross Energy Requirement - total energy consumption): The GER of a product is the sum of all energy sources which are required for the making of the product. The total energy used throughout the life cycle of a functional unit of the product / service. The GER is expressed in MJ (megajoules). The Eco Tool CONAI takes also into consideration the feedstock energy (raw material input that is not used as an energy source).

Water consumption indicator, expressed in liters (l) or kilograms (kg), which assesses the amount of process water used in the production and marketing of consumer goods, which does not come back, at the end of the process, to the source from which it comes. This is part of the called "blue water", a component of the "water footprint", calculated as reported in www.waterfootprint.org .

More information at: http://www.ecotoolconai.org/

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Bilan Produit ® - ADEME

by Ademe, FR

The Produced Balance Assessment was designed by the ADEME to allow the companies to estimate easily, quickly and in a autonomous way the ecological impact of their products. More particularly intended to SME/SMI and for the students, this tool was realized with the university of Cergy-Pontoise and ecoinvent center. It allows to model the product in a simple way, by taking into account the main stages of its life cycle: the materials which compose it, the manufacturing processes, the means of transportation, the sources of energy. The estimation of the impacts concerns **eight indicators** (in an Excel workbook) and allows to compare various simulations for the same product.

How it works

The balance sheet Bilan Product contains a methodology of impact assessment and a database of materials, manufacturing processes, transport, energy, model of the product. To retain a simplicity of operation. The tool uses LCA results to provide impacts.

The consumption of materials and energy, emissions and emissions into the air, water and soil and waste are quantified at each step life cycle and expressed by 8 indicators:

- **Non-renewable energy consumption (NR)**
- **Natural resources consumption**
- **Greenhouse gases emissions (GHG)**
- **Acidification**
- **Photochemical pollution**
- **Eutrophication**
- **Aquatic ecotoxicity**

Environmental issues	Indicators
Natural resources depletion	Non-renewable energy consumption (NR)
	Natural resources consumption
Global warming	Greenhouse gases emissions (GHG)
Air pollution	Acidification
	Photochemical pollution
Water pollution	Eutrophication
Toxicity	Aquatic ecotoxicity
	Human toxicity

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Source: UN OUTIL GRATUIT POUR DIMINUER L'IMPACT ECOLOGIQUE DE MES PRODUITS, Ademe (ES)

More information at: http://www.ademe.fr/internet/bilan_produit/login.asp

PACMAn

BEE (Bilan Environnemental des Emballages)
by Ecoemballage, FR

Description

BEE (for packaging environment impact assessment) software helps the licensees to assess the environmental impact of a packaging system for its global life cycle, identify the optimisation opportunities and compare selected alternatives.

How it works

In the first version of BEE three indicators of environmental impact have been considered. The list was then integrated by an additional indicator on depletion of non-renewable resources. The former three indicators of environmental impacts presented are defined as follows (see table).

List of indicators

Air pollution

- greenhouse gas emissions

Natural resources

- water consumption
- depletion of non-renewable resources

Waste

- production of non-recycled packaging waste

More information at: http://bee.ecoemballages.fr/

ECO-it.
by Ihobe, ES

Description

It is a simple Eco-design software tool and it is available free of charge to all companies in the Basque Country.

How it works

It works by using ecological indicators that reflect the impact of a process or material on the environment by means of individual scores. The impact will be more serious the higher the score is.

The tool uses two types of ecological indicators:

- Those based on the RECIPE approach, which provide an overview of the simplified Life Cycle Assessment (taking into account most of the environmental impact categories).
- Those of the Intergovernmental Panel on Climate Change (IPCC) which provide an overview of product Carbon Footprint (providing results in kg of CO2 equivalent).

More information at: http://www.ihobe.net/Paginas/Ficha.aspx?IdMenu=04bded12-a25a-4a80-b223-491dae855e28

Other tools

Ecoembes - The national compliance scheme Ecoembes is also developing a tool for the analysis of environmental impacts through simplified LCA, allowing companies interested in this kind of actions have the necessary information on the environmental impacts associated with each stage of the value chain of the pack. Thus, the company through the analysis of this information may direct their efforts for margin improvement in the package is marked as a target.

More information at: http://www.ecoembes.com/es/gestion-de-empresas-adheridas/prevencion/Documents/PEP%202012%20-%20Documento%20Completo.pdf

The **Italian Institute of Packaging** has developed the **Software Green Pack**. It's a software based on a database of roughly 200 parameters to be used for the comparison of two packaging systems in order to identify, on the basis of 4 indicators, the more sustainable solution from an environmental point of view.

More information at: http://www.istitutoimballaggio.it/the-italian-institute-of-packaging/?lang=eng

Comparison among the impact indicators provided by LCA-based eco tools

The four tools analysed in this section use LCA results to provide assessment, in accordance with the international standards and guidelines, although differences in the impact indicators applied can be identified.

- All take into account most of the environmental impact categories, and in particular the effect of greenhouse gas (GHG) emissions in terms of climate change associated with a product along its supply-chain is considered by all of them;
- Eco tool Conai, Bilan Produit and BEE take into consideration the total energy used throughout the life cycle;
- All except Eco-it provide companies with an additional indicator on depletion of non-renewable resources;
- The estimation of the impact concerning water is measured in terms of water consumption (Eco tool Conai, BEE) or in terms of eutrophisation (Bilan produit, Eco-it).

Eco-tools / Impact	Eco Tool CONAI	Bilan Produit	BEE	ECO-it
Air pollution (Greenhouse gas emissions)	●	●	●	●
Energy consumption	●	●	●	
Water consumption	●		●	
Eutrophisation (water pollution)		●		●
Natural resources consumption		●	●	●

Chapter 3 - Who can support

The "Key Prevention Criteria" for green packaging innovation identified so far are matched with the "Actors" (see table) which play an active role in contributing to the achievement of sustainable packaging.

Key Actions (what) → / Actors (who) ↓	6 prevention criteria 1.Raw material conservation 2.Reuse 3.Use of recycled and renewable materials 4.Simplification of the packaging system 5.Optimization of logistics 6.Recycling activities simplification
Research Community Universities	Actions carried out by **laboratories and research centres** in the MED Area to improve green packaging (per single indicator + list of contacts)
Education and Training bodies	**Training courses** related to sustainability and focused on packaging, where available, organized by **education and training bodies** (per single indicator + list of contacts)
Advisory services -Compliance schemes -National organizations of reference	Actions carried out **to support green packaging** in the MED area

R&D on green packaging

Innovation can contribute to improve packaging sustainability following the six prevention criteria related to green packaging (see chap.1). A multitude of strategies are employed to bring products to consumers at minimal environmental and economic cost. Research and Technological Innovation activities summarised below show 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.

Innovation on packaging in the identified organizations have been classified in the following main areas:

- **Packaging systems: Process control and organization**
- **Design / Smart packaging**
- **New materials**
- **Analysis/characterisation of packaging materials**
- **Packaging/product interaction - Food product-packaging adaptation**
- **Shelf- life of food products**
- **Quality and hygiene standards for packaging**
- **Environmental impact of packaging**

The specific activities carried out have been summarized in the following list:

Packaging systems: Process control and organization

- LCA (life Cycle assessment)/ LCT (Life Cycle Thinking)
- Technological monitoring of products, materials and processes.
- Designing, calculating, simulating, testing and optimising packaging systems, machines and equipment.
- Reengineering packaging processes of food products. (eg.: Packaging Pilot Plant to evaluate the performance of the various systems of product packaging, to define and design the optimal system)

Design / Smart packaging

- Design of packages and packaging systems: Packaging, labelling, printing.
- Optimal design: aesthetic, functional and technical:
  - Dimensional optimization.
  - Simulation of the manufacturing process : optimization.
  - Load simulation (compression, internal pressure, etc).
  - Attributes focused on consumer needs: marketing.
  - Materials and processes features.

New materials

- Development of edible packaging and biodegradable materials
- Functional and improved polymeric materials
- Homologating new packaging materials
- New materials and cellulosic plastics packaging, with special attention to its sustainability

Analysis/characterisation of packaging materials

- Analysis and study for materials in contact with food, methods for toxicological risk assessment
- Analysis of contamination in extruded recycled materials
- Evaluation of the protection offered by the functional barrier in A/B/A structures
- Study of the use of surface films with antimicrobial and antifungal properties
- Mechanical and physical properties, thermal behaviour, permeability
- Development of coatings
- Membrane technology

Packaging/product interaction - Food product-packaging adaptation

- Food contact (migration), food product requirements matching packaging
- Modified and controlled atmosphere packaging
- Cutting, mixing, baking, extrusion

- Heat treatments
- Technologies of conservation (packaging and conditioning)
- Organoleptic analysis of packaged products
- Industrial application of new conservation techniques (MAP, vacuum, radiation, technical materials, etc.)
- Comprehensive design of facilities to handle and package fresh products
- Modelling of packaged foods behaviour
- Evolution of the atmosphere inside the package
- Analysis of the effects on the products due to contact with the materials and gases

Shelf- life of food products

- Increased shelf-life of food products
- Full characterization of food materials and containers with extended shelf-life
- Evaluation of the shelf life and food sensory evaluation for materials in contact with food / Influence of packaging material and technology on the shelf-life

Quality and hygiene standards for packaging

- Study of the various methodologies for the insertion of gas inside the packaging
- Microbiological analysis in order to assess their growth over time
- Quality control of food products with electronic noses
- Tests to determine if the containers meet the requirements set by the rules
- Traceability tools
- Traceability systems for preparation processes, packaging lines and logistics of food products
- Control Analytical techniques/Controls online

Environmental impact of packaging

- Minimization of packaging wastes
- Prevention plans and diagnosis
- New applications of packaging wastes
- Eco-packaging
- Analysis of the impact of packaging to the environment (sustainable packaging)
- LCA of food packaging
- Study for the adoption of new materials or combinations in order to reduce the environmental impact
- Design of an integrated optimization of packaging towards sustainability
- Study of materials and processing techniques for biocompatible and environmentally friendly packaging

The laboratories identified are the following:

Research centre	Description	Location	Contact
Emilia Romagna			
CIRI AGRI-FOOD	Interdepartmental Centre for Industrial Research in Agri-food	Forlì-Cesena Technopole	www.agroalimentare.unibo.it
BIOGEST-SITEIA	Interdepartmental Research Centre for Agri-food Biological Resources Improvement and Valorisation	Ex Reggiane, Area San Lazzaro Reggio Emilia	http://www.biogest-siteia.unimore.it
CIPACK	Packaging Interdepartmental centre	Parma Technopole	www.cipack.it
SITEIA.PARMA	Interdepartmental Centre of the University of Parma	Parma Technopole	http://www.siteia-parma.it
CIRI MAM	Advanced Applications in Mechanical Engineering and Materials Technology	Bologna	http://www.mam.unibo.it
France / Paca Region			
LNE	Laboratoire national de métrologie et d'essais	Paris	http://www.lne.eu
CTCPA	The Laboratory of characterization of packagings of the CTCPA	Paris	http://www.ctcpa.eu
CASIMIR	-	Aubiere	http://www.casimir.org/
Spain / Murcia /Valencia			
AINIA	Agro-food technological center	Valencia	http://www.ainia.es
Ihobe	Ecoefficiency service	Bilbao	http://www.ihobe.net
ULMA Packaging Technological Center	Design and production of packaging equipment and services	Murcia, Valencia and other Spanish cities	http://www.ulmapackaging.com/contact/spain
Centro Tecnológico Nacional de la Conserva y Alimentación	Technological assistance to food businesses	Murcia	http://www.ctnc.es/
ITENE	Instituto Tecnológico del Embalaje, Transporte y Logística	Valencia	http://www.itene.com/

Education and training bodies, advisory services

The courses identified in Italy (Emilia-Romagna), France (PACA region) and Spain (Murcia and Valencia) are aimed to provide the **main following skills related to green agro-food packaging**:

- Chemistry and technologies for the environment and materials
- Packaging technologies
- Packaging design and eco-design
- Design and development of production processes related to packaging
- Innovative and safe packaging
- Environmental Certifications
- Mechanics design
- Management of environmental issues
- Optimization of logistics
- LCA and evaluation tools of sustainable packaging
- Management of waste and recycle
- Environmental communication and marketing
- Testing of packaging
- Energy management (saving, renewable energies, ecc.)
- Packaging techniques of specific production segments f(e.g.: fruits and vegetables)
- Eco-labelling of products
- Methods of food preservation
- Quality systems
- Environment and prevention in the food industry

In the following tables the list of the **professional courses**.

Italy (Emilia Romagna)

Organization	Title
CFP Cesta	Emas and Ecolabel
Ecipar	Mechanics Designer with specialization in agro-food production
	Expert in the management of environmental issues for SMEs
	Strategic Marketing and access to new markets in the agro-food sector
	Efficiency in the production processes for the realization of wood industrial packaging
	LCA – Analysis of the product life cycle from the environmental and ecological point of view
	Optimization of internal and external logistics
	Expert in recycle of “green” material
Formart	Food Packaging
Centro Servizi P.M.I.	Environmental expert
	Expert in planning of the integrated cycle of municipal waste
	Process and product technician in mechanics
	Lean and Green
	The Environmental Declaration of Product
Futura	Embedded systems developer
Formindustria Emilia-Romagna	Development and Design of Agro-Food Products
Cofimp, Aziende , Unindustria Bologna	Quick assessment of production-logistics processes
Iscom	Innovations in the packaging
	Green Economy. Sustainability of production processes, effectiveness of the communication
	Commercial marketing expert specialized in green economy
CISITA Parma	Safe packaging
CE.SVI.P.	Green Logistics: logistics to support environmental development
	Packaging: role, functions and types of packaging
I.F.O.A.	Management Skills Food processing Expert in sustainable logistics in the agro-food sector
CESCOT	Packaging
Fondazione Aldini Valeriani	LCA and eco-design: advantages for the companies and the environment

France (PACA Region)

Organization	Title
LNE	Propack Food Training : knowledge on the regulation of materials in contact, design or modify a packaging, some study case.
CTCPA	Crimping, practice and control
	Control of the sealing of flexible packaging
	The alimentary of packaging management
	Plastic packaging: functionality, chemical inertness, sustainability
	Environment and sustainability
Afnor	ISO 26000
	AFAQ 26000 : evaluation tool of sustainability
	Ecolabel
CRITT agrofood PACA	Develop an environmental packaging
	Knowing tools to reduce environment impact
	Carbon footprint
Eco emballage	Environmental analysis
	Environmental design for packaging
Ademe	Climate change
	Waste
	Energy saving
	Energy building
	Renewable energy
	Urban planning

Spain (Murcia and Valencia)

Organization	Title
ECOEMBES	Packaging Online course for professionals and Environment.
	Classroom Training Specialist Packaging and Environment (Barcelona).
	Ecodesign as training courses in company.
ITENE	Course of Packaging Technology: Fundamentals.
Instituto de Formación Integral	Food labelling. Methods of food preservation. Quality systems, environment and prevention in the food industry. Packaging line. Packaging techniques of fruits and vegetales
Kideak Ingurumenaren Engineering, S.L.	Environmental Awareness Identification of Environmental Aspects Ecodesign Life Cycle Assessment LCA software tools Environmental Management Systems design and development process of products ISO 14006 (formerly UNE 150301) Eco-labelling of products

Universities also have specific courses and Master focused on packaging. Some example in the following table.

Course class	Title	Location	Link
UPV, Universidad Politécnica de Valencia	Master degree in Packaging Technology	Valencia - ES	
University of Parma	Master in Packaging	Parma - IT	
University of Bologna (Rimini)	Chemistry and technologies for the environment and materials	Rimini - IT	
University of Parma, Faculty of Mathematics, Physics and Natural Sciences	Industrial chemistry and packaging technology	Parma - IT	

Other Initiatives

National packaging organizations also carry out initiative related to training concerning green packaging .

Description of measures	Country	Organization
CONAI provides member companies with training activities dealing with the issue of environmental sustainability of packaging. The Consortium plans training courses on eco-sustainability and packaging waste prevention, aimed at reaching a growing number of companies .	Italy	Conai
Eco-audit: it's an advisory service which provides companies with an ecological profile. The service is divided into three phases: 1. filling in of a preliminary questionnaire; 2. one day on site for data collection and training on eco-design 3. data processing by means of an Eco-audit tool and issuing a report with the foreseen strategies and measures addressed to improve the packaging management; http://www.istitutoimballaggio.it/wp-content/uploads/2011/08/Brochure-eco-audit.pdf	Italy	The Italian Institute of Packaging
In order to promote the integration of ecodesign in companies Ecoembes has launched a training facility which offers different types of courses (in person, online, in-company training and workshops) through which they can specialize in packaging and the Environment. Under this initiative, in 2009 created a Ecoembes Web portal online training "Environmental Classroom Ecoembes" available at http://www.ecoembes.com/en/documentos-e-informacion/aula-ambiental/Pages/default.aspx where businesses can find out about courses and programmes. Training on packaging and sustainability: • Strategies for improving the recyclability of packaging • Packaging waste management • Europe-wide initiatives	Spain	Ecoembes
On site diagnosis Packaging experts spend 2 days on site to provide companies with simple and operational recommendations for packaging reductions and potential cost savings. http://www.ecoemballages.fr/entreprises/prevention/outils-services-formation	France	Ecoemballage

Chapter 4 - Who already did it

Prevention measures to support sustainable packaging

Case studies of innovative initiatives on sustainable packaging from dossier, awards, guidelines, etc.

In this chapter, intervention tools (guidelines, dossier, awards, etc), mostly addressed to the application of best methodologies for innovation and knowledge management, with the goal to improve both companies active in the packaging sector and the enabling environment, have been identified.

Case studies of communication initiatives on sustainable packaging	Country	Organization
Dossier Prevenzione Conai. A collection of cases on sustainable packaging innovation, promoted by the member companies. For any case study there is a factsheet that describes the action adding figures, presenting the brand and the name of the product, the prevention criteria adopted and the effectiveness of the action. http://www.conai.org/hpm00.asp?idcanale=99	Italy	CONAI
EPACK CONAI. A new online service to companies who want to improve their performance in terms of eco-design and implementation of eco-efficient packaging http://www.conai.org/hpm01.asp?CgiAction=Display&IdCanale=190&IdNotizia=2138	Italy	CONAI
Practical guide to the eco-design of packaged products http://www.conseil-emballage.org/Img/Publications/85_2.pdf	France	CNE
The packaging oscar is a traditional event held by the Institute. Organized for the first time in 1957, in the form of a competition, it has evolved over the years into a valuable tool for all the innovative companies operating in the sector. It's specifically dedicated to the eco-innovations in packaging. The competition is promoted through a special publicity campaign, in a number of technical magazines, and on the Institute's web site. http://www.conai.org/hpm00.asp?idcanale=99	Italy	The Italian Institute of Packaging
Catalogue of best practices of packaging reduction. A web site showing best practices of packaging reduction. http://reduction.ecoemballages.fr/	France	Eco-emballage
The Trophies of the Green dot have a double objective to reward the actors whom initiatives and actions deserve to be distinguished for their capacity to reduce packaging and to improve the sorting and the recycling and to value best practice regarding raising awareness, regarding optimization of collection, sorting and recycling as well as reduction of the impact of packaging on the environment. http://www.ecoemballages.fr	France	Eco-emballage
Remarkable packaging & alternatives during the Salon de l'emballage, Paris. The students of six international design schools dreamed up alternatives to the packaging considered to be symbolic of our daily lives. The selection of the award-winning works is based on four principal criteria: sustainable development, use, attraction and communication. http://en.emballageweb.com/	France	Salon de l'emballage, Paris
Prix Entreprises & Environment during Pollutec, International exhibition of environmental equipments, technologies and services. Each year, POLLUTEC rewards the best innovations through various awards and trophies. http://www.pollutec.com/GB.htm	France	Pollutec
Best Practice on Ecodesign Search Engine. This search engine currently consists of over 400 examples of packaging environmental improvements, selected from the initiatives implemented by companies participating in the Plan. The selection includes experiences from all sectors of activity and involve all packaging materials and types of measures implemented within the Prevention Plan framework. http://www.ecoembes.com/en/gestion-de-empresas-adheridas/prevencion/Pages/Best-Practice-on-Ecodesign-Search-Engine.aspx	Spain	Ecoembes
Awards R Awards on innovative initiatives in recycling and sustainability by Ecoembes, which recognizes the initiatives that contribute to the protection and respect for our planet. http://www.premiosrdeecoembes.com/	Spain	Ecoembes

Case studies of sustainable companies

France (PACA Region)

Name / Weblink	Segment of Activity /Description	Green Packaging Criteria
Les calissons du Roy René http://www.calisson.com/	**Activity** Production of sweet products as “nougats” and “calissons **Description** The company Calissons du Roy René has initiated a sustainable development approach at the outset on the environmental component through a study on the **recovery of a portion of its organic waste**. It then implemented an approach to the **eco-design packaging** to reduce its environmental impact. They have realized last year a **diagnosis on sustainability**, in order to know their points of weaknesses to work in 2013. Finally the company will build its new factory HQE (high environmental quality) and implement **actions on the social, societal and environmental components.**	•Packaging system simplification •Raw material conservation •Other criteria
Soleou http://www.soleou.fr/	**Activity** Preparation and conditioning of oil and flavoured oil **Description** Soleou is a pioneering SMEs in the implementation of sustainable development on the 3 pillars (environment, economic and social) approaches. They were started by the establishment of an **eco-design approach on their packaging in 2009** (olive oil in tetrapak) on which they initiated a partnership with WWF, **then joined the Global Compact of the United Nations** (Global Compact), and have realized a **sustainability diagnosis** and built an action plan in 2011 to work on various aspects (particularly **social approach**).	•Packaging system simplification •Other criteria
Tossolia http://www.tossolia.com	**Activity** Production of “tofu” (which is also called soja steak) **Description** The company has worked in 2011 on the **assessment of the environmental impact** of its main pack and found solutions to reduce it. Furthermore the company, manufacturer of organic products, has implemented **environmental actions** for a few years (sewage treatment, reduction of energy consumption and waste…).	•Packaging system simplification

Spain (Murcia and Valencia)

Name / Weblink	Segment of Activity /Description	Green Packaging Criteria
AGUA DE MONDARIZ, FUENTE DEL VAL	**Activity** Manufacture and distribution of drinking water bottle **Description** A bottle have been redesigned to use less material per bottle.	•Raw material conservation
HERRERO MARINESCA CONSERVAS.	**Activity** Canned food **Description** - Packaging weight reduction through design changes. - Incorporation of secondary raw material using recycled material. Changed the grouping packaging design for cans, reducing the height. The box contains six primary packaging units, as grouping the previous model. Thus the former case weighs 145.8 g and the new 92.4 g 53.4 g getting a lighter package. It has also changed the material of the current box, which is now fully recycled cardboard.	•Raw material conservation •Use of recycled materials
TORRES Y RIBELLES	**Activity** Cook oil **Description** Optimize volume of the packaging to improve the logistic.	•Raw material conservation •Optimisation of logistics
Grupo Leche Pascual S.A	**Activity** Soya drinks and juice drinks and milk **Description** Packaging weight reduction through technological improvements of the materials. Reduce by 5.3% the paperboard grammage grouping boxes 8 "cartons" 1 liter passing weigh 180 grams instead of initially weighing 190 grams.	•Raw material conservation
PRODUCTOS CAMPANAL	**Activity** Canned food **Description** Packaging weight reduction through removing elements from Packaging: removing labels accompanying cans corns and fabada steel HIGHNESS. Currently the product information is lithographed directly on the can.	•Raw material conservation

Italy (Emilia Romagna)

Name / Weblink	Segment of Activity /Description	Green Packaging Criteria
TETRA PAK Italiana Spa www.tetrapak.com	**Activity** Packaging **Description** Tetra Pak monitors and measures its environmental performance and reports about it annually by disclosing the progress towards goals and general performance on a number of performance indicators. Wood fibre used in Tetra Pak packaging comes from responsibly managed forests certified to the highest standards, currently set by FSC (Forest Stewardship Council). The Tetra Pak forestry programme's focus is on traceability of supply and sustainable forest management. Tetra Pak is member of ACE (the Alliance for Beverage Cartons and the Environment) in Europe. Example of **Environmental solutions** (Processing Dairy): Tetra Lactenso Aseptic with OneStep technology reduces fresh water consumption and carbon footprint.	- Packaging system simplification - Recycling activities simplification - Raw material conservation
Centroplast www.centroplast.it	**Activity** Flexible plastic packaging **Description** S.R.S. (Solvent Recycling System) In 2011, the printing machines have sent to the solvent recycling system (SRS). The S.R.S. retrieves an average of 176.050 kg of raw solvent per month for a total estimated annual of 2,112,589 kg of solvent blank in 2011. It is also important to note that the emission of solvent Total Organic Compounds (TOC) corresponding to these amounts recovered 2,112,589 kg to 10.6 kg per year, or less than one pound per month. In other words there is an emission of 5 mg of TOC per kg of crude recovered. Of this crude material recovered, the usable part provides two products: distilled ethyl acetate and alcohol recovery. Alcohol Recovery: 15.993 kg/month (average month 2011) for a total estimated annual 178.752 kg. Cogeneration Cogeneration is a technology that increases energy efficiency (thermal and electrical) of a system's overall energy conversion. The electricity produced by the cogeneration Centroplast final balance for the year 2011 amounted to 3.833 MWh (almost half the annual consumption Centroplast equal to 8.173 MWh). By running the motors of the cogenerator, in addition to this electrical energy has been recovered a satisfactory amount of thermal energy: - 1.315 MWh thermal heat transfer on the oil used to power the printing presses; - 884 MWh heat used to heat water for the uses of Centroplast sanitation. The plant have been recognized WHITE CERTIFIED (or energy efficiency certificate) certifying energy saving corresponding to 900 TOE (tonnes of oil equivalent not used).	- Packaging system simplification - Reuse - Raw material conservation

CPR System www.cprsystem.it	**Activity** Packaging **Description** CPR System is a cooperative between the principal players in the agrofood chain, offering a system of **reusable, recyclable boxes,** with collapsible sides, for the fruit and vegetables sector. By joining CPR System, producers and distributors have the opportunity to make use of these boxes, entrusting the logistics management to CPR, which guarantees the functioning of the entire system through the supply of services, by means of an I.T. system ensuring total control and cost transparency. These boxes are made of colored polypropylene with additives to resist ultraviolet rays and are totally recyclable. They can be used throughout the production chain, from the producer to a warehouse, from a general market to a retail store, and allow, with their collapsible sides, space, and cost savings when transported empty; in fact, 4 closed boxes occupy the space of one open box.	- Optimisation of logistics -Reuse - Raw material conservation
Consorzio Bestack www.bestack.com	**Activity** Packaging **Description** The consortium carries out activities of research and promotion of corrugated cardboard packaging for fruit and vegetables. Its members adopt a voluntary certification system that deals with dimension and performance of the packaging, ensuring high efficiency of logistics and recycle.	- Optimisation of logistics - Use of recycled materials

Chapter 5 - Territorial figures in Italy, Spain and France

This Chapter provides a short overview of the packaging placed on the market, tonnage recovered, and some basic statistical data on actual recovery and recycling performances in Italy, France and Spain.[6]

Facts, figures and trends

The economic downturn remains key factor affecting packaging industry

The economy in *Italy* declined in 2011 despite a good start to the year and expectations of a recovery. The most important effect was felt in the foodservice channel with the decline in sales of glass packaging and the growth of PET bottles, which is cheaper and more convenient for on-the-go consumption. Similarly, the use of thin wall plastic containers and plastic pouches has grown, as consumers want products that can be prepared and consumed easily at home. These packs enable the consumer to heat prepared products in the microwave oven.

Reduced spending by consumers impacted strongly on foodservice sales in *France* in the review period. Consumers showed higher sensitivity about unnecessary purchases. However, brand owners tried to relaunch foodservice consumption by innovating their packaging to respond to the on-the-go trend. This packaging innovation enabled the company to offer lower prices in foodservice outlets.
Spanish consumers have become extremely concerned over their financial security and the decline in disposable incomes has increased the importance of price in the choice of products. The main effect of this trend has been the collapse of sales volumes in the foodservice channel, with consumers preferring to meet at home in a bid to reduce expenditure. This has evolved into a shift in demand – from glass bottles, traditionally used in this channel, to more economic pack types bought in bulk or larger volumes.

Convenience is a main source of differentiation and offers environmental benefits

The economic crisis and stronger competition in the *Italian market* saw consumers demand more value from consumer goods. This is forcing brand owners to lower the costs of production and reduce prices to attract consumers and is affecting profits. Because consumers want to save time and money, they prefer to eat and drink at home, especially with friends, or buy products in convenience stores to consume on the go.

Packaging unit volume sales enjoyed positive growth in *France* in 2011. The positive performance was chiefly driven by retail unit volume growth at the expense of foodservice. The stronger trends of homemade meals and social gatherings at home led to product innovation and boosted retail packaging sales. The growing demand for convenience is a significant factor in the development of packaging in France. The trend for homemade meals saw brand owners try to widen their consumer base by increasing consumption opportunities. Widening the packaging mix also helped brand owners to target new young adults. Thus the product was promoted via

[6] This Chapter is based on the information provided by Euromonitor International's research which offers a unique combination of specialist industry knowledge and in-country research expertise. October 2012.

social networking sites such as Facebook.

Increasing consumer demand for low prices and enhanced convenience has forced brand owners to consider new forms of packaging in *Spain* as well.

Private label operators become pioneers in packaging innovation

Supermarkets and hypermarkets continued to expand in 2011 in *Italy*, as they benefited from the increasing demand for low prices due to the economic crisis and decline in disposable incomes. This has benefited the growth of private labels as they are cheaper than traditional brands, especially for mature product types, where consumers do not perceive differences in quality. As a result, brand owners are being pushed to standardise packaging in order to achieve economies of scale and increase competitiveness.

Increasing consumer demand for low prices has benefited the development of private label in *Spain* in 2011, given the price advantage of these products. The perception of the value and quality of private label products has increased considerably and consumers are shifting towards these products at the expense of main brands across most categories, especially for commodities traditionally dominated by leading brands. Private label operators have mostly focused on enhancing the value-added features of packaging in consumer goods to attract consumers, and increased the supply of chilled product varieties as an alternative to ambient preserved products in a bid to respond to the health concerns of consumers.

Healthier eating habits drive packaging innovation in canned/preserved food

The awareness of healthy eating habits was strengthened by ongoing governmental campaigns such as “Five fruits and vegetables a day”. This encouraged *French consumers* to show more interest in products claiming health benefits. Additionally, busy lifestyles and longer working hours fostered the emergence of easy to carry and use products.

Italy - Facts & Figures

Turnover
28,6 billion € turnover (2011)
6% of world production

Employment
105.750 employees (2011)

Number of companies
7,246 companies (2011)

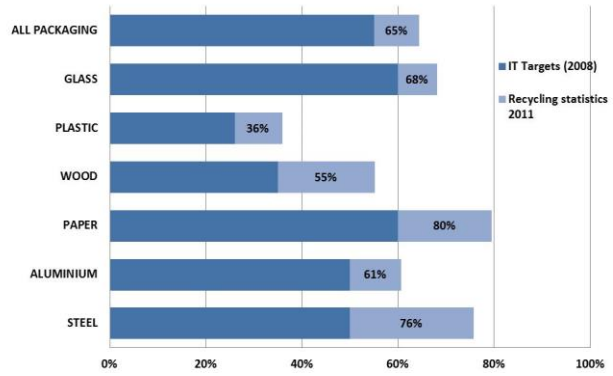
Source: Istituto Italiano Imballaggio, (2011), L'imballaggio in cifre 2012

Packaging placed on the market
11,657 Million tonnes (2011)

Tonnage recovered
8,596 Million tonnes (2011)

Actual situation
73.7% recovery overall (2011)
64.4% recycled (2011)

Recycling performance – 2011



Source: CONAI General Prevention and Management Programme 2001

Recovery perfomance – 2011

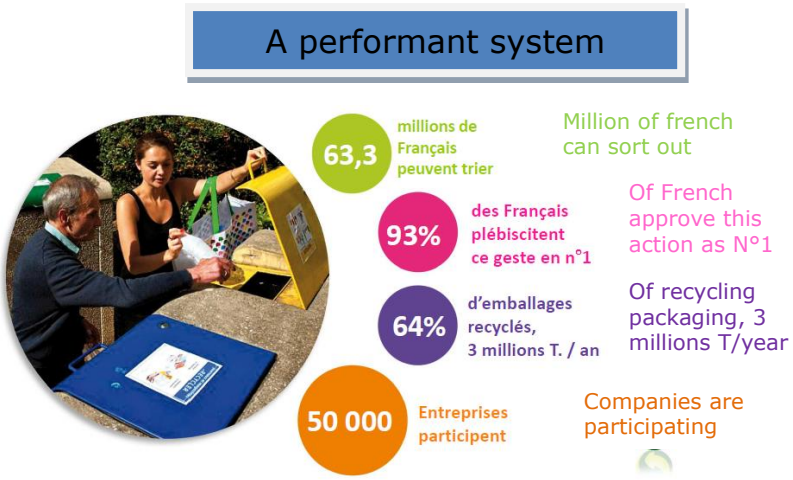
Source: CONAI General Prevention and Management Programme 2001

PACMAn

France - Facts & Figures

Turnover 20 billion € turnover (2006) 3% of the turnover of the manufacturing industry
Employment 111 000 employees (2006) About 6% of the French employees
Number of companies 850 companies of 20 employees or more

Packaging placed on the market 4.7 Million tonnes (2008)
Tonnage recovered 3.0 million tonnes (2010) household packaging
Actual situation 64.3% recycled (2010)

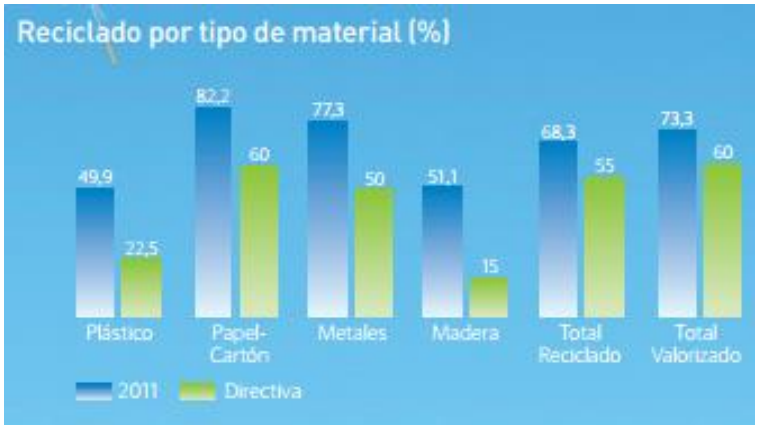


Source: Eco Emballage

Spain - Facts & Figures

Turnover 17,463 million euros (2010)
Employment more than 73,000 workers (2010)
Number of companies 1,483 companies (2010)

With regard to recycling, in Spain in 1998 was recycled only 5% of the containers that were placed on the market. However in 2011 and recycled 68.3% of all containers attached to Ecoembes, ie 1.2 million tons (over 81,000 million packs). Recent results have exceeded the targets set in the 1997 Act and laDirectivaEuropea 2004/12/EC. Thus, Spain has confirmed its ability to respond to solvency requirements of the European Union on recycling.



SOURCES:
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