

## **PACKAGING... WHAT FOR? Packaging is crucial for logistics**

## Table of contents

Introduction .....	3
A word from the president .....	3
Summary .....	4
Goals 4	
2. CONTEXT .....	5
2.1. Distribution in physical stores.....	6
2.2. New ways of distribution .....	6
3. Definitions.....	7
3.1. Logistics.....	7
3.2. The logistics functions.....	7
3.3. The product's life cycle.....	9
4. Packaging is crucial for products' logistics .....	10
4.1. Handling of products.....	10
4.1.1. Facilitating product logistics by the consumer/user .....	10
4.2. Products' distribution.....	12
4.2.1. Grouping of products .....	12
4.2.2. Optimizing the processes of palletization, handling, storage, etc. ....	13
4.2.3. Protecting the product.....	14
4.2.4. Informing the supply chain actors .....	15
4.2.5. Informing the consumer .....	16
4.3. Manufacturing/packaging of the product.....	17
4.3.1 Preservation of the product in a modified atmosphere.....	17
4.3.2 Integrating logistical contingencies.....	18
4.3.3 Protecting the product.....	19
4.4. Supply of raw materials.....	20
4.4.1 IBC/GRV .....	20
4.4.2 The supply of spare parts .....	22
4.4.3 Packaging of raw materials .....	23
4.5. Contribution to sustainable logistics.....	25
4.5.1 Optimizing flows .....	25
4.5.2 Integrating the circular economy.....	26
5. CONCLUSION .....	30
6. APPENDIX .....	31
6.1. Other definitions.....	31
6.2. The five topics of packaging .....	33
6.3. Regulations .....	35
Acknowledgments.....	40

### A word from the president

As I was introducing this topic, I carefully reread what I had written 5 years ago on the logistical functionality of packaging. 3 pages out of 230 in the book dedicated to packaging. In other words, that is very few. And I realize it today, probably not enough. The reason being that this functionality is so obvious that it doesn't need to be elaborated on. Wasn't packaging created by man to get products from the producer to the consumer?

The almost exponential development of e-commerce also sometimes makes the modern and "connected" consumer believe that products arrive at home by the magic of a simple click on a smartphone. I recently had the opportunity to answer the following question: "But with digital technology, with the digital revolution underway, what will happen to packaging?" Implied, will there be any left? This simple question (which did not come from a student) clearly shows that not all the functionalities of a packaging are well known. Yes, digital technology will change many things in the packaging industry, but products will not be transported via the internet. Bringing products from one place to another remains and will remain a physical action for which protection and identification of the product are absolutely essential.

In the end, the "logistics" functionality of packaging is not as obvious as it seems and it is the objective of this document to remind that without the "packaging" tool, the world of logistics would not work.

Michel Fontaine

## Summary

As everyone knows or can guess, products do not fall from the sky whether it is within the framework of a traditional distribution or an E-commerce distribution.

The packaged product is part of a defined life cycle: it must go through various stages of production, packaging, palletization, routing, storage, and distribution before its use by the consumer (or user) and the transport packaging at the end of its life is recovered in a downstream logistics chain.

To ensure the integrity of the product and for the implementation of a smooth logistics, the design of the transport packaging is essential for technical, economic and environmental reasons.

The steps below are detailed under various aspects and are illustrated by examples in order to show the diversity of the functionalities carried by this packaging unknown to the general public:

- Product handling
- Product distribution
- Product manufacturing/packaging
- Raw material supply

Finally, the actors of this ecosystem work together on a daily basis to reduce the global environmental impact and define together a packaging contributing to a sustainable logistics, here too examples are proposed.

## Goals

The goals of this document are:

- To show the importance of the functions of a packaging unknown to the general public: the packaging ensuring the logistics of the product and to show that a whole ecosystem exists (actors, machines, packaging, logistic means).
- Demonstrate that transport packaging must meet the strong constraints of the supply chain, both to protect and transport the finished product and to optimize the economic cost of so-called "end-of-line" operations.
- Describe the distribution and consumption modes and show the importance of packaging in the efficiency (especially economic) of these processes.
- Show the universality of this type of packaging insofar as standardization is pushed to its maximum in terms of dimensions, traceability and reusability.
- Finally, to remind that without this packaging, the supply chain (whether raw materials, spare parts or finished products) stops, just remember the speech of Edouard Philippe<sup>1</sup> during the pandemic at Covid-19.

---

<sup>1</sup> <https://conseil-emballage.org/lemballage-est-necessaire-a-la-vie-du-pays/>

## 2. CONTEXT

### **Preamble**

The subject of the movement of a product from a place of production to a place of distribution and then of use or consumption is a universal subject (see description of the modes of distribution below). The packaging, especially in transport, is essential to ensure these movements of products and associated raw materials.

Consumer products are distributed on a large scale: there is a real industrial dimension to packaging to take on this fact. There is a whole ecosystem, actors, packaging, machines, etc.

Logistics processes (handling, grouping, palletization, storage, trans-storage, etc.) are all elements that involve packaging designed according to rules and specifications (palletized loads, standardized dimensions, load securing, etc.).

This high level of mechanization of storage and order preparation processes, whether for traditional distribution or e-commerce, includes dedicated packaging, while also including economic and environmental optimization.

The regulatory context (SUP directive, AGEC law, Climate and Resilience law, etc.) emphasizes the reuse of packaging and the recycling of packaging. Transport packaging considers this regulatory aspect in its specifications.

## 2.1. Distribution in physical stores

The distribution of consumer goods is mainly carried out on the date according to the diagram below, using various modes of transport with packaged products presented in palletized units.

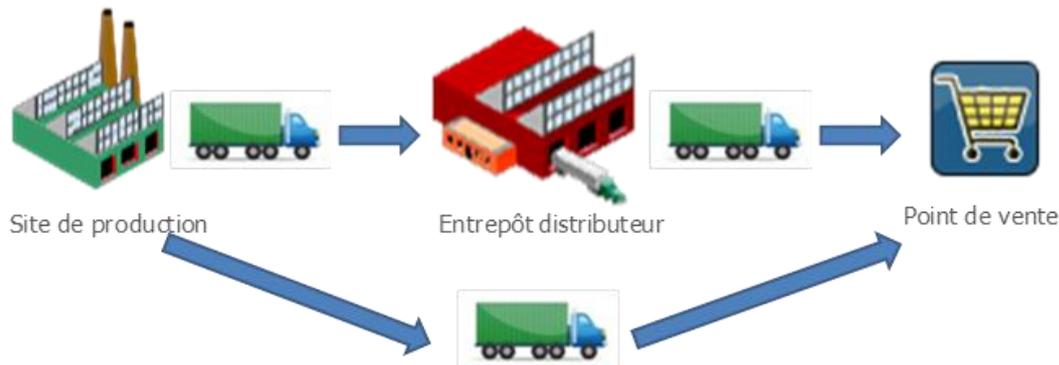
Consumers go to physical stores to make their purchases and then take them home. Not all the logistics specificities linked to the products are reproduced here (e.g. refrigerated transport, rail transport, river transport, air transport and all operations in logistics centers, etc.).

Note: this diagram does not include export flows or distant import flows.

\*"site de production": production site

\*"entrepôt distributeur": distributor warehouse

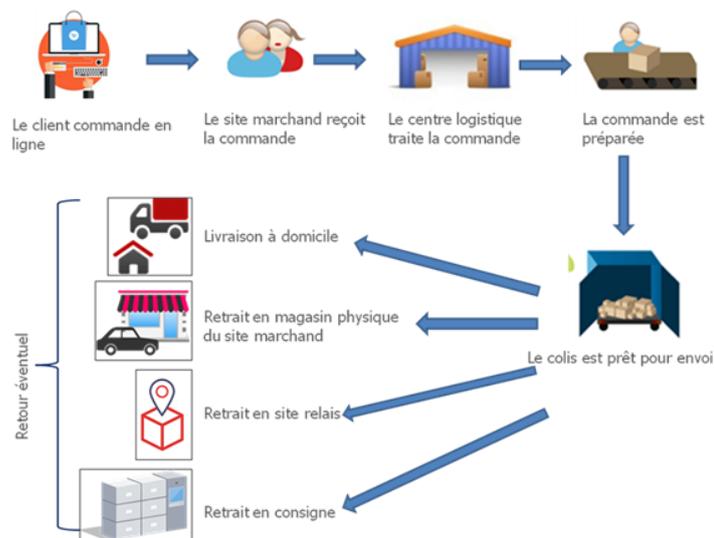
\* "point de vente": sale point



## 2.2. New ways of distribution

**E-commerce** (distance selling) **growth**<sup>2</sup>: E-commerce sales in 2020 are expected to reach 112 billion euros, up 8.5% over one year. 30% of orders are now made on mobile devices (phones, etc.).

E-commerce represents 13.4% of the retail trade but still less than 2% of the food trade, excluding the drive-through. This sector has been further strengthened by the global pandemic period.



To learn more about new consumption patterns and new distribution channels, the CNE invites the reader to read its document: <https://conseil-emballage.org/en/packaging-the-development-of-consumption-patterns-and-distribution-channels/>

<sup>2</sup> <https://www.fevad.com/bilan-du-e-commerce-en-2020-les-ventes-sur-internet-atteignent-112-milliards-deuros-grace-a-la-digitalisation-acceleree-du-commerce-de-detail/>

## 3. Definitions

### 3.1. Logistics<sup>3</sup>

*"The planning, execution, and control of the movement and placement of people or assets and the supporting activities associated with such movement and placement, within a system organized to achieve specific objectives."*

### 3.2. The logistics functions

*"A function<sup>4</sup> whose purpose is to satisfy expressed or latent needs, under the best economic conditions for the company and for a given level of service. The needs are internal (supply of goods and services to ensure the operation of the company) or external (customer satisfaction). Logistics calls upon several professions and skills that contribute to the management and control of physical and information flows as well as resources."*

The mission of the logistics function is to optimize all of the company's physical and informational flows and addresses two main types of flows: material flows and information flows.

Moreover, the action of logistics can be apprehended through two dimensions:

- a technical dimension: logistics includes classic transport activities such as storage, the use of transport and lifting machines, but also the layout of premises in order to optimize the flow of components. In addition, it includes the management of returns related to after-sales service.
- a functional dimension: logistics is a very transversal function. It will therefore optimize the overall circulation network of component and product flows.

Logistics is composed of 4 sub-systems:

- Procurement,
- Production,
- Logistics itself, i.e. all the operations required to bring the product from the manufacturer to the user: preparation, packaging, control, sorting and storage,
- Reverse logistics<sup>5</sup>

Designing, producing, and delivering products in increasingly shorter timeframes, while ensuring safety and reliability, is a major challenge for companies.

For a number of years now, the globalization of product flows has led to many logistical movements around the world: the Covid-19 pandemic has shown us this more than once.

In order to provide these logistics services from a production basin to a consumption point, numerous steps take place, notably involving regrouping, splitting and other order preparations.

---

<sup>3</sup> Standard NF EN 14943 (NF X 50-601): transport services - logistics - glossary of terms

<sup>4</sup> Norme NF X 50-600 : management logistique démarche logistique et gestion de la chaîne logistique.

<sup>5</sup> Definition (adapted from Rogers & Tibben-Lembke - 1998): Reverse logistics is the process of planning, implementing and controlling the performance of:

- raw material utilization.
- of work-in-progress: stock, production, finished goods.
- the management of the information chain from the customer to the supplier to recover, create or dispose of the value of the products sold and the associated packaging, while minimizing the impact on the environment and the use of resources.

The logistics sector<sup>6</sup> represents 1.9 million jobs in France, both among the actors of Industry, Trade and Distribution, Transport and Logistics providers, but also those of associated activities. It represents 347.8 billion tons/km of transported goods, and 78 million m<sup>2</sup> of warehouses of more than 5000 m<sup>2</sup>.

Historically, concerns associated with product development have generally focused on optimizing production operations (raw materials, packaging, processes, etc.) and the consumer experience of the product (marketing innovation, use value, etc.), with optimization of product logistics generally investigated right up to the production plant (optimization of palletization plans, stability of products on pallets, etc.)

Beyond these optimizations of formulations, processes, packaging, etc., in view of an increasingly multi-channel distribution, product logistics becomes a source of continuous improvement and a potential source of savings. A quality Supply Chain is therefore obvious, it must be controlled and agile.

This logistics also integrates the dimension of E-commerce where the flow of products must be irreproachable for the user at the point of delivery.

The logistics of any product-packaging pairing must therefore be thought through:

- **by thinking about the complete packaging system** (primary packaging, secondary packaging and transport packaging),
- **by integrating circular economy strategies** (eco-design, recyclability, reverse logistics, pooling of resources between players, etc.),
- **in its entirety**, because business choices made at one point in the supply chain can have an impact on another point in the chain: the economic model chosen by one player in this supply chain is not without consequences for the economic model of other stakeholders.

---

<sup>6</sup> Source France Supply chain : [www.francesupplychain.org](http://www.francesupplychain.org)

### 3.3. The product's life cycle<sup>7</sup>

The life cycle of a product considers all the activities involved in the manufacture, transportation, storage, use and disposal of that product. The life cycle is usually illustrated as a series of stages, from production (with upstream raw material extraction or harvesting) through manufacturing, packaging, transportation, household consumption, industrial use, recycling or disposal, to final waste disposal (with downstream recovery or disposal).

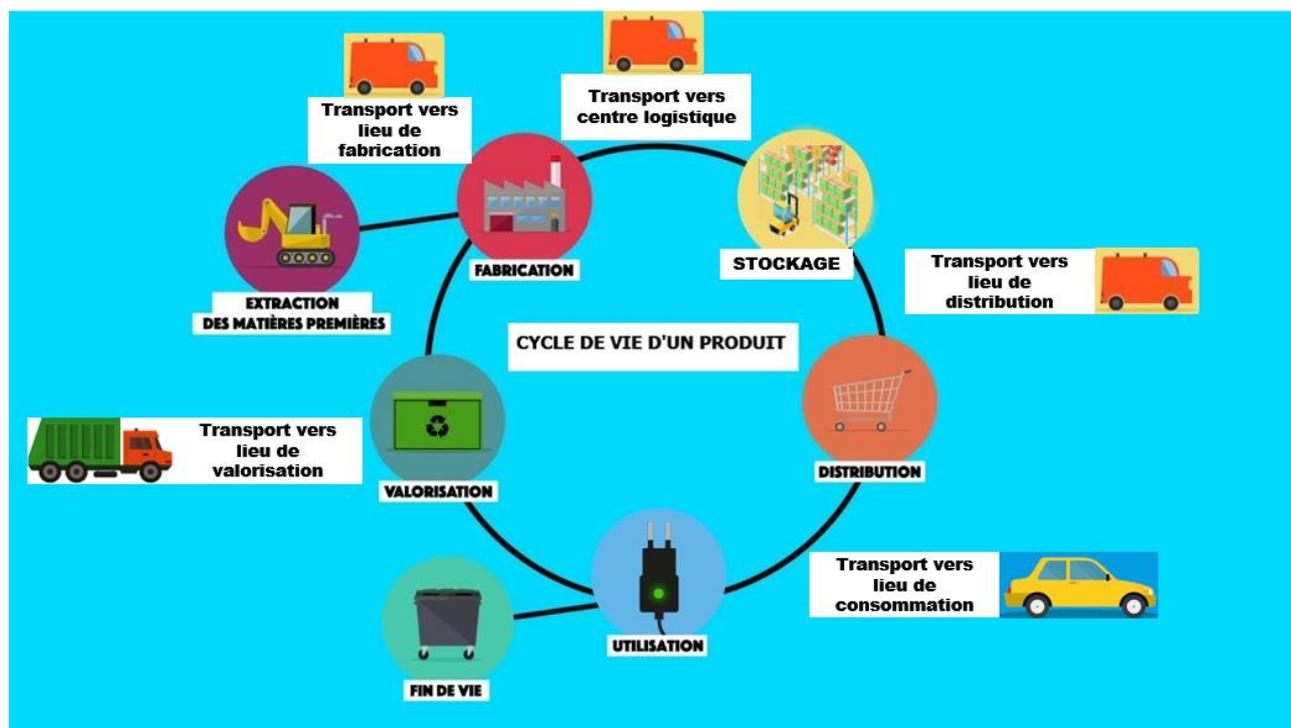
In this document, the CNE shows that the product cannot "travel" alone and that the so-called transport packaging is important to follow the pathway below.

Starting from the life of any product, this document will trace the path of the packaging, especially transport packaging: the latter will participate in the fact of routing from a point A to a point B, first raw materials, then products and finally packaging in place of recovery.

Naturally, this journey cannot be exhaustive as there are many stages that the simplified diagram below cannot summarize.

**The reader will discover during this "journey", that the packaging system is important and it assumes many functions without the final consumer knowing it.**

Diagram: Source: CNE (inspired by Ademe)



The life cycle of a product is divided into 5 main stages:

- Supply of raw materials (extraction, transformation, etc.)
- Manufacturing - packaging
- Product routing (distribution, marketing)
- Use of the product
- End of life management (recovery, reuse, recycling, waste treatment...)

<sup>7</sup> For more information: Ademe's explanatory video: [https://www.youtube.com/watch?v=SJq7i\\_3UODM](https://www.youtube.com/watch?v=SJq7i_3UODM)

## 4. Packaging is crucial for products' logistics

### Preamble

This chapter takes the life cycle from the end user (consumer) back to the source of the product, the raw materials. The functions of packaging associated with these stages are proposed with the help of examples. At each stage, packaging coexists in response to a need and let us not forget that as soon as there is a movement of material, of product, there are packaging and actors.

The proposed journey within the life cycle includes the following stages:

1. Handling of products
2. Product distribution
3. Product manufacturing/packaging
4. Raw material supply
5. Contribution to sustainable logistics

### 4.1. Handling of products

#### 4.1.1. Facilitating product logistics by the consumer/user

The customer experience of the packaged product by the shopper is important, and the consumer can be considered the last "logistician"<sup>8</sup> of the entire supply chain:

- The shopper performs logistical activities comparable to those of professional actors: transporting items in the cart; loading/unloading the vehicle; transporting from the point of sale to the home; storing/storing in the closet or refrigerator at home; managing the cold chain to the home; managing products and packaging at the end of their life.
- The shopper makes choices and arbitrates between the quality of the logistical service("benefit") obtained from the packaged product and the costs (fuel depending on the weight of the packaged product) as well as the non-economic costs (effort, burden, "non-comfort", time spent).
- The shopper is confronted with typical decisions of a supply chain actor, such as outsourcing logistic tasks - via home delivery and online shopping - or internalizing logistic tasks - via traditional shopping.

Packaging design should therefore consider the requirements of the ultimate logistician, the shopper: he reasons in terms of cost-benefit like any other actor in the supply chain. The ergonomics of the packaging should therefore target the shopper not only as a customer (marketing approach), but also as the last logistician (logistics approach).

---

<sup>8</sup> HARRIS K., HARRIS R., BARON S. (2001), "Customer participation in retail service: lessons from Brecht". International Journal of Retail & Distribution Management, vol. 29, n. 8, pp. 359-369.

## Example of products sold in Drive

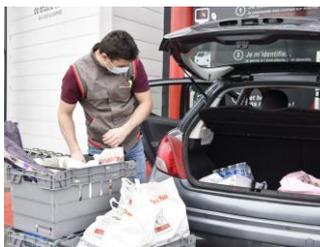
### Definition

The drive generally designates a point of withdrawal of goods or goods within which the customer takes delivery of his articles directly within or near his vehicle. For some years now, it has also been used to designate the withdrawal points proposed by the major food retailers which allow the delivery of items to the boot of the vehicle. In this case, the order is placed beforehand on the Internet from a computer or a mobile application on a smartphone and the customer choose a pick-up time slot.

### Figures<sup>9</sup>

According to Iri's figures, sales of all products made online by large food stores (drive, pedestrian drive and home delivery) were 9.865 billion euros (from January 6, 2020, to January 3, 2021), an increase of 46.5%, which is close to the 10 billion marks in sales. A chasm compared to the sales of 2019, with an additional turnover of 3.1 billion euros. In this economic landscape, the drive represents 92% of the total, or more than 9.1 billion euros in 2020.

Packaging is important to facilitate drive-through operations, such as filling the trunk of the customer's car.



## Example of a transport aid for the consumer

Concerning the grouping of packaged products such as beverages: the handle attached to the grouping unit is clearly a handling aid, especially for the last logistician, the consumer.

More widely, any system that facilitates the handling of packaged products (e.g., drink grouping packs) or large containers (e.g., large bags of fertilizer, rice, pet food, etc.) is important for moving these products from the point of distribution/sale to the point of consumption.



<sup>9</sup> Source: <https://www.lsa-conso.fr/infographie-la-progression-du-drive-en-2020-et-le-detail-des-ventes-par-categorie,369978>

## 4.2. Products' distribution

This stage of product distribution includes transport, handling, storage, etc., regardless of the nature of the facility (logistics center, warehouse, etc.).

### 4.2.1. Grouping of products

#### Example of the pallet and associated packaging

- World production of new pallets from the main industrialized countries: in the order of **2.3 to 2.5 billion units, i.e. an average ratio of about 0.55 new pallets per inhabitant**
- World production multiplied by 6.8 in 50 years
- **8 billion wooden pallets** in circulation (estimate)

The weight of the wooden pallet in France:

- 98.5 million used pallets collected in 2019 of which:
  - 56.5 million resold as is
  - 35.5 million repaired and resold
  - 6.5 million crushed and recycled
- 842 million in sales
- 645 pallet manufacturing and reconditioning companies
- Approximately 350 million wooden pallets in circulation

#### Packaging

Packaging is **a crucial and essential factor** in reliable logistics, particularly in order to ensure functions such as product protection, safety, transport, shelf availability, etc.

The CNE reminds us that **the logistical efficiency** of products is one of the **performance criteria** imposed by Directive 94/62/EC and its associated standards (standard NF EN 13428): this performance criterion must be assessed in relation to requirements linked to products, but also to environmental and sustainable development requirements.

The transport pallet is a fundamental element of any product development and supply chain organization: its dimensions aim at optimizing the loading of the means of transport. They determine the dimensions of the transport packaging, the sales units and ultimately the product itself. It allows to deliver products from a point A of production to a point B of distribution.

In addition to the pallet itself, it is important to remember the packaging elements that are essential to the constitution of a palletized load, i.e., the corner protectors, the spacers between the layers of the boxes, the stretch or shrink film, the cover that stabilizes the complete pallet, etc.

## 4.2.2. Optimizing the processes of palletization, handling, storage, etc.

Palletizing, handling, and storage processes are complex and require considerable packaging specifications. Transport packaging must be perfectly defined at the design stage. There is a whole ecosystem of know-how (dedicated trades) and players on these subjects (Machines, palletization software, etc.): the packaging is designed thanks to this. Depending on the type of transport (road, sea, rail, air), there are constraints, rules (see regulations section), and specifications that the packaging must meet.

There is an imperative need for quality palletization supports and palletized loads to improve the overall performance of the supply chain, especially when operations are carried out at high speed and/or in an automated manner (e.g., trans-storage<sup>10</sup>).

The triptych Packaging / Machines / People is major for the economic efficiency of the system, especially for mass distribution products. The stakes of a correct palletized load are not only the global performance at the end of the line but also the economic performance because a poorly arranged palletized load can lead to economic losses and wastage of finished products (for example due to a quality refusal at delivery by the customer). The packaging of palletized loads is necessary and indispensable to ensure protection, maintenance, and safety during transport.

### Example of buckets, drums<sup>11</sup>

A palletized load is part of a "reverse engineering" approach to packaging. Indeed, the logistics operations specifications and the standard dimensions of the pallet support will define the sub multiple dimensions of the product packaging so that the palletization ratios are efficient and the palletized loads can be part of the rapid automated storage processes without defects.



### Example of tiles for construction sites<sup>12</sup>

Palletization processes are often mechanized to respond to an economic constraint and also, to meet the needs of users in a timely manner (particularly for widely distributed products); a single element constituting the palletized load is missing and all the downstream players are impacted.

Let's take an example: a roof tile manufacturer who would be out of strapping (element circled in red opposite), would no longer be able to manufacture. The tiles could no longer be held in rows and could not be transported. This is how deliveries to the construction sites can be stopped. In the event of a prolonged supply shortage, the kiln would have to be shut down, and thus the factory's production. In a way, a butterfly effect where one package runs out and everything stops: hence the importance of packaging, whatever its nature, in a country's economy.



<sup>10</sup> <https://www.mecalux.fr/stockage-automatise/stockage-automatise-palettes/transstockeur-pour-palettes>

<sup>11</sup> Source photos : Thimon

<sup>12</sup> [https://www.youtube.com/watch?v=U8imz\\_pqHJ8](https://www.youtube.com/watch?v=U8imz_pqHJ8)

### 4.2.3. Protecting the product

Each of the elements of the complete packaging system plays a role at different stages of the product flow. The product is intrinsically considered fragile, whether it is a light bulb, a flat screen, a cosmetic cream, or a food product.

It is therefore necessary to protect:

The product from its own characteristics (e.g., to extend its lifespan):

For example, plants release ethylene which accelerates their development. The packaging can be designed to release an absorber of this gas to extend the life of the product (active and intelligent packaging).

Some products, due to their intrinsic characteristics, must be protected by temperature-controlled transport and storage to ensure their preservation: the associated logistics require the definition of isothermal packaging, or the use of refrigerated transport.

In all cases, the primary packaging must be protected and adapted to the product it contains.

The external environment of the contained product:

- limit the risks of leakage,
- blocking solvent evaporation in order to protect the health of the user,
- prohibit the use of dangerous products by children,
- etc.

The product from external aggressions:

All products

- prevent theft or consumption of the contents before the act of purchase,
- limit the deterioration of primary packaging or sales units by mechanical shocks,
- protect the product and its characteristics from its environment all along the chain, until consumption: this is the essential role of the primary packaging.
- Resistance to humidity (both for the packaging itself and for the contents such as powder).
- Resistance to heat (e.g. aerosols during transport and storage)

**Example of protection of palletized loads: black film for valuable products.**

Example of good practice in the fight against theft throughout the product's logistics

This trivialization of palletized loads of high value products allows to hide the content of the pallets, which are filmed in black.



Black filming is widely used on shared logistics platforms (e.g., Kuehne + Nagel) or dedicated platforms (e.g. Printemps logistics platform) in order to fight against shrinkage and theft during the transport of high-value products (electronic tablets, smartphones, luxury goods, etc.).

#### 4.2.4. Informing the supply chain actors

The importance of packaging as an information carrier throughout its logistical journey. Depending on the stage, information will be useful to different actors, and can be carried by the various elements of the packaging system (primary packaging, secondary packaging, transport packaging) to facilitate logistics operations.

##### ➤ Logisticians

Help in preparing orders by information carried by the transport packaging  
Immediate recognition of the contents of a logistic unit

The transport packaging must allow for quick identification of the contents in terms of the identification criteria:

- The brand name, the product,
- Product variety,
- The number of CUs,
- Weight/volume per UVC,
- Etc.

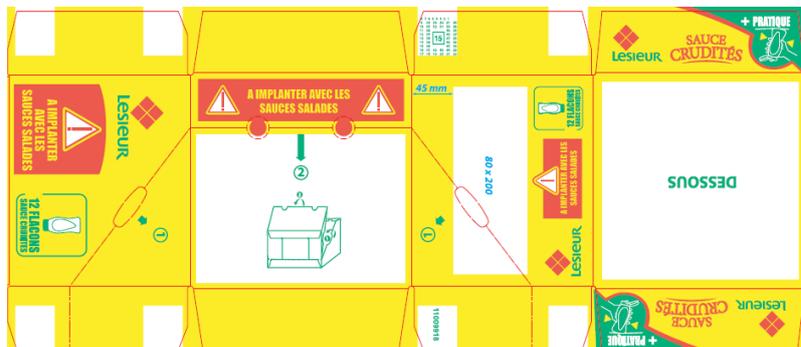
Source of the picture: Groupe Mars



##### ➤ Distribution store personnel

Help in filling a shelf with information carried by the transport packaging

The understanding of how to open a transport box is immediate and the positioning of the product contained in a RRP (by adding a diagram of the principle of easy opening and positioning on the shelf) is intuitive.



Source of the picture: Lesieur

## 4.2.5. Informing the consumer

### Example of information during products' sale

Merchandising operation: shelf display

Products can be promoted by marking out the shelf using transport packaging (box, half-box, quarter-box, etc.).



The sale of products can be achieved by the transport packaging: the latter is placed directly on the shelf and thanks to the printing of the latter: it dramatizes the shelf; it highlights the product to encourage and facilitate the act of purchase. Beyond the transport and protection of the product, the transport packaging system is a communication support in store.

### Example of information on the nature of the product

The transport packaging allows the immediate recognition of the product contained: the communication, for certain RRP, can be summarized by the identification by the shopper of the product.

Simplification of the information carried by the "Ready to Sell" transport boxes containing garbage bags<sup>13</sup>: the consumer just wants to easily identify the litter and the nature of the closure of the garbage bag during the act of purchase (photo below right, characteristics of the bags surrounded by a red circle).



<sup>13</sup> Source: Carrefour

## 4.3. Manufacturing/packaging of the product

### 4.3.1 Preservation of the product in a modified atmosphere

We are used to having many food products for our daily consumption but before ending up on our plates, these fresh or processed products go through different stages from their packaging to their delivery to the store.

The short or long logistic chain becomes the essential link between the producer and the consumer.

As most of these products are perishable, it is necessary to protect them to ensure their preservation and to provide a guarantee of freshness to the final customer.

Several alteration mechanisms can degrade food products and make them unfit for consumption: oxygen is in most cases a vector of multiple degradations for food because it favors the development of bacteria causing changes in color, texture and taste.

A specific packaging technology can delay this degradation process:

**It is the modified atmosphere packaging also called MAP. It consists in replacing the oxygen present in the ambient air by a mixture of protective gas before sealing the packaging.**

Packing a food under protective atmosphere requires the use of sophisticated packaging machines to first evacuate the air present in the packaging chamber and replace it with a precise gas mixture, before sealing the package.

Most often the protective mixture will consist of carbon dioxide and nitrogen.

The success of this operation depends on the ability of the package to contain the protective gas and to ensure a perfect hermeticity in order to preserve the product against any risk of contamination.

The MAP process associated with a judicious choice of packaging guarantees and simplifies the logistics and marketing of food products.

#### Examples:

Cheese, meats, ready meals protected by a mixture of protective gases (50% CO<sub>2</sub>/50% N<sub>2</sub>).

The products can be stored and moved on a time scale of several weeks.

Red meat requires an oxygen-enriched protective mixture to maintain its color (70% O<sub>2</sub>/30% CO<sub>2</sub>). Very sensitive red meat can be stored for a few days.



### 4.3.2 Integrating logistical contingencies

#### Example des spirits

In the context of alcohol-based products of a certain value, the consumer's perception of a well-filled bottle at the time of purchase is a key element of marketing requirements; for example, for spirits, where the expansion of alcohol by temperature can be significant (3.5 to 5.5% expansion), this must be integrated into the development of primary packaging to avoid subsequent logistical concerns.

It is therefore necessary to find a compromise between marketing needs and technical constraints.

Photo of 60°C spirits



The bottle on the left has a compression chamber (air between the cap and the liquid at filling) of 3.5%, the middle one of 4% and the one on the right of 4.5%. The expansion of the alcohol will lead to a rise in the corkage, this last being non-reversible, this will lead to an impossibility of marketing.

This phenomenon has two causes:

- the strong propensity of alcohol to dilate (4 times more than water),
- the fact that spirits are widely exported, and this logistics will lead to a transport in container, inside which the temperature can be very high (Passage via the intertropical zone, storage on docks in the sun ...)

### 4.3.3 Protecting the product

The packaging of the finished products can play several roles: It is necessary to consider that the transport packaging of primary packaging has important functions for the packaging of the product.

#### Storage buffer in production

This packaging can be used as a storage buffer during the product packaging process, thus allowing to manage production hazards (breakdown for example).

#### Deferred use in time

In the example below, the empty glass bottles can be stored "cleanly" outside because the palletized loads are hermetically covered. Depending on the seasonality of the product, storage of empty bottles is sometimes necessary to ensure the supply of finished products (e.g. beverages during the summer): this packaging method allows to compensate for strong production increases as it allows a consequent storage.

#### Transport packaging and lower environmental impact

The suppliers of primary packaging must ensure their customers by the specifications a perfect sealing of the transport packaging between the place of production and the place of filling. Some of these containers are used directly upon receipt without washing. For some other containers, they are only slightly rinsed.



## 4.4. Supply of raw materials

Finished products, whatever their nature, require raw materials which will enter the recipe, the manufacture of the product. The supply of these raw materials takes place in particular thanks to packaging.

### 4.4.1 IBC/GRV<sup>14</sup>: drum flow<sup>15</sup>

To supply many industries (chemical, food, pharmaceutical, phytopharmaceutical, cosmetic, etc.) with large quantities of products, packaging called IBCs or GRVs are essential and are designed to facilitate the emptying of the product in question.

An IBC or GRV consists of a plastic bag to contain the chosen product, a metal cage and a plastic or wooden pallet.

90% of the IBCs on the market have a capacity of 1000 liters. Returned IBCs must be emptied by the holder, but it is not the holder's responsibility to wash them.

The reuse rates are very high for the metal cage or the pallet. However, for the parts in contact with the contents, such as the plastic bag, the valve, etc., the reuse is more complicated to set up, because of many exclusions which do not allow the reuse of these parts:

- Food products (except in the case of short and controlled loops)
- Hazardous products (mandatory energy recovery)
- Non-washable products (e.g., sticky or foaming products)

However, almost all this packaging is recycled, except for those containing hazardous products.

#### Some figures:

In Europe, out of 2 million IBCs produced, 1 million are reconditioned.

150,000 tons of new packaging/year, and 20,000 tons of washed IBCs every year.

On the French market there are 1.2 million new units.

According to Future Market Insights (FMI), the global IBC market is expected to grow by 5% annually over the 10-year forecast period.

#### Case of foldable IBCs:

A new generation of IBC packaging for the storage and transportation of food, cosmetic and pharmaceutical products as well as non-hazardous chemicals based on the Bag in Box "single-use bag" concept.



The foldable IBC solutions offer the combination of a reusable packaging with an average life span of 10 years and a single-use plastic liner weighing less than 2.5 kg. Combo solutions are optimal in terms of food safety and guarantee a "clean" packaging without risk of contamination and limiting oxidation. Thanks to an important folding ratio between 60 and 70%, the IBC solutions generate various cost reductions such as transport costs, optimization of empty and full storage, reduction of water and detergent consumption.

<sup>14</sup> IBC: Intermediate Bulk Container - GRV: Grand Récipient pour Vrac

<sup>15</sup> Source : Schoeller Allibert

The single-use bags are 100% plastic and recyclable.

Simple to use and ergonomic, the damaged structural elements are easily replaceable to extend the life of the bags.

A complete range between 250L & 1200L that can be used for aseptic or non-aseptic applications. The Combo can be equipped with various traceability tools such as IOT for location, temperature, level.

**IBC's for the transport of hazardous materials** require ADR approval (see regulation annex). UN certified IBCs for all types of hazardous liquids, up to a density of 1.9, 100% plastic, maintenance free and fully recyclable.



Versatile range in High Density Polyethylene from 500L to 3000L repairable with a wide variety of valves, caps, vents to meet all the requirements of the chemical industry. Robust and safe, compatible with all handling devices; all surfaces are smooth and rounded to improve operator handling.

The new generation of IBC UN is developed to reduce costs by simplifying the replacement of damaged parts and to use some parts of the IBC more than 5 years (structure). The IBCs can be equipped with various traceability tools such as IoT for location, temperature, product level.

## 4.4.2 The supply of spare parts

### Example of the automotive industry

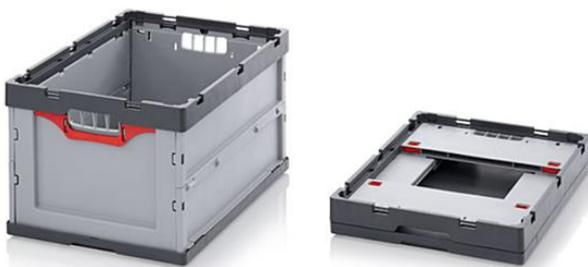
The automotive industry is characterized by a complex supply chain made up of multiple, often interdependent suppliers (tier 1, 2, 3 suppliers, etc.) and globalized from the manufacture of the simplest components to the vehicle assembly lines.

The flexibility and rigor in terms of deadlines (just-in-time), quality (protection of parts) and traceability that characterize the automotive supply chain require specific packaging. For more than 20 years, the automotive industry has actively participated in the development of reusable packaging and handling supports made of plastic, wood or metal, and has set up global standards allowing the use of this packaging everywhere in the world (Galia, Odette...). These packages range from a bin for storing nuts weighing a few grams to the largest container for the logistics of headlights, door panels and dashboards. Most of these packages include specific arrangements for cushioning and protection (fabrics, foams, etc.) of mechanical and appearance parts.

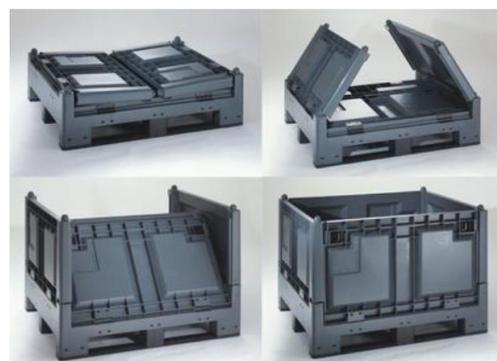
Right from the design stage, economic, environmental impact and traceability considerations have been integrated into the packaging. This translates into three notable characteristics:

- Foldable packaging for a reduction in the volume occupied by the empty packaging when it is returned to the supplier. The reduction in volume can be as much as 80%, which leads to savings in terms of transport costs and CO2 emissions by transporters.
- Traceable packaging thanks to RFID tags that allow the identification of containers, bins or pallets and the rapid recording of movements and location in real time.
- The implementation of "pooling" systems offered by specialized companies that take care of all the management, return and quality guarantee of the packaging. Manufacturers can rent the number of packages they need. The pooling companies collect them after use, wash and repair them so that they can be reused or recycled by the packaging manufacturers from whom they buy them. The packaging fleets managed by these companies can represent millions of units

Foldable crate



Foldable pallet box



### 4.4.3 Packaging of raw materials

#### Example of products for animal nutrition<sup>16</sup>

Pet food producers obtain the raw materials necessary for the manufacture of kibbles. The ingredients necessary for the extrusion and therefore for the manufacture of the kibbles come from agriculture (cereals or derivatives or other ingredients that replace cereals but are necessary for the extrusion process, such as potatoes), the other ingredients come from meat and fish farms (meat/fish or derivatives) or are food additives, vitamins, proteins and other trace elements that enrich the final product by giving it all the fundamental nutrients that are essential for a complete meal for the animals

All these "ingredients and additives" are transported from the producer/manufacturer to the kibble production plant in specially designed packaging; the packaging materials vary according to the type of product being transported and the type of barrier the product needs in order to keep its organoleptic characteristics intact. The bags are prepared/arranged before shipment on pallets inside cardboard boxes or wrapped in polyethylene film to protect them and prevent them from falling or breaking during transport and storage (risk of significant economic loss, raw material to be thrown away, possible infestation, etc.).

Once they arrive at their destination, the raw materials are checked. Specific analyses determine if the product has remained intact, if the nutritional and organoleptic characteristics have changed or not, or if there have been infestations by insects or molds (which can come from the warehouse of departure or, worse, in the truck, if the products are well packaged and well protected it is not verified). All these controls are established by the regulations in force and have the aim of protecting the final consumers and their health: without a suitable packaging and a logistic system made to measure, the protection and the transport of the raw materials, would not be possible.

The ingredients are stored in the factory in warehouses (suitably protected depending on the type of ingredient/additive) or in silos until production and are transported from the warehouse to the production lines in suitable containers or via conveyor tubes (if stored in silos).

---

<sup>16</sup> How pet food is made (video in English): <https://www.pfma.org.uk/pet-food-film/>

## Example of vitamin C

L-ascorbic acid, better known as vitamin C, is now part of everyone's daily life. It is an antihistamine that stimulates the natural and immune defenses and whose deficiency favors poly-infections and sepsis. Vitamin C penetrates the cells of the immune system, where it is very quickly used in case of infection. About 80,000 tons of vitamin C are produced each year, 50% of which are used in pharmaceuticals and parapharmaceuticals, 25% as a preservative in the food industry, 15% in beverages and the rest in animal nutrition.

However, before being used on different supports (pills, drinks, food...), the liquid vitamin C must be transported for its final transformation. This solution is extremely fragile because it is destroyed in contact with air (oxidation) and under exposure to UV light.

To be able to use it, it is essential to select an appropriate packaging. The packaging must be made of a grade of plastic approved by the European Pharmacopoeia, which will guarantee the harmlessness of the packaging with the contents (migration tests). The manufacturing process should be sufficiently clean to limit the presence of particles in the product. The bucket must be sufficiently airtight to avoid oxidation by air and completely opaque to protect the solution from ultraviolet light.

Plastic packaging is the only packaging that can meet all these requirements.



## 4.5. Contribution to sustainable logistics

This chapter completes the life cycle of the packaged product and the associated transport packaging.

The actors of the products logistics integrate for a long time approaches of continuous improvement because various stakes exist:

- the economic issue for a lower cost, the processes are more and more mechanized, automated and thus make the finished product accessible to the greatest number,
- the service issue where the transport packaging must be designed to carry out the logistic path without problems,
- the environmental issue, where packaging is part of companies' CSR strategies and integrates the regulatory framework and where eco-design is widely used to reduce environmental impact.

### 4.5.1 Optimizing flows

#### Wall to Wall

Wall-to-wall production of rigid plastic packaging is a supply chain in which plastic bottles for liquid products are produced directly at the marketer's production facility. While trucks would normally transport the empty bottles from the bottle plant to the bottling facility, in this facility the machines blow the bottles from plastic pellets and are directly connected to the marketer's bottling operation. This means that there is no need for additional transport packaging or trucks carrying empty packaging.

#### Example 1

L'Oréal<sup>17</sup> has implemented this principle in many of its plants. The production unit of the bottle supplier is located in a building adjoining the shampoo packaging workshops: the supply of bottles is thus done on demand. This concept allows:

- to reduce the transport of the bottles,
- optimize production scheduling due to greater reactivity,
- obvious economic gains,
- environmental gains, in particular through the reduction of greenhouse gases linked to transport (nearly 1,500 tons of CO<sub>2</sub> equivalent less per year in the Rambouillet plant, for example),
- better ergonomics of the workstations and thus a reduction of the arduousness,
- the use of shuttle packaging between the supplier and L'Oréal, thus limiting the production of packaging waste from the previous production system.

However, the integration of this W2W principle requires a sufficiently large production volume for it to make economic sense.

#### Example 2 de W to W

For more than 14 years, Procter & Gamble<sup>18</sup> has installed a blowing plant for washing powder bottles directly on the production site in Amiens (Somme) with the aim of limiting the transport of empty bottles. On average 400 million bottles are produced each year, which corresponds to 100% of the site's consumption. This initiative has reduced transport by 77 million kilometers over the past 14 years, the equivalent of 100 round trips between the Earth and the Moon!

Blowing bottles on the site also allows :

- the reduction of in-process inventories (reduction of rejects linked to quality defects identified during filling),
- the reduction of transport packaging,
- the elimination of forklifts, consumption and related safety risks.

---

<sup>17</sup> Source: L'Oréal

<sup>18</sup> Source Procter & Gamble

## 4.5.2 Integrating the circular economy

- Eco-design of packaged products

The CNE reminds us that eco-design of packaging does not make sense, even if the expression is often used, since economic actors design a product-packaging pair because the user buys packaged products and not packaging. Thus, the economic actor develops a solution that integrates the constraints of the product, the packaging but also the packaging operations, the palletization, the logistics and the use.

Beyond prevention by reduction at the source (legal obligation of the environmental code), eco-design integrates totally different and innovative solutions from the product-packaging couple by going back to the use expected by the consumer.

A functional analysis of the need can be used as a basis for this work, it is built by associating the various trades of the company and ideally the consumer.

For a complete approach, the reflection and analysis must go back to the very definition of the functionalities requested from the packaging-product pair, in order to weigh their usefulness, and to size these different functions to the level really expected by the consumer, the user.

### **The two prerequisites:**

1. To be in conformity with the regulations in force
2. To develop all together where each one exposes its constraints and solutions

### **The checklist of 26 questions covered within four key points:**

1. Packaging at the service of the packaged product
2. The packaged product at the service of the consumer/user
3. Less environmental impact of packaging
4. Packaging after consumption of the product

For more information, readers can read the CNE's "Methodological guide to the eco-design of packaged products."<sup>19</sup>

---

<sup>19</sup> <https://conseil-emballage.org/en/eco-design-of-packaged-products-methodological-guide/>

- Packaging reuse

The CNE document<sup>20</sup> " packaging and deposit systems overview of reuse systems " shows, through certain examples, that reuse is a widespread practice in the field of industrial and commercial packaging.

Without going into the details of this reuse (also mentioned in this document by examples at various stages of the product life cycle), the following 7 key success factors should be noted:

1. A specific design of the packaging considered, which must be robust to ensure resistance to rotation for reuse,
2. A design that facilitates return for reuse (standardization, compactness, easy cleaning, etc.),
3. A regulated cost (for some packaging) of the deposit allowing the return of the packaging,
4. Return logistics generally carried out in the same packaging (e.g. crates) as outbound logistics,
5. Storage areas and stocks of empty packaging that exceed packaging requirements, which are synonymous with financial assets, particularly in view of the seasonal nature of products and the need to clean them before reuse (as in the case of drinks and plastic crates used in mass distribution),
6. Players included in an efficient logistics ecosystem with a territorial network as close as possible to the places of consumption,
7. A robust and controlled system to ensure, on the one hand, the perfect traceability of packaging, especially concerning its end of life and, on the other hand, the perfect sanitary safety of the packaged product.

For more information, the reader is invited to read the complete document.

---

<sup>20</sup> <https://conseil-emballage.org/en/packaging-and-deposit-systems-overview-of-reuse-systems/>

- Recycling

The end-of-life of packaging is a key step in the eco-design process. Improving the recyclability of packaging is an action to be considered from the design of the "product-packaging" couple in order to maximize the circular economy.

Definition of recycling:

*"Any recovery operation by which waste, including organic waste, is reprocessed into substances, materials or products for its original function or for other purposes.*

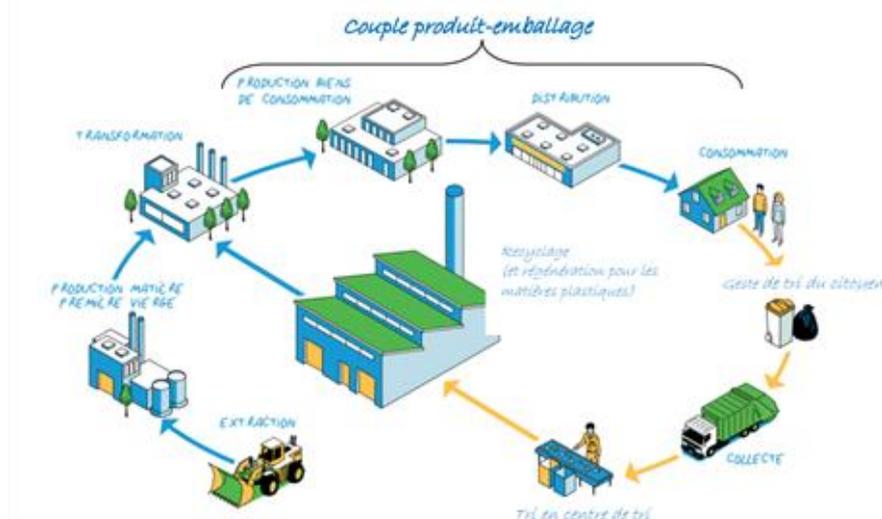
*Waste-to-energy operations, operations relating to the conversion of waste into fuels, and landfill operations do not qualify as recycling operations."*

Recycling involves various stages, from the collection of waste to its sorting to produce new raw materials available for the manufacture of new products. Recycling is both a method of waste treatment and a method of resource production.

The recovery and recycling of used packaging requires the involvement of several actors:

- Manufacturers and distributors: they contribute upstream by putting recyclable packaging on the market that can be integrated into existing recycling channels. They contribute by designing packaging that is less complex, single-material, easy to recycle and that incorporates raw materials from recycling,
- the consumer: thanks to his sorting gesture, he allows the virtuous management of the end of life of packaging,
- the collection operators: they ensure the collection of this packaging at the end of its life,
- recyclers: sorters and transformers who will transform the collected packaging into new raw materials for a second life,
- the local authorities: essential role in the organization of the collection and in the sensitization of the citizens to the act of sorting,
- Public authorities: setting targets and supporting certain means of achieving them.

Below is an overview of the packaging recycling process (Source: CITEO)



In a circular economy framework, the whole chain of actors is important for packaging recycling, each link in the chain having a dedicated role to play (marketers, distributors, citizens-consumers, public authorities, the eco-organization Citeo and recycling companies).

Readers can find out more about the facts and figures, about all the actions carried out over the last 20 years and the achievements to enhance the value of post-consumer packaging in the CNE document "post-consumer packaging"<sup>21</sup>.

<sup>21</sup> <https://conseil-emballage.org/en/packaging-after-consumption-of-the-product/>

In accordance with the Waste Directive 2008/98/EC and the Packaging and Packaging Waste Directive 94/62/EC, the management of packaging waste has as a fundamental principle the development of recycling and other forms of recovery.

The packaging used in logistics (cardboard boxes, plastic film, etc.) is easily identifiable and constitutes flows of homogeneous quality that can be massified in logistics centers, which facilitates their technical and economic recycling.

- The use of recycled material (in closed or open loop)

There are many advantages to using recycled materials:

- A real contribution to the circular economy
- A reduction in energy consumption and natural resources
- A reduction in greenhouse gas emissions (CO<sub>2</sub>)
- A driver for innovation in the collection, sorting and implementation of materials
- Positive communication for packaging users

To learn more about the use of recycled materials from packaging recycling, the CNE invites the reader to read its document<sup>22</sup> "*Recycled materials and packaging: state of play, assets, obstacles, challenges and perspectives*".

---

<sup>22</sup> <https://conseil-emballage.org/en/recycled-materials-and-packaging-state-of-play-advantages-obstacles-issues-and-prospects/>

## 5. CONCLUSION

This document shows the importance of transport packaging in the supply of raw materials and packaging for the manufacture of products or the performance of industrial operations (e.g., construction). It also enables the transport of finished products from a point of production to a point of consumption or use; the slightest lack of a packaging element contributing to this chain of actors can limit certain processes and can lead to a halt in certain productions.

This packaging is complex because it must meet several constraints due to the plurality of actors involved. It is necessary to deliver on time and ensure continuity of services for the activities that depend on it.

In an economy of mass consumption products, the actors of this ecosystem carry out actions within the framework of CSR strategy and test solutions with a view to a lesser environmental impact while seeking technical and economic efficiency.

To achieve this, they share best practices and innovate through the effervescence of collective intelligence and emulation.

The initiatives are multi-stakeholder, and the mobilization is collective, particularly within the National Packaging Council.

## 6. APPENDIX

### 6.1. Other definitions

#### 6.1.1. Packaging

Packaging<sup>23</sup> is any object, whatever the nature of its components, intended to contain and protect goods, to allow their handling and transport from producer to consumer or user, and to guarantee their presentation. All "disposable" goods used for the same purpose must be regarded as packaging.

"Packaging"<sup>24</sup> only refers to:

*1° Primary or sales packaging (I), is packaging conceived so as to constitute a sales unit to the final user or consumer at the point of sale.*

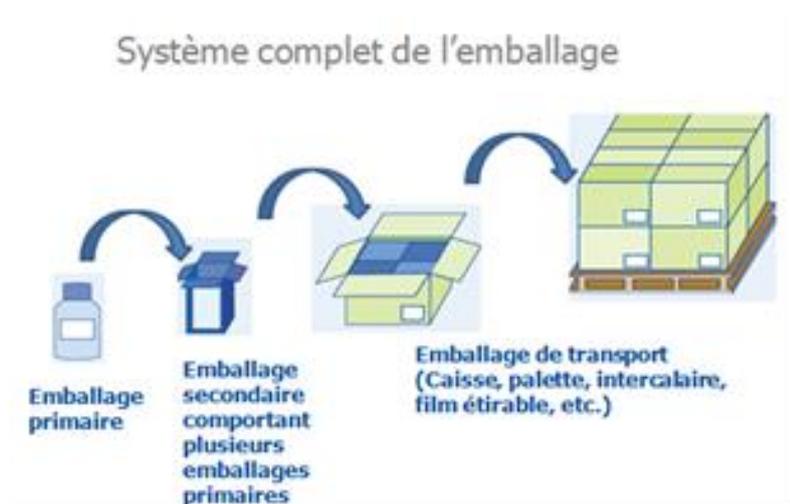
*2° Secondary or grouped packaging (II), is packaging conceived so as to constitute at the point of sale, a set of several sales units, whether the latter is sold as such to the final user or consumer, or whether it only serves as a means to replenish the shelves at the point of sale. It can be removed from the product it covers or protects without affecting its characteristics.*

*3° Tertiary or transport packaging (III), is packaging conceived so as to facilitate the handling and transportation of several sales units or grouped packaging in order to prevent physical handling and transport damage. Transport packaging does not include road, rail, fluvial, maritime or air containers."*

For more information, the reader can refer to Directive 2013/2/EU.

Editor's note:

- The primary packaging can be constituted by various elements. It protects the product and its characteristics throughout the chain until the consumption of the product (ex: packaging bag, box and film).
- The article means a unit of primary sale or a consumer unit.
- The grouped packaging means a grouping of a number of primary units of sale.



<sup>23</sup> Environmental Code (Volume 5, Title 4, Chapter 3, Section 5, Article R543-43).

<sup>24</sup> 94/62/EC Directive

The system of packaging<sup>25</sup> combines generally three types of packagings but the primary packaging can, in certain cases, fulfil the functions of two other types. The packaging system must be capable of responding to all operating characteristics of these subsystems.

Depending on the final holder and its end of life, packaging is also classified into:

#### Household packaging (municipal route)

They apply to all packaging that, after consumption of the product in the home or outside the home, is discarded by households.

#### Industrial and commercial packaging

They apply to all packaging that is not household packaging: packaging for industrial activities (packaging B2B, multi-packaging and transport packaging), packaging used outside the home (Horeca), etc.

---

<sup>25</sup> Complete packaging system: it encompasses primary, secondary, and tertiary packaging. CNE - December 2010.

## 6.2. Functionalities of packaging

### • Preserving and protecting the product

It must protect:

- The environment from the product inside (limiting potential leaks, stopping solvent evaporation to protect the user's health and banning dangerous uses for children, etc.)
- The content from external constraints (limiting damage incurred by mechanical impacts, reducing the effect on taste and odors, preserving from air or oxygen spoiling, protecting from germs, insects or undesirable products interference, preventing theft or consumption of the contents before purchase, increasing the lifecycle of perishable goods...).

### • Informing

- Providing general and legal information (use-by date, storage temperature, user's guide, posology/unit dose, composition, presence of allergens, price, quantity, weight, etc.)
- Providing information on the conditions of the production process (Eco-label, "Label rouge" – a French national quality assurance scheme for food products managed by the Ministry of Agriculture, fair trade, AOC label, etc.)
- Providing information related to the characteristics of the product in its market environment (brand, allegations about nutrition and/or health, recipes, cooking mode, product history...).

### • Grouping consumption units

- Grouping several consumption units together so as to get an adequacy between the products consumption and the frequency of the purchase (yogurts or beer packs)
- Gathering products in easily manipulable units (packs of biscuits) to ensure different types of consumption (nomadic lifestyle...)
- Promoting products (promotional kit)
- Facilitating handling and transport for the consumer
- Making shelves stocking easier as well as any other handling actions for operators.

### • Transporting and storing

- Delivering the goods from the production site to the sales area without any damage (protecting the product-packaging combination from mechanical accidents) by wooden pallets, corrugated cardboard protections, corner protections, metallic and plastic strings, stretch and shrink-wrapping, etc.
- Protecting against any malevolent act (theft or "bioterrorism")
- Notifying logistics centers of the contents of transport crates (logo, brand, contents, bar-code etc.)
- Facilitating their storage by the consumer
- Ensuring that the consumer may easily transport the products home

- **Facilitating the use of the product**
  - The use of the product and its packaging go hand in hand, since they are often inseparable:
    - Easy opening of the packaging for groups of consumers (seniors, children, nomadic adolescents, athletes, etc.)
  - A closing mechanism to enable later consumption of the product
  - Multi-portions for a split consumption or an on-the-go consumption
  - Comfortable handling of the product to ensure optimal matching between weight, size, form and frequency of use
  - Exact doses to limit losses
  - Restitution of the product: emptying as much as possible the contents out of the packaging
  - Using the product-packaging combination for any kind of preservation (freezing) or of preparation (oven, microwave, double boiler, etc.)
  
- **Facilitating the packaging of the product**
  - Fulfilling automated systems without inadvertent shutdown
  - Guaranteeing the safety of the employees in charge of packaging operations
  - Carrying out packaging operations at reasonable costs
  - Resistance to all packaging operations (impacts, heat, output, vibrations, closing, hygiene, canning...)
  
- **Making the product visible and spreading the values of the product and/or of the brand, of the company**
  - Encouraging the act of purchase through packaging, which constitutes a beacon among the shelves (the consumer only spends a few seconds in the aisle) thanks to a color code (green for bifidus yogurts, red for cola beverages...), the shape of the packaged product (orange-shaped bottle for orange juice), the material used and the context to be referred to (wood for tradition), graphic design and typography for immediate product recognition
  - Spreading the benefits and values of the brand and the company (corporate social responsibility)
  - Guaranteeing acceptability for the consumer during the purchasing and consumption phases of a product<sup>26</sup>.

---

<sup>26</sup> <https://conseil-emballage.org/en/acceptance-of-packaging-for-the-product-for-the-consumer-and-for-the-user/>

## 6.3. Regulations

The CNE points out some of the most common regulations that establish a link between logistics and packaging:

### 6.3.1. Labour Law

#### ➤ Hardness and Risks regarding Handling

Articles R.4541-5 and R.4541-6 of the French Labour Code require the employer to assess the risks handling operations present for the health and safety of workers, considering, in particular, the characteristics of the load and required physical effort.

Moreover, a decree of 29 January 1933 adopted pursuant to these two articles of the Labour Code lists the factors to be considered when manually handling loads that might pose physical risks, especially back injuries.

In this decree, the term "load" denotes **the container/content set**.

The decree focuses on a number of factors where packaging plays a key role:

- the load is troublesome or difficult to take hold of;
- the load's balance is unstable or its content might move;
- the load is presented in such a way that it must be held or handled at a distance from the torso or whilst flexing or twisting the torso;
- the load, owing to its appearance and/or its consistency, is likely to cause the worker to suffer injuries, especially in case of a blow.

#### ➤ Load Weight

The French Labour Code establishes maximum loads not to be exceeded for minors and pregnant women (articles R.4541-9, D.4152-12, D.4153-4). For adults, maximum loads are assessed by an occupational health doctor.

The French National Technical Committee for Services, Businesses and Food Industries "CTN D" has implemented the Recommendation<sup>27</sup> regarding risk assessment related to manual handling of loads in packing positions in hypermarkets and supermarkets: practical limits reduce risks related to manual handling.

*"In a supermarket or hypermarket, the person working at a packing position handles several different goods in order to scan them and get them through the conveyor belt. Some of these goods are heavy or pose difficulties. Others are difficult to hold. Lastly, the speed with which workers have to perform the handling often prevents them from doing so in a good position. [...]"*

*Manual handling means any load transport or support operation, including lifting, putting down, pushing, pulling, carrying or moving, that requires physical effort from one or more workers. [...]  
Recommendation: 8 kg is the maximum acceptable quantity for manual handling of loads performed by the cashier in a hypermarket or a supermarket. [...]"*

This recommendation applies to hypermarkets with a sales area of over 2500 m<sup>2</sup> and to supermarkets with a sales area of less than 2500 m<sup>2</sup>, but over 400 m<sup>2</sup>.

#### **Recommendation:**

**8 kg is the maximum acceptable quantity** for manual handling of loads performed by the cashier in a hypermarket or a supermarket. [...]"

This recommendation applies to hypermarkets with a sales area of over 2500 m<sup>2</sup> and to supermarkets with a sales area of less than 2500 m<sup>2</sup>, but over 400 m<sup>2</sup>.

**Lighter packaging that can handle** the same load represents an advantage for the company: fewer occupational illnesses, faster load handling, ...

---

<sup>27</sup> French National Health Insurance Fund for Employees (CNAMTS) n°440, made public with circular 44/2008 on August 20th 2008 after being passed by the CTN D (French National Technical Committee) for Food Services, Trade and Industries (SCIAL).

### 6.3.2. European Directive on Packaging and Packaging Waste

Directive 94/62/EC of 20 December 1994, transposed into the French Environmental Code, requires member states to enforce the necessary legal provisions so that the packaging placed on the market meets certain basic requirements (on the packaging system in its entirety), particularly:

- Prevention by source reduction of packaging weight and/or volume;
- Recovery of end-of-life packaging;
- Potential reuse of the packaging.

**Prevention by source reduction must be compatible with its “acceptance” considering logistics requirements.**

The CNE points out in its study “Acceptance of Packaging<sup>39</sup>” that acceptance is a legal criterion established by European Directive 94/62 and the French Environmental Code.

Thus, one of the European eco-design standards considers this legal criterion as a performance criterion to be complied with: EN 13428 - Requirements specific to production and composition - Prevention by source reduction. These requirements must allow the specification of the characteristics necessary to the packaging's design (resistance, etc.) which should be documented using the CNE document<sup>28</sup>.

Standard EN 13428 lists performance criteria to consider when designing packaging. Among these criteria, we find **logistics**:

<b>EMBALLAGE PREVENTION PAR REDUCTION A LA SOURCE Check-list d'évaluation</b>		<b>EMBALLAGE :</b>	
<b>Critères de performance</b>	<b>Exigences les plus pertinentes/importantes</b>	<b>Points Critiques</b>	<b>Références</b>
Protection du produit			
Procédé de fabrication du produit			
Processus d'emballage/remplissage			
Logistique			
Présentation et commercialisation du produit			
Acceptation par le consommateur			
Informations			
Sécurité			
Législation			
Autres aspects			

Source: CNE

The CNE recalls that hygiene and safety rules (cleanness, food contact, etc.) applying to packaging still apply when the same packaging is used for the same purposes.

<sup>28</sup> Taking into account environmental requirements in the design and manufacture of packaging-CNE-September 2009 at [http://www.conseil-emballage.org/eng/wp-content/uploads/2014/01/1\\_2.pdf](http://www.conseil-emballage.org/eng/wp-content/uploads/2014/01/1_2.pdf)

### 6.3.3. Regulations for Transport of Dangerous Material

#### ➤ International ADR Agreement

Dangerous materials include any chemical products that may cause damage to goods or people because they can, for example, ignite, pollute, negatively affect the skin, provoke vomiting, and even produce cancer or congenital malformations.

The international development of trade has led authorities to standardise their safety regulations regarding the transport of chemical products. The standardisation of relations dates back to a 1957 European agreement known as ADR<sup>29</sup>.

The ADR is an international agreement between European states that was ratified in 1957 and came into force on 29 January 1968 under the aegis of the UN, a worldwide organisation, but only applies to the European continent. The agreement is actually managed by the United Nations Economic Commission for Europe (UNECE).

The international agreement covers all sorts of dangerous goods **containers** (generally named "means of containment" under Part 1, page 72 of the ADR):

<b>1 Emballage</b>	<b>2 GRV</b>
<b>3 Grand emballage</b>	<b>4 Petit conteneur</b>
5 Wagon	6 Véhicule
7 Wagon-citerne	8 Véhicule-citerne
9 Wagon-batterie	10 Véhicule-batterie
11 Wagon avec citernes amovibles	12 Citerne démontable
13 Grand conteneur	14 Conteneur-citerne
15 CGEM	16 Citerne mobile

It describes **packaging and labelling regulations** for dangerous goods and sets out the necessary conditions for the construction, equipment, and operation of vehicles carrying them.

#### ➤ Labelling of transported hazardous material GHS: the new "Globally harmonised system" for hazard communication

A globalized world requires globalized rules. Such is the case for the classification of hazardous products; the GHS (Globally Harmonised System) labelling system's challenge is to become the global standard through the UN.

The GHS was designed to harmonise the various **accumulated regulations** and **ensure**:

- adequate protection for the workers who manufacture these chemicals (EU directives and labour legislation);
- adequate protection for the environment in the production stage (EU directives and environmental legislation);
- adequate protection for goods and individuals during transportation (for example, the ADR – Agreement concerning the International Carriage of Dangerous Goods by Road)

The GHS' objective is to supplant existing legal frameworks by a unique global system encompassing chemicals classification, associated safety data sheets, and labelling using the same pictogram and phrase to warn of the same hazard throughout the globe in order to provide better protection for workers, consumers, and the environment.

---

<sup>29</sup> ADR: Agreement concerning the International Carriage of Dangerous Goods by Road

In order to introduce the GHS in its borders, the European Union enacted the **CLP<sup>30</sup> Regulation 44 1272-2008 on December 16th 2008**. As of January 1st 2015, this regulation<sup>31</sup> serves as the basis for all legislation pertaining to the classification, labelling, and packaging of chemical substances and mixtures not only to transport said substances but also to inform the customer at home:



### ➤ Certification of Packaging used for Transport

Pursuant to regulation on the transport of dangerous goods, **packaging** intended for the transport of dangerous goods must be tested and certified by a special body.

In principle, approval is given for a packaging template. The holder of the approval must make sure that the subsequent mass-produced packaging conforms entirely to this model that has undergone statutory tests conducted for the issuance of this approval. To this end, the holder must implement a quality assurance program since the affixing the required labelling on mass-produced combination packaging is their responsibility.

### **Example: LNE<sup>32</sup> certification for corrugated cardboard packaging.**

This approval procedure for packaging intended for the transport of dangerous goods by road, rail, and sea has been published in an official journal. The procedure pertains to combination packaging that has a corrugated cardboard crate as outer packaging.

The parties likely to be holders of approval are either the packer (user, industrial packer), who builds combination packaging themselves, the manufacturer of outer packaging (cardboard crates), or the manufacturer of inner packaging.

When the holder is not the manufacturer of cardboard boxes, the holder of the approval must ensure that the boxes are supplied by a manufacturer listed on the approval certificate.

<sup>30</sup> <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32008R1272&qid=1446393747175&from=EN>

<sup>31</sup> CLP: Classification, Labelling, Packaging

<sup>32</sup> LNE: Laboratoire National d'Essais (French National Laboratory of Metrology and Testing)

#### 6.3.4. Regulations on the Stability of Goods in a Transport Vehicle

Directive 2014/47 of April 3rd 2014 regarding technical roadside inspections of commercial vehicles seeks to standardise load securing conditions between all of member states as properly securing the load is essential for road safety.

This directive should come into force on May 20th 2018, but French regulation already anticipates fines in case of non-compliance. During a roadside inspection, the securement of the load of a vehicle may be controlled in order to check that the load is secured so as neither to disturb driving safety and nor to constitute a threat to people, goods, or the environment. Thus, the means employed to secure the load must be able to withstand acceleration when the vehicle is moving.

During an inspection, the inspector particularly checks if the transport packaging allows for the load to be appropriately secured.

If the inadequacy of the method chosen for attaching the packaging represents a critical regulation fault, the inspector might retain the lorry until the packaging is brought into conformity. This measure will be added in 2018.

Appendix III of this directive refers to a number of standards, including Standard EUMOS 40509 « Transport Packaging » (Eumos is a private logistics association). Such references will be added in 2018.

#### 6.3.5. Chain of Responsibility of Parties

**Packaging plays a key role throughout the responsibility chain** insofar it passes from operator to operator along the logistics road, each of them having to consider the characteristics of the packaging used for the proper performance of their responsibilities.

In this way, Standard NF V01-002 “Hygiene of Food Products - French/English Glossary” points out that the concept of perishable goods depends on the preservation conditions which are different depending on the food category: transport temperature and duration are key, as are factors such as primary and secondary packaging and over-packaging.

French General Directorate for Competition Policy, Consumer Affairs and Fraud Control (DGCCRF) memo 2007-168 of August 22nd 2007 allows some establishments to freeze pre-packaged food products intended for further processing. The goal is to reduce the risks of microbiological contamination by not un-packaging/re-packaging food products before freezing. They are mostly retail businesses and catering establishments.

Pre-packaged products subject to freezing before their use-by date without removal of the primary packaging must be placed inside transparent over-packaging bearing the freezing date and use-by date. Establishments must implement a Hazard Analysis and Critical Control Points (HACCP) approach, as well as best hygiene practice regulations regarding, in particular, the residual lifespan of the product and traceability regulation.

Another example is the decree of December 21st 2009 (Section 5 of Appendix 3) which allows for the concomitant transport of food products and dangerous goods (alcoholic beverages, cleaning, hardware shop or hygiene products) provided that:

- all products be packaged in sales units for the end user;
- food products be effectively protected from all contamination risks from other products that must be placed inside impact resistant and easily identifiable packaging.

## Acknowledgments

AMETEK MOCON  
ANIA  
BOSTIK  
BULTEAU Systems  
Carton Ondulé de France  
Cartoon Design  
Cartoon Design  
CFA  
DOMINO SAS  
FAR  
Fédération Nationale du Bois  
FEDEREC  
FIPEC  
FSPACK  
GOGLIO France  
HENKEL FRANCE OPERATIONS  
MADELEX  
POLYVIA  
SCHOELLER ALLIBERT SWISS Sarl  
SCHOELLER ALLIBERT SWISS Sarl  
SYMOP  
SYNDILAIT  
THIMON  
TOUPRET

MARSOT Jean Erick  
ARROM Xavier  
LE FEVRE Alain  
HAZOT Laura  
DESBOUIS Kareen  
ROSSI Émilie  
ROSSI Jacques  
BLOTTIERE Jean  
BAUDESSON Delphine  
ABOULFARAJ Mostafa  
CHARRON Léa  
DEWALLE Diane  
BLAISE Emilie  
FRUCHARD Jérôme  
TINAZZI Alessandra  
HORNEBECQ Emmanuelle  
MARTIN Sylvain  
MADEC Marc  
LEFRANC Pascal  
LEGRAND Gauthier  
ROBERT Sybille  
PERENNOU Hélène  
GAIDON Yohann  
THIOLIERE Stéphane

CNE  
CNE  
CNE

Bruno SIRI  
Michel FONTAINE  
Maryse BRICOUT

## Board of Directors

Michel Fontaine, President  
Kareen Desbouis, CLIFE, Vice-President  
Noël Mangin, InterEmballage, Treasurer  
Kaméra Vésic, PikPik Environnement, Secretary

Evangeline Baeyens, ILEC  
Jacques Bordat, InterEmballage  
Charly Hée, Familles de France  
Olivier de Lagausie, CLIFE  
Valentin Fournel, CITEO  
Adeline Vancauwelaert, Comexposium  
Fabrice Peltier, INDP  
Antoine Robichon, CITEO  
Arnaud Rolland, ILEC

Bruno Siri, General Delegate

## The Nine Colleges of the CNE

Manufacturers of packaging materials,  
Packaging manufacturers,  
Consumer goods manufacturers,  
Distribution companies,  
Authorized companies and operators in the collection and recovery sector,  
Consumer associations,  
Environmental protection associations,  
Local authorities.  
Other federations, other companies

*All our publications are online on our website:*

[www.conseil-emballage.org](http://www.conseil-emballage.org)

*For more information, please contact:*

**Bruno Siri, délégué général**

Conseil National de l'Emballage

Phone: 01.53.64.80.30.

Email: [info@conseil-emballage.org](mailto:info@conseil-emballage.org)