

Packaging's contribution to food waste reduction in France

In partnership with the ADEME

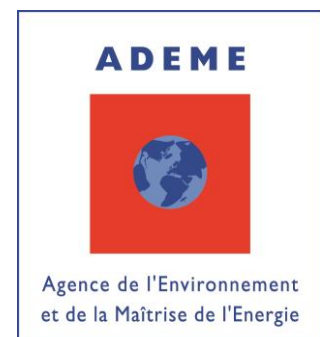


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Foreword: President's message

The fight against food waste is an international cause and it is the duty of the French National Council of Packaging (CNE) to participate actively in this citizen battle in France.

1. Packaging in itself does not generate waste, quite the contrary. I must remind that historically speaking, packaging is born from the humans' need to protect and preserve food products and drinks that they had just produced and that they were then going to consume at their own pace. Without packaging, the latter would have been lost or consumed by other kinds of predators. Product preservation and protection are still part of any packaging's basic functionalities today. Fighting against waste of packaging's content has therefore always been written in its DNA.
2. The CNE had already tackled the waste issue in 2011 and a document¹ written on the basis of these works is available on our website. The question is therefore: can we do better? Can we do more? Certainly yes, even if packaging does not actually "cause" waste, it can most likely help consumers and the whole production line upstream to reduce some losses that are behind it. With the shift in consumption patterns, possibilities carried by new technologies should enable progress in this field.
3. This time, we do have the opportunity to benefit from a very detailed work of the French Environment and Energy Management Agency (ADEME) which has estimated food waste in France in tonnes and value. On this basis, and taking into account the constant and fast-paced evolution of our fellow citizens' consumption habits, this year's document should represent a significant step forward concerning the packaging's role in the fight against waste.

Michel Fontaine
President of the CNE

¹ http://www.conseil-emballage.org/wp-content/uploads/2014/01/74_1.pdf

Summary

In 2011, the CNE had already worked on this major international cause that is Food Waste. The conclusions that had been drawn are now updated, particularly thanks to the ADEME's recent works, which have provided a detailed measure of the phenomenon in France. This measure is an essential prerequisite to implement an efficient action plan.

All in all, this analysis shows that the most "costly" packaging for the community is the one noticed once the product has been packaged, which means at the end consumer's site. The document reminds that in this particular case, packaging's role is not crucial compared to the French's habits of consuming food and drinks, especially the loss of food's financial and symbolic value.

The European environment Directive 94/62 imposes a reduction in weight and/or volume of the packaging system until the latter no longer completely provides the functionalities that have been its basis at its creation. We know that the environmental impact of packaging is often low within the product-packaging pair. That means that slightly more packaging can sometimes be justified at the environmental level insofar as it brings about a better preservation of the product and a significant waste reduction.

The document broaches all the possibilities related to the different functions of packaging that enable to help reduce waste and as a first step, the necessary harmony between consumption habits of a given household and the size of the products offered. Beyond this size adjustment of pre-packaged products, the increase in a product's lifespan, the restitution rate augmentation, the possible watertight resealing, the help for the right dosage, the information on product's value and management, etc. are further examples of best practices that constantly need to be remembered at the design and packaging stages of the product.

1. Context

Food waste has nowadays become a priority for European and French policies:

In Europe:

Food waste reduction is one of the main objectives of the European Circular Economy Package. In a resolution submitted on 16th May 2017, the European Parliament especially argues in favour of:

- A legally binding objective: reducing food waste by 50% by 2030. The European Parliament reiterates its call for an objective of at least 30% by 2025
- Adopting a common method of measuring food waste
- Improving consumer understanding of use-by date and date of minimum durability
- Asking Member States to implement economic incentives aiming at reducing food waste

In France:

In 2013, France committed to an objective of cutting food waste in half by 2025. To do so, the government has adopted, along with representatives of the whole food chain, a pact establishing an action plan. The latter is shaped around several priorities such as consumer awareness and information, training provided for food sector professionals, development of donations or measurement of losses and waste.

Besides, an Anti-Waste Act has been adopted on 11th February 2016, thus increasing the huge amount of laws, the first of which was the Act on Energy Transition (August 2015). A hierarchy of actions against food waste has been created, fostering waste prevention, then donation or transformation of unsold food products, and finally animal, organic and energy recovery. That way, distributors with a surface higher than 400m² must imperatively propose a donation agreement to one empowered organisation at least.

Each person involved in the food chain **plays a role in food losses and waste**, at his/her level as well as up- and downstream, through trade relations and interactions. Thus, **on the one hand, the responsibility for waste is shared between the different actors of the food chain, and on the other hand they are interdependent.**

Within this food chain, packaging can contribute, thanks to its various functions, to food waste reduction in France and the best food practices below can apply to any other type of product (cosmetics, household and personal care, etc.) in order to fight against waste and losses.

Within the framework of the 2014/2020 National Plan for Waste Prevention, the action "*Examining the link between the food product and its packaging*", led by the CNE and the ADEME, is on the agenda for the fight against food waste.

This guide's publication seeks to meet this request.

2. Food waste in France

2.1 Definition

Debates initiated in the framework of the National Pact against food waste (renewed in April 2017 for 3 years)² along with the Act against food waste³ and the works carried out by the ADEME in order to better identify potentials and sources of progress for tomorrow's feed efficiency⁴ allow for a more precise definition of food waste:

"Food waste: any food intended for human consumption which has been lost, thrown away or deteriorated at a single point of the food chain".

This definition's scope of food waste can be specified by the following elements:

- As soon as food is thrown away, it does not matter whether it is deteriorated or not nor what the reasons can be
- Human food donation is not considered waste as the product remains within the food chain.
- Food used for animal consumption is considered food waste, even though it can be an excellent way of recovery.
- Individual or collective composting of products intended for human consumption is considered food waste.
- Pre-harvest agricultural production losses are not considered: the scope only takes into account products in their maturity stage (consumable post-harvest) intended for human consumption.
- Lost products that are inedible for human consumption and linked to transformation/preparation processes (bones, banana skins) are not considered waste.

2.2 Figures

The ADEME has conducted a study on *"food waste and losses: current situation and management at the different stages of the food chain"*⁵, that was presented in May 2016.

This innovative analysis assesses the total amount of losses and waste on 26 food chains representing more than 80% of products consumed in France and at each stage of the food chain. It also points out the theoretical commercial value as well as the carbon footprint expressed in t/CO₂ of these products.

This general study is being supplemented by sector-specific studies (home consumption⁶, mass catering⁷, distribution⁸, health sector, transformation⁹) which clarify the origins of losses and waste, the potential cost reductions, and especially provide a feedback on actions implemented to reduce waste.

² National Pact against food waste, <http://agriculture.gouv.fr/pacte-national-de-lutte-contre-le-gaspillage-alimentaire-les-partenaires-sengagent>

³ Act of 11th February 2016 on the fight against food waste:

<https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000032036289&categorieLien=id>

⁴ Steering Committee's members of the study on which this definition is based are the following : ADEME, French Ministry of Ecology, French Ministry of Agriculture, French National Institute for Agricultural Research (INRA), France Nature Environment (FNE).

⁵ <http://www.ademe.fr/etat-lieux-masses-gaspillages-alimentaires-gestion-differentes-etapes-chaine-alimentaire>, ADEME, May 2016

⁶ <http://www.optigede.ademe.fr/impacts-financiers-et-environnementaux-gaspillage-alimentaire>

⁷ <http://presse.ademe.fr/2016/09/etude-cout-du-gaspillage-alimentaire-dans-les-differents-types-de-restauration-collective.html>

⁸ <http://www.ademe.fr/distributeurs-engages-contre-gaspillage-alimentaire>

⁹ Coming.

Annual food losses and waste in France: key figures



In total, **10 million tonnes of products for human consumption per year are lost or wasted in France**. That is nearly 150 kg of food waste per person per year, 30 kg of which are due to home consumption. Among these 30 kg, 7 kg are products which are still packed¹⁰. These figures are close to European Union estimates, which amount to 88 million tonnes, that is 173 kg per inhabitant per year.

These 10 million tonnes have a **theoretical commercial value of 16 billion euros**. This “theoretical” value corresponds to the selling price of lost and wasted products. It does not include the eventual financial gains from food recoveries that can be carried out (use for animal consumption, energy production by methanation, compost...) nor the costs brought about by the actions that are necessary to ensure that these products will not be lost (workforce, storage, consumer awareness, transport).

Finally, the carbon footprint caused by these losses and waste is estimated at **15.3 million tonnes CO₂ equivalent (Mteq)**. This corresponds to 3% of the overall emissions of the national activity¹¹.

Out of the 10 million tonnes that are lost and wasted each year:

- **33% of them are lost or wasted at the consumption stage,**
- **32% at the production stage,**
- **21% at the transformation stage,**
- **14% at the distribution stage.**

However, **more than 40% of the economic value of these losses and waste correspond to the consumption stage**. Indeed, the product’s value (as well as its carbon footprint) increases through the food chain due to transport, transformation, sale or advertising costs, thereby increasing the value of related losses.

Since packaging has mostly a role to play at the distribution and consumption stages in terms of fight against food waste, the present guide book focuses on both these stages of the food chain.

¹⁰ Composition of household and similar waste in France (in French) – 2010 – ADEME.

¹¹ France emissions amount to 491 Mteq CO₂, inventory format CITEPA (in French) -2013 figures.

2.3 Consumer behaviour and types of wasted products

The following sub-chapter highlights the significant share of fresh products in food waste: it thus underlines the high importance of preserving these short-shelf-life products, especially thanks to packaging.

It also points out the consumers difficulties of perceiving the amount of food products they throw away daily: packaging can become a means, a medium for any piece of information (preservation or cooking method, but also any information on waste awareness).

Waste perception and consumer behaviour¹²

A few elements allow for a clearer perception of waste by consumers who participated in the 2012 TNS SOFRES survey.

54% of French people consider that reducing food waste is an important action that needs to be taken daily.

76% of French people think that advertisement does not or not much deal with waste. Paradoxically, these French people do not consider themselves contributing to this waste. When perception and reality are not congruent... Yet two-thirds of the French population actually think that they waste less than the 30 kg-waste identified by the ADEME for home consumption.

The products that are most often thrown away are those with the shortest shelf life or the hardest preservation method:

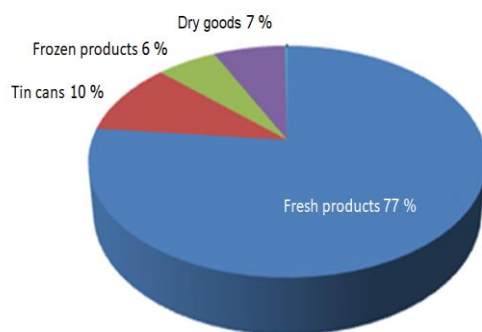
- *31% of French people throw away plate and meal leftovers at least once a month*
- *28% throw away bread at least once a month*
- *21% throw away fruits at least once a month*
- *19% throw away vegetables at least once a month*

Reasons why the French consumer is wasting food:

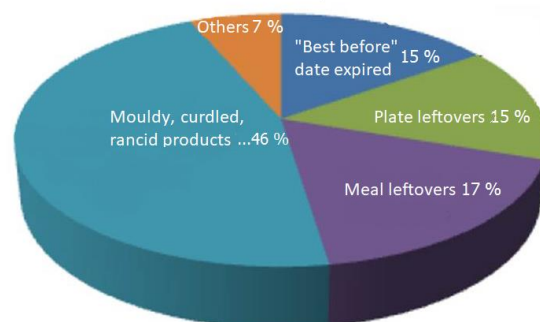
- *The main reason for waste whatever the aim: the product appearance.*
- *The second most important reason is when the expiration date is exceeded.*

Types of wasted products:

On the basis of the 2011 study carried out by the FNE and Pik Pik Environment: charts expressed in % by weight



Distribution by type of wasted product



Distribution by cause for wasted products

For further information about the nature of wasted products, the reader may refer to the 2014 study carried out by the ADEME¹³ on 20 households.

¹² <http://www.tns-sofres.com/sites/default/files/2012.10.24-gaspillage.pdf>

¹³ http://www.optigede.ademe.fr/sites/default/files/fichiers/Presentation_etude_Impacts_GA_menages.pdf

3. Packaging, lever in the fight against food waste

In this chapter, the CNE shows how fighting against food waste must be at the heart of all endeavours that need to be considered in the eco-design of the product/packaging pair and puts into perspective the specific role that packaging can take on.

3.1 Packaging optimisation and food preservation

In this sub-chapter, the CNE emphasises the importance of a reflection on the full life cycle of the packaged product with some examples of packaged products compared to food waste. Food waste must be examined through the entire life cycle of the packaged product by integrating the whole packaging system: this is referred to as Full Life Cycle Analysis carried out according to a standardised system¹⁴.

The CNE emphasises below the crucial requirements and performance criteria that packaging must meet. It mentions the relative share of packaging in the issue of environmental impacts of a product-packaging pair.

Two objectives are often presented as incompatible:

- Prevention by source reduction of packaging, requirement of the 94/62/CE Directive and transposed into the Environmental Code (article R543-44),
- Packaging's contribution to reducing food waste.

Thus, the article R543-44 of the Environment Code states that packaging should be designed and manufactured in such a way as to limit its volume and mass to the minimum necessary to ensure a sufficient level of security, hygiene and acceptability and to enable its recovery.

The EN 13428 standard – *Requirements specific to manufacturing and composition - Prevention by source reduction* – enumerates the performance criteria to be considered when a packaging is being designed, regardless of the distribution channel used to reach the product's consumer. These requirements must enable to specify the characteristics that are strictly necessary to design the packaging (resistance...), which should be documented with the help of the CNE document¹⁵.

PACKAGING PREVENTION BY SOURCE REDUCTION Evaluation check-list		PACKAGING :	
Performance criteria	Most relevant/important requirements	Critical points	References
Product protection			
Product manufacturing process			
Packaging/filling process			
Logistics			
Product presentation and commercialisation			
Consumer acceptance			
Information			
Security			
Legislation			
Other aspects			

Source : CNE

¹⁴ ISO 14040 and ISO 14044 standards.

¹⁵ Consideration of requirements related to environment in the design and manufacturing stages of packaging – CNE – September 2009 on http://www.conseil-emballage.org/wp-content/uploads/2014/01/1_1.pdf

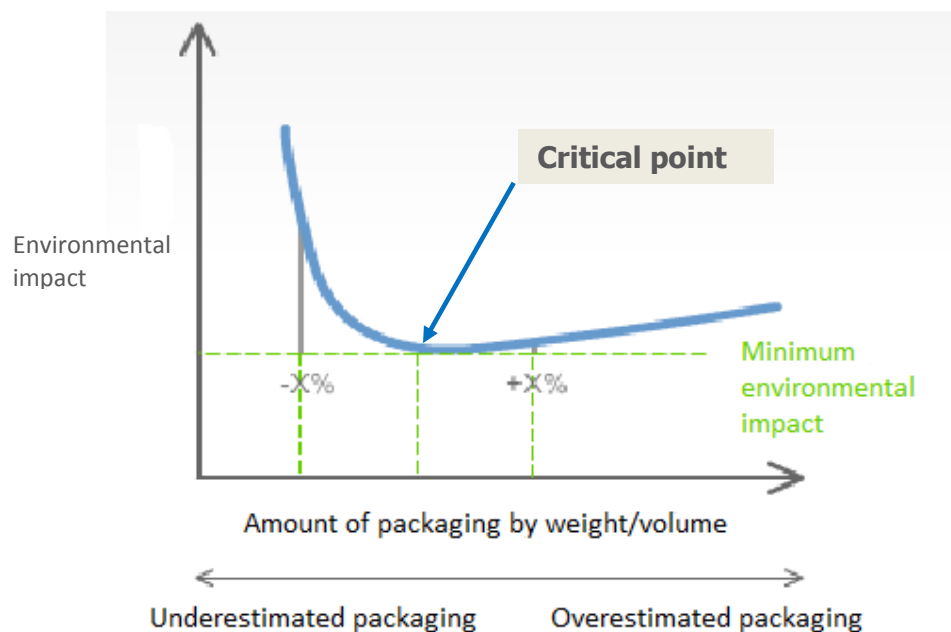
Source reduction can be estimated by highlighting “critical point(s)” according to the performance criteria.

The notion of critical point builds up an essential approach that highlights the complementarity of both objectives below:

- **Packaging size must not be further reduced if it is proven that it jeopardises the product, leading to more waste quantity.**
- **Increasing packaging size can be legitimate if it is proven that it can help fighting against waste.**

Setting up a “critical point” boils down to demonstrating that a further reduction of the packaging by weight and/or by volume would compromise one or more of its core functions called “performance criteria”.

Regarding food waste, this critical point is the packaging’s limit value beyond which the product can be lost and therefore wasted for several reasons (fragile transport packaging; primary packaging too thin, leading to product losses; barrier packaging too weak, etc.)



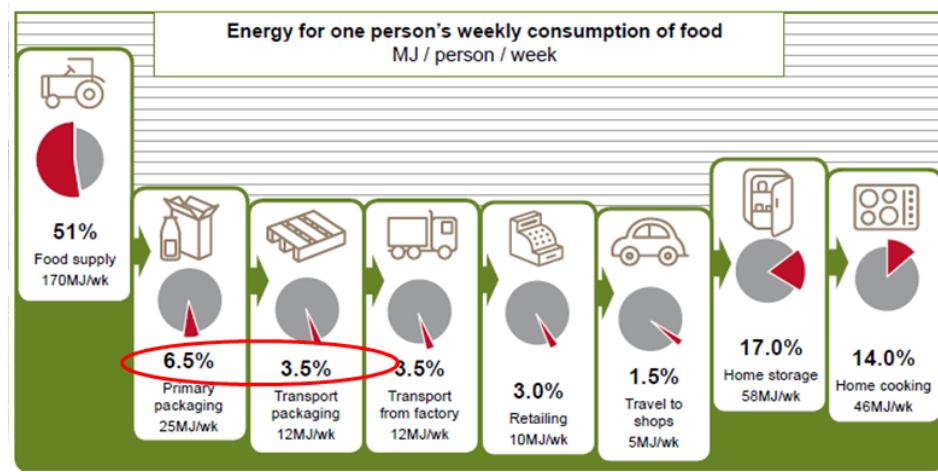
Source:Fost-plus

3.2 Between packaging and food product: environmental impacts put into perspective

◆ Consumption Packaging's share in environmental impacts of food products

Numerous available Life Cycle Analysis (LCA) enable to quantify the environmental impacts caused by packaging in the product-packaging pair analysis. In the following context, it has been decided to present the most significant and documented environmental impacts:

➤ Primary energy consumption¹⁶



Regarding the average consumption of food products per week, **nearly 10% of** an inhabitant of the United Kingdom's **primary energy consumption** is due to packaging.

The most significant shares of primary energy consumption are linked to agricultural upstream, food products storage at the consumer's site (refrigeration, freezing) and the products preparation/cooking.

➤ Greenhouse gases

As part of the 2011 pilot project on environmental information for products, many of them have gone through a Life Cycle Analysis: the packaging's share in the carbon footprint amounts macroscopically to nearly 10 to 20% when it is not being used, according to the food product's nature¹⁷.

In the study conducted by the Department of the Commissioner-General for Sustainable Development (CGDD¹⁸) about the carbon content of an everyday consumption basket, it has been demonstrated that **the packaging part in the carbon content of the average basket is estimated at 8%**, with high variations depending on the product. At 30%, they contribute the most for liquid products (mineral water, carbonated or alcoholic drinks). It is logically below the average for products with a higher carbon content (meat, animal products, etc.).

¹⁶ A table for one, juillet 2009, INCPEN.

¹⁷ Pilot on environmental labelling (in French), FCD/ANIA/ADEME octobre 2010.

¹⁸ Observation and statistics Environment n°121 April 2012 of the French CGDD (Commissariat Général au Développement Durable).

◆ Putting into perspective the environmental impact of packaging and food waste

The CNE points out that the evaluation of environmental impacts must be done on product-packaging pairs and that, in light of the environmental impact of certain food products, it can be interesting to get rid of some packaging if it may reduce food waste.

The CNE reiterates that packaging optimisation must always take place while preserving the product's container and the consumer's habits.

Based on product-packaging pairs, for some uses or consumption habits in certain consumers or households, a little more packaging (the right packaging) can fight against food waste while better preserving the food product.

The examples below happen to show that for some uses, a little more packaging – if it is able to avoid wasting the product itself –, could be the least impactful solution for the environment.

Cans of green beans¹⁹

Depending on the size of the household, one would be wise to choose the smaller cans of green beans depending on the needs and potential risks of waste if a part of the product is not consumed or is lost.

The switch from big tin cans (400 g) to smaller ones (200 g) is justified starting from 15% of losses avoided: it corresponds to about 34 g of (drained) green beans.



Can of 400 g



Cans of 200 g

CNE recommendation

To adjust the product quantity to the consumption, the CNE suggests the products manufacturers to investigate the idea of packed products the size of which is fitted to the need.

Cucumber packaging²⁰

Cucumber is composed of 90% water which it starts to lose right after harvest. After 3 days, it has lost so much water that it becomes colourless and soft, therefore unsellable.

A 1.5-gram plastic film packaging extends its shelf life by 14 days.



CNE recommendation

Considering how packaging played a part in the environmental impact because of the immutable product packaging, a little more packaging can sometimes be the least impactful on the environment, provided that actors do verify, on the basis of the appropriate tests, that said packaging constitutes an effective factor of food waste reduction.

¹⁹Source: http://www.preventpack.be/sites/default/files/publications/preventpack_21_dossier_fr_final.pdf

²⁰ Source: Packaging in perspective - Advisory Committee on Packaging - 2008

3.3 The limits of the contribution of packaging

The causes of food waste are numerous with shared responsibilities and a strong interdependence between the different actors of the food chain²¹.

The contribution of packaging to the reduction of food waste must be developed and consolidated, even if it should be put in perspective in view of other factors which generate said waste.

Indeed, even if packaging allows to conserve food products, to inform consumers, and to transport products, it still does not make it possible to address all the root causes of waste, notably the loss of the value of food and the lack of visibility of losses. In other words, even if a packaging able to substantially increase the protection and shelf life of the product supposedly existed, waste could remain high. This rings particularly true if based on the well-established behaviours and habits of the consumer resulting from the contractual relations between actors of the food chain.

It can be noted that food waste at a consumer level has been growing steadily over the last 40 years, even though the means (fridge, cold chain, increased refrigerator equipment, packaging improvements) and information (e.g. consumption dates) to help consumers to conserve products have been steadily increasing.

One of the root causes of food waste is the **loss of financial and symbolic value of food**. Between 1960 and 2014, the proportion of the French citizens' budget²² dedicated to food went from 35% to 20% at constant prices.

In addition, the remoteness of consumers from production sites combined with the increase in product processing leads to a lower awareness of the value of food.

Furthermore, **waste is not very visible to the actors** since it only represents a small proportion of the volumes of food produced, handled or consumed (less than 7%) that remains vague. For example, at home, this waste represents only 40 g per meal (including liquid foods) and happens during different phases (preparation, leftovers, storage outside of meals).

Thus, whether at home or in a company, individuals are not aware of throwing away²³ and when they do, it is a non-choice. They focus on other values, norms or constraints such as saving time, avoiding any health risk, respecting decorum or a certain social status, etc. which are, in the end, more important than these small wastes. However, these wastes represent huge masses at the end of the day.

Contractual relationships between actors in the food chain can also be an important cause of waste. For example, the GAROT report on food waste²⁴ published in April 2015 states that *'dates are sometimes misused in contracts binding manufacturers and distributors, and can be used as an adjustment for inventory management. In these contracts, a "guaranteed customer lead time" is provided (a timeframe needed by the distributor to market the product from the moment it is delivered), although it can generate waste when products are delivered slightly late, while the date of the product always allows it to be sold'*.

²¹ <http://www.ademe.fr/etat-lieux-masses-gaspillages-alimentaires-gestion-differentes-etapes-chaine-alimentaire>, ADEME, May 2016.

²² Source: INSEE

²³ Eurobarometer Study: Food waste and date marking Report - September 2015.

²⁴ <http://agriculture.gouv.fr/file/rapport-gaspillage-alimentairecle0ea927pdf>

For certain products with a long shelf life, this guaranteed customer lead time could be studied in order to avoid losses linked to said lead time, for example a 12-month product of minimum durability must, on delivery to the distributor, benefit from an 8-month shelf life at least. Failing this, although perfectly consumable, the product is refused by the distributor.

Moreover, in contractual relations between the actors of the food chain, the demand for a 100% service rate²⁵ can generate excess production to ensure that this rate is reached on all references, thus generating waste due to surplus products.

It is therefore a question of establishing a relationship between operators, such as to carry out tests according to the nature of the logistics flows and the specificities of the products or to provide concerted solutions, the finality being that this contract-date becomes consistent with the rotation of the product.

A number of pilot experiments²⁶ have been set up: the CNE can only encourage initiatives by stakeholders on the subject.

²⁵ The service rate corresponds to the rate of conforming orders delivered on time by the supplier to the customer.

²⁶ Club Demeter's study to learn more:
<https://www.youtube.com/watch?v=hv58kLOId0&feature=youtu.be>

4. The functions of packaging

Examples of Good Practices to limit food waste

In this chapter, the CNE reviews the functions of packaging²⁷ related to the fight against food waste and identifies any good practices related to the subject. Additionally, the CNE makes recommendations regarding the link between these packaging functions and their impact on the fight against food waste.

4.1 Conserve the contained product

- ◆ **Protection of the content from external constraints** (limiting damage caused by mechanical shocks; reducing taste and odour transfer; guarding against air or oxygen deterioration; protecting against interference from germs, insects or unwanted products; preventing theft or consumption of the contents before purchase; optimising the shelf life of perishable products; etc.).

Protection of the integrity of the product

This is an essential function of packaging in response to any mechanisation and any constraint/stress on the product-packaging pair. The product specification must be drawn up between the various relevant actors so that the product and its packaging arrive intact at the end of the logistic process.

Example of cardboard transport boxes for bananas:

The banana is a fragile fruit that must be transported over long distances and whose ripening is inexorable once it has begun –it will even accelerate if the fruit is damaged. As soon as the fruit is removed from the tree, a period of 20 days must be respected between harvesting and sale to the consumer located at the other end of the world.

The cardboard packaging must fulfil the following functions:

- Protect the product from shock.
- Allow good ventilation through perforations on the crate to control the temperature and the rate of ethylene produced by the fruit.
- Ensure a transport by cargo, for more than 10 days at a time, in very fluctuating temperature and humidity conditions.
- Allow storage by being stacked in containers.
- Ensure the ripening process of the bananas (48 hours in 'hot', non-ventilated rooms between 18°C and 20°C, then for 5 days at 16,5°C).



²⁷ For example: to protect, conserve, and transport the products it contains (all the functions of the packaging are available in CNE documents).

Increased shelf life of the products through packaging processes

MAP²⁸ and vacuum packaging technologies

In order to extend the shelf life of certain food products, manufacturers use a variety of means to slow down degradation processes, thereby preserving the appearance of food products and maximising their shelf life.



These means include modified atmosphere or vacuum packaging: they consist of packing the food in a package containing a mixture of natural inert gases, or vacuuming it, which considerably slows down the deterioration of the product and prolongs its shelf life.

Packaging a foodstuff in a protective atmosphere or vacuum requires the use of sophisticated packaging machines to first evacuate the air in the packaging chamber and either replace it with a precise gas mixture, or only by evacuating the air before sealing the packaging tightly. State-of-the-art technologies have been developed to ensure the accuracy of the gas mixture and to check that the sealed packages contain the correct gas mixture and are leak-free.

Example of MAP or vacuum-sealed products: pre-sliced and pre-packaged charcuterie²⁹: The primary packaging consists essentially of a thermoformed plastic tray and a lid sealed on the tray (see pictures below).



For this market, the carbon impact (expressed in kg of equivalent CO₂) due to the packaging is particularly low (8% part of the packaging) compared to the contained product. Note: even for small containers (e.g., one sales unit of two slices of ham), the packaging represents only 15% of the carbon footprint of the packaged product.

The packaging must be adapted to meet different consumer needs in terms of shelf life, particularly for products that are very fragile by nature. Thus, depending on the product range, packaging can provide greater flexibility to the consumer with, for example, a complementary offer between:

- **Sliced products: for fast consumption**
- **Pre-packaged products: for consumption delayed over time**

²⁸ MAP: Modified Atmosphere Packaging.

²⁹ CNE source: Why are products packed this way? http://www.conseil-emballage.org/wp-content/uploads/2014/01/104_3.pdf

The hydrocooling process from bulk salad to wood packaging³⁰

Some products need to be transported at low temperatures (fresh produce for example). For the conservation to be optimal, the products as well as the packaging must be cooled down. This operation is called hydrocooling, meaning that the process is conducted in cold water. In the case of wood, this 'hydrocooling' operation superimposes four levels that complement each other to extend the shelf life of the product:

- Cool down
- Clean either the dirt off the product for products in open ground, or some particles or dust for the others
- Conserve moisture, especially for salads, radishes, leeks, and green beans, which are all products called "humid" or "wet". While harvesting, salads are, for example, packed in a wood packaging which will then be placed on a very simple semi-automatic chain, showered or immersed in a pool of clear water to wash off the product (picture), saturated with water and soaked along with the wood packaging. During transport, storage, delivery and warehousing, the wood stays humid and transmits its moisture to the salad which dries faster than wood, thus objectively extending the shelf life of the product.
- Protect the product on account of the wood's antimicrobial characteristics which conserve the product from early spoilage that could result from the necessary level of humidity. The EMABOIS Case (scientific consortium of 2010-2015) has largely demonstrated the antimicrobial qualities of wood packaging.



³⁰ Source: SIEL (trade union for light wood packaging)

Innovative packaging to extend shelf life³¹

Packagings allowing the respiration of products by technologies of perforation

Combat against the fast degradation of fresh produce relying essentially on the control of its respiration. The oxygen supply and the release of carbon dioxide stemming from the products' respiration are regulated by the micro-perforations of the plastic packaging.

Packaging with selective permeability

The improvement of the preservation of fresh fruits and vegetables can be achieved through packaging allowing an evacuation of the CO₂ and a controlled input of O₂. This selectivity of transfer of CO₂/O₂ can be obtained by the association of various materials (polymer deposits on porous supports or polymer mixtures).

Example³² to store and conserve vegetables in optimal conditions:

Broccolis are now wrapped in plastic films with selective permeability, with drilled-in micro-holes to allow gaseous exchanges.



Chicories are not only wrapped in a microperforated plastic packaging, but also in a UV filter to limit the greening of the produce under the light.

Packaging with mineral coatings

The plasma residue technology corresponds to the deposit of a very thin layer of mineral coating at the surface of the packaging. It limitates the loss of aroma by applying a micron-sized silicon layer for example. This technology allows to increase the barrier characteristics of plastic materials, therefore improving the shelf life of food products. Drinks are primarily concerned.

Packaging made from bio-based materials

Some bio-designed materials feature interesting oxygen-barrier characteristics like the PBS³³, whose aspect and mechanical behaviour are akin to propylene, include an oxygen barrier at least 50 times stronger. The PEF³⁴, whose mechanical behaviour is similar to that of PET, exhibits an oxygen barrier 6 times stronger: these materials might be relevant in increasing the use-by date or shelf life of certain products.

Active packaging (oxygen and maturation components)

Scavengers intervene mainly to limit the accumulation of oxygen, ethene or water within the packaging. They are in the form of sachets or labels disposed within the packaging or included in the mass of polymer packaging (caps, film coatings, foam trays). The use of an oxygen scavenger can generally increase by at least 20% the microbiological life expectancy of a chilled fresh product and incidentally improve the use-by date; the control of water or ethene by scavenging also improves the shelf life of products and consequently limits food waste.

³¹ Source: PIPAME's prospective study "Technological advances, means of reducing waste in the agri-food sector: what is at stake for consumers and companies" - November 2014.

³² Source: Prince de Bretagne.

³³ PBS: Polybutylene succinate.

³⁴ PEF: Polyethylene furanoate.

Packaging with carbon dioxide or ethanol generators

Beyond its use for MAP, CO₂ can also be generated by the action of organic acids on a mineral substratum. The products concerned are fresh pasta, bread and precooked croissants, sausages and fresh meat, ready-made meals and meal trays.

Ethanol generators appear in the form of adhesive labels or sachets containing some encapsulated ethanol. They mostly find applications in the field of pre-packaged bakery/confectionery/pastry.

Packaging with controlled release of antimicrobial substances

Incorporating substances with antimicrobial effects in packaging or grafting them on the packaging's internal face would allow on one hand an incremental action over time, and on the other hand, a concentrated action on the food's surface. The antimicrobial agents offer very sensitive prospects of improvement in the by-use date of chilled perishable products. The main applications concern meat-based products and fish, as well as certain dairy products.

4.2 Facilitate the use

A product's use goes hand in hand with its packaging as both are often inseparably linked:

◆ Refund rate of the product: how to optimally empty the contents of one's packaging

In 2013, the CNE defined the refund rate as such:

It is the relation, expressed in a percentage, between the quality of the product the consumer will effectively be able to use in normal conditions of use (without having to rely on tools to open the packaging to reach any residual product) and the commercial quantity displayed on the Consumer Sales Unit.

It is one of the key parameters of the CNE³⁵ eco-design guide and it provides an opportunity to demonstrate all the efforts of adaption between product and packaging that have been made to avoid waste, especially food waste (rheology of the product, nature of the packaging material, etc.).

We can also evoke the research conducted to improve the packaging's surface tensions, consequently increasing its slippery aspect (research which could find applications in mayonnaise, mustard, ketchup, etc.).

CNE recommendation

This product's refund rate must be held as the fundamental principle of all product-packaging couples' conception, and must also be part of the eco-design key parameters to be piloted.

Example of cardboard packaging³⁶:

Conscious of the importance of facilitating the opening and closing systems of their packaging and the optimisation of product flow, food packaging manufacturers developed systems to improve the practicality of their packaging, while acting in favour of the reduction of food waste.

For several years, some astounding innovations came to be in order to increase the size of the caps and thus allow an optimal product flow. Some lids are now almost 30mm in diameter, allowing an optimal flow of the product. Other innovations, such as the "injected" lid, without any lumps inside the brick, allow for an even smoother pour.



◆ Closing the packaging in view of a differed consumption

This function is important in situations where the product cannot be fully consumed in one go. In this respect, for certain products, containers that are resealable exist in view of differing consumption of the product over several days following the product first being opened and therefore extending the lifespan of certain products (for example, slices of ham, powdered milk, etc.). It however seems that this seal is not always effective and does not always allow the expected conservation of the product after it is first opened/used.

If this function is not offered, the consumer can transfer the left-over portion of the product into reusable hermetically sealed boxes for a later consumption.

CNE Recommendation

This sealing function is a pertinent option which allows differed use over time after the product first being opened: The NCP asks its partners to confirm the efficiency of this function by carrying out consumer tests.

³⁵Eco-design methodological guide of the packaging product couple: http://www.conseil-emballage.org/wp-content/uploads/2014/01/84_0.pdf

³⁶ Source: Alliance Carton Nature (ACN)

◆ Packaging in the service of war on waste in commercial catering

To help fight food waste in commercial catering, services are developing which offer clients packaging allowing customers to take leftovers with them.

To find out more, one can check the gourmet bag website³⁷ set up with the support of the ADEME to promote such practices. This French denomination (*Doggy bag* in the United States) concerns all types of promotion of this practice in France.

◆ dosage adjusted to the need in order to limit waste

The number of households is increasing (from 24 million in 1999 to 28 million in 2013) and during the same period of time the number of people in each household is decreasing (from 2.6 people per household in 1990 to 2.2 people per household in 2013): the distributors offer different combinations of packaging-content with adapted sizes that correspond to these sociological phenomena, which explains why packaging formats are getting smaller.

The increase of single and two person households (from 55.3 % of households in 1999 to 60.8 % of households in 2013) is one cause of the adjustment of packaged products to the needs of these households.

Consumer fragmentation, nomadism, reduced time for the preparation of meals are all sources for the need of the product-packaging pair to be adjusted to the needs of consumers.

Example for a correct dose

- The packaging may allow the consumer to be **guided**: it can help them us the correct dose when they use the product (example on certain packs of dry vegetables where one can find the graduation on the side of the packaging allowing correct dosage when the product is being used).
- The measure of the correct dose using the packaging (practical trick of cutting in the packaging to dose pasta, cardboard box with graduation...) ³⁸.

CNE Recommendation

The CNE proposes the distributor investigate any tricks or information allowing, through the packaging, to aid the consumer to determine the correct dose of product.

³⁷ <http://gourmetbag.fr/>

³⁸ <http://www.casuffitlegachis.fr/particuliers/je-relaie-la-campagne/verre-doseur>

◆ Multi-portions in view of fractioned consumption

For certain fragile products with a short lifespan, the adequacy between the need of the consumer (size of the household, age, etc.) and the proposed quantity can be a useful means to avoid waste.

Example of cheese spread³⁹

Go from a "standard" packaging (150 to 200g) to individual portions (16 to 20g)

Starting from 2 to 3% of avoided waste (around 5g), the environmental impact of the additional packaging for the individual packaging is compensated for.



150g tray



20g portion

Example of portions of melted cheese⁴⁰

The portions of individually packaged cheese allow a fractioned consumption and do not impose a rapid consumption after opening the whole of the product. The portions that are not consumed can be kept as long as the best before date on the product is not passed.



According to an IFOP study⁴¹ from 2013, this type of individual conditioning contributes to **significantly reduce food waste**: 75% of consumers say that they never throw away individually packaged cheese.

Also, a study carried out by IFOP⁴² in a school cafeteria showed that individually packaged cheese allows a reduction of 30% of waste (cheese + primary packaging) and of 60% of product waste. Therefore for 100g of finished product (cheese + primary packaging) prepared at the beginning of service, the cheese packaged individually generates 11g of waste, against 16g for cheese by the slice. This explains the fact that the main cause of waste is food waste.

Moreover, it must be said that the **packaging of these portions represents a very small impact to the environment for the cheese-packaging coupling**. The LCA (Life cycle analysis) carried out on the main Bel serving size cheeses⁴³ show that the packaging in its whole only account for **5 to 10% of greenhouse gas emissions**, while the production of the raw dairy materials account for more than three quarters of them. In other terms, the packaging has a low environmental impact that allows the preservation and avoids waste on a product with high nutritional value and a greater environmental impact.

³⁹ Source : http://www.preventpack.be/sites/default/files/publications/preventpack_21_dossier_fr_final.pdf

⁴⁰ Source : BEL group.

⁴¹ IFOP study carried out in April 2013 among 764 consumers of cheese sold in self-service shelving based on photos of cheese under different presentations: individually packaged cheese, shredded cheese, cheese in tray, whole cheeses.

⁴² IFOP study for Bel Foodservice on food waste of cheese in secondary school cafeterias, carried out between December 2014 and January 2015 in 33 establishments over 4 days.

⁴³ Life cycle analysis carried out using the environmental impact referential of dairy products in France - January 2014.

Finally, the sanitary interest of individually packaged cheese is proven since the packaging **limits the risk of exterior contamination**.

The multi-portion option meets the needs of the product and adapts to individual consumption; **the CNE does not ignore the fact that alternative consumption practices exist which also allow consumption to be adapted to (bulk purchasing, purchase of products where the consumer brings their own container, etc.)⁴⁴**.

4.3 Inform

◆ Value of the food

The packaging can be a communication tool to have a pedagogical approach to showing the importance of the nutritional value of the product. Food waste is often looked at from the following point of view:

- The economic value⁴⁵ : The ADEME study shows a loss of 240 € per person in France.
- The ethical (or moral) value: Wasting food products while not everyone has enough to eat raises certain questions.
- The social value: Throwing away an unprocessed or processed product, while ignoring the fact that it is the fruit of work and know-how which took time and energy to develop.

CNE Recommendation

The CNE considers that packaging could inform on the value linked to nutritional aspects for the consumer; especially in light of the resources necessary to create the foodstuff and the energy and human passion that goes into food production.

Simple messages could be printed on the packaging (see photo): "loving food, is respecting it" allowing appeal to be given to food and therefore avoiding it being wasted.



The CNE is also conscious that too many messages on packaging can limit the impact to the consumer. It is therefore necessary to find the correct equilibrium between obligatory information and information which can lead to behavioural change.

⁴⁴ To learn more, the reader can refer to the document "pre-packaged products - Bulk product recommendation from the CNE".

http://www.conseil-emballage.org/wp-content/uploads/2014/01/111_0.pdf

⁴⁵ On an individual level, loss and waste during the consumption stage represents around 108€ per year per person and around 240€ per year and per person if we consider loss and waste at all stages of the production and consumption stage calculated at an individual level. This takes into account the price of products when they are lost, not consumed. It does not include the price of associated services.

◆ Food Management

- Pouring the product
The packaging can **give advice** on how to pour the product (for example a brick of soup that can be rinsed with a little water after pouring it out in order to recover all of the product).
- Refrigerator Management
Basic rules must be respected concerning the management of a refrigerator; at least in order to respect the rule of First In, First Out (FIFO)⁴⁶. Packaging can also play an **educational role** by offering consumers the option to place older products at the front of the refrigerator.
- The adjustment for left overs and conservation
Same advisory exercise where, through packaging, the manufacturer **can communicate** the manner to adjust for left-overs and the proper conditions for conservation.
- Freezing
Subject to reglementary, sanitary and organoleptic guidelines, it is possible to freeze perishable foods in order to differ their consumption. The packaging can inform the user on this practice and the precautions to take.

In the 2016 marketing campaign "enough waste", the ADEME put forward anti-waste actions that spread and illustrate this message⁴⁷.

◆ Shelf-life of products: Expiry date/Best before date

A best before date being placed on a product has as a goal to make the consumer aware of⁴⁸ the limit after which a product may have lost its sanitary, nutritional or organoleptic, physical, etc. qualities.

On packaged products two types of dates can be written: one with the expiry date (DLC) and one with a best before date (DDM), before known as the optimal consumption date (DLUO). Finding the type of date (DDM or DLC) as well as the effective lifespan of the product is the responsibility of the producer.

A better understanding of these dates by the consumers is an end goal and can lead to a reduction in food waste.

Within the framework of the European study "Eurobarometer" "Food waste and date marking Report" from 2015, almost six out of ten Europeans⁴⁹ (58 %) say that they always check the best before and the expiry date while grocery shopping and while preparing their meals.

This study confirms the significance of the indications concerning consumption dates on food products that they are largely misunderstood. Less than half of Europeans (47%) understand the significance of "best before" and even less (40%) of an "expiry date". For both types of indications "best before" and "expiry dates", a quarter of Europeans do not understand the significance of the indications.

⁴⁶ FIFO : First in - first out.

⁴⁷ <http://www.casuffitelegachis.fr/particuliers/je-relaie-la-campagne/carte-postale>
http://www.casuffitelegachis.fr/particuliers/je-passe-laction?field_thematique_passe_tr_target_id=430&time=1510590893

⁴⁸ With the communication limits of packaging described in the document: consumer information concerning prevention of biological risks linked to foodstuffs - Tome 2 - Evaluation of the efficiency of communication strategies: advice notice from ANSES - October 2015.

<https://www.anses.fr/fr/system/files/BIORISK2012sa0118Ra-02.pdf>

⁴⁹ European Eurobarometer study: Food waste and date marking Report - September 2015.

To understand more about the comprehension of use by dates and the associated behaviour of French individuals, the reader could also check the ADEME/CLCV study⁵⁰ of 2013.

CNE Recommendation

The CNE reminds that the DDM mention is not obligatory on all food stuffs (see INCO regulation and its X Annex) and in the case, encourages that it not be applied.

The list, still reduced, merits that it be studied by food sector professional based on consumer studies and sensory analysis (organoleptic test of products to for example help regulation evolve and allow packages to be more efficient in providing information against food waste).

◆ **The consumption of the product after the packaging has been opened**

According to the nature of the product, the consumer must think about purchasing the correct product-packaging pair on offer, depending on its use once the packaging is opened.

After opening a package, it is not easy for a consumer to know for how long (in a factual manner) they can conserve a product without issues in adequate conditions of storage: they are often confronted with the expression “rapidly use after opening”, which allows an open interpretation.

According to the ANSES⁵¹, the lifespan after a product is opened is an unresolved question, on which it would be useful to carry out scientific studies based on forecast microbiology and appreciation of quantitative risks.

CNE Recommendation

In the same way as the ANSES, the CNE wishes that the professional organisations of manufacturers of food stuffs assimilate the subject in order to offer comprehensible information, simple and homogeneous concerning possible consumption after opening. For adoption by the consumer, this information would need to be placed near the best before date of the product.

⁵⁰ <http://presse.ademe.fr/2013/12/dlc-enquete-clcv.html>

⁵¹ Saisine n° 2014-SA-0061: Advice of the ANSES concerning the definition of perishable and very perishable goods. <https://www.anses.fr/fr/system/files/BIORISK2014sa0061.pdf>

Emergent information technologies

The use of NICT⁵² (New Information and Communication Technologies) allows access to information in real time. This information can be placed on a website or an exchange platform, as long as readable codes are placed on the packaging which can be used with smartphones and associated apps.

- **One-dimensional bar codes (linear)**

The bar code is composed of codification represented by numbers, and of symbolism represented by bar codes. The use of a bar code allows the producer to identify each unit in a lot from the production to the distribution.

- **Bi-dimensional bar codes**

Bar codes in two dimensions made up of black cells disposed in squares with a white background. Two protocols with the same function can be distinguished:

- Datamatrix, developed especially in the health sector in France.
- QR (Quick Response Code), often linked to a URL.

They are destined to be read by bi-dimensional readers such as smart phones. They have the advantage of being able to store more information than linear bar codes.

- **RFID tag** - Application on/in the product itself or on the packaging.

Is a marking and reading technology without contact with products.

The RFID or identification by radio frequency, consists of placing on a product or its packaging an electronic tag which holds information which may be used by specific readers.

Beyond the packaging, the CNE mentions that smartphone **applications** exist which allow the consumer to limit food waste⁵³. The goal is then to make the packaging "connected" through RFID technology or QR code printing allowing a bridge to be created towards the website of the distributor (for example with ideas on the use of left-overs).

⁵² NICT: New Information and Communication Technologies

⁵³ "Anti waste" applications: Ademe data sheet - April 2017

4.4 Regrouping

- ◆ **Regrouping several consumption units** in order to match consumption of products and purchase frequency (yogurt packs, beer bottle packs, etc.)

Virtual lots (see below good practices⁵⁴ identified from 2011).



CNE Recommendation

The CNE considers that this notion of virtual lots (ex : pack of 12 yoghurts purchased in 3 packs of 4 yoghurts with chosen flavours versus 12 yoghurts with imposed flavours) can likely limit waste by offering more individualised choice at the time of purchase.

- ◆ **Ensure the promotion of products** (promotional lots)

BOGOF promotions (Buy One Get One Free) should be changed to BOGOF-L (Buy One Get One Free - Later)



This evolution in promotional offers is already found in the UK since the ban⁵⁵ by Gordon Brown, Prime Minister of the UK in 2008, of promotional practices "two products for the price of one".

Even if packaging does not have a particular role in fighting food waste, this promotional offer with a free differed product (BOGOF Later⁵⁶) allows an adjustment of the act of purchase with regards to the product's consumer, this sort of promotion is essential for products with a short lifespan.

⁵⁴ Page 14 of the CNE document "waste and loss prevention for consumer products: The role of packaging" - 2011

⁵⁵ Food Matters: toward a Strategy for the 21st century, the Strategy unit, Cabinet Office UK 2008.

⁵⁶ Buy One, Get One Free...Later: A purchased product entitles the claim of a free product which can be obtained at a later time, according to need.

4.5 Transport/Storage

Food waste may be generated during logistic flow between stakeholders, be it during transport between producer and distributor or between the distributor and the final consumer.

The CNE has already documented the importance of packaging concerning the logistic of products⁵⁷ in general, the reader may refer to these documents.

The CNE offers below several elements of thought with the goal of reducing food waste.

◆ Conceiving the logistic unit

Palletizing and logistic units must be conceived while integrating all the constraints of the logistic circuit (including the final consumer): packaging must be adapted to distribution (while also considering E-commerce) and to storage in a logistic centre but also consumer storage.

CNE Recommendations

The number of consumer sales unit by logistic unit should be adjustable to store sales (notably for very perishable products), which will allow adapted quantities to be ordered in line with product rotations.

This possibility should be studied at a reasonable economic cost for all parties taking into account the technical feasibility for the packer.

- ◆ Ensure the delivery from the production site to the distribution site without damaging the product (protection against mechanical damage to the product-packaging pair), by using pallets, corrugated cardboard tops, edge protectors, metallic or plastic links, stretch or retractable film, etc.

CNE Recommendations

The mechanical resistance of logistic units must be studied by integrating all the characteristics of the logistic flow including transport to the final consumer.

The distributors can offer innovative solutions for delivery into stores (rolls).

- ◆ Inform logistic centers of the content of transport crates (logo, brand, content, bar code, etc.)

Beyond the electronic information system which limit errors when preparing an order, the transport packaging (or logistic unit) can be a vector of information concerning the content, thus avoiding delivery refusals and loss of products.

⁵⁷ http://www.conseil-emballage.org/wp-content/uploads/2015/11/Emballages-et-Logistique_Fr1.pdf

5. Regulations

Until 2007, the size of pre-packaging for many food products was regulated by European directives. For example, cod fillet could not be sold to the consumer in packages of 400 or 1000 grammes (or multiples of 1000). This legal framework was rescinded⁵⁸. The European Commission responsible for the deregulation had explained, after an impact analysis, that the regulation was not adapted; for example, diabetics could not find portions of products adapted to their needs. Today, the size of packaging is unconstrained.

Packaging is not considered directly by the law as a means of fighting against waste but of course a company can integrate conditioning in its general environmental policy and particularly its anti-waste policy⁵⁹ which is designed to avoid waste⁶⁰.

5.1. Regulation of food donations in distribution: measure regulated by law

The law No 2016-138 of February 11th 2016 relating to the fight against food waste prohibits distributors from destroying food which is still edible. It also heavily encourages the donation of unsold inventory by imposing that distributors with over 400 m² of store space offer that one or several authorised associations create agreements to obtain unsold food stuffs gratuitously. The provisions of this law are included in the environmental code articles L. 541-15-4 and the following ones.

◆ Prohibition from making food products unfit for human consumption

The distributors of the food sector are no longer allowed to deliberately make their unsold products unfit for human consumption. Beforehand, it was common practice to spray them with bleach to stop them from being recuperated and eaten without assurance of microbial quality.

It is also prohibited to make these products lose their value: animal products, compost, or energetic value notably through methanisation.

In the event that these regulations are not followed, the distributor faces a fine which can be of up to 3 750 euro. The judge may also additional sentence the distributor to publicise the fine in their store or to broadcast the decision in the press or online.

Of course, these sentences are not applied if the unsold product posed health risks, for example through contamination.

⁵⁸ Directive 2007-45, September 5th 2007, setting regulations on the nominal quantities of pre-packaged products, rescinding directives 75/106 and 80/23 and modifying directive 76/211.

⁵⁹ To this end, the code of commerce requires that large companies make public their social measures aimed at curbing food waste in their "extra-financial declarations" (article L. 225-102-1 modified by law n° 2016-138 of February 11th 2016 relating to the fight against waste).

⁶⁰ See in § 2.1 the official selected definition in the National Pact against food waste of 2013 between the state and the representative of the food industry.

◆ Donations to associations

Since February 12th 2017, food distributors with a sale surface of over 400 m² are obligated to offer that **authorised** nonprofit associations (national or regional authorisation⁶¹), pursuant to article L. 230-6 of the rural fishing code, an agreement which states the modalities through which food products are given to them on a gratuitous basis.

Failure to respect this obligation can lead to a fine of up to 450 euro.

The decree No 2016-1962 of December 28th 2016 completes the environmental code through the following dispositions (articles D.543-306 and 307):

1° the food products subject to an expiry date (DLC) must be taken by the association at least 48 hours before the expiry. This delay may be shorter if the association can justify that it is able to redistribute the products before the expiry date;

2° labeling of food products must show the legal mentions specified in the regulation 1169-2011, also known as INCO concerning the information for consumers of food products;

3° the agreement specifies that the sorting of food products is done by the distributor and that the association may refuse all or some when, notably, its transport capacities, storage capacities or distribution capacities are not sufficient or after visually checking the products if they seem unfit for consumption or that health and safety rules are not respected;

4° the agreement define the modalities of pickup, transport and storage of food products, as well as the respective responsibilities of the distributor and the association during these operations;

5° it stipulates how traceability is ensured for food products and provides for a withdrawal receipt which justifies that the donation occurred.

◆ Responsibility

Companies that give products sold under the distributor's brand are responsible for any damages to the people who consume them. (Civil code, art. 1245-10). One background note⁶² relating to the legislative framework and the applicable regulations, on the matter of sanitary safety of food products, of donations carried out by companies of the food sector was published in July 2017.

⁶¹ <http://agriculture.gouv.fr/mise-en-oeuvre-de-laide-alimentaire-la-liste-des-structures-habilitees>

⁶² <https://info.agriculture.gouv.fr/gedei/site/bo-agri/instruction-2017-551>

5.2. Legislation surrounding active packaging

Traditionally, in Europe, packaging had a passive role. It was not meant to modify the properties of the packaged products. It was the role assigned to the packaging by European legislation and by habit.

The legislation planned that materials in contact with food products could not lead to chemical reactions which might modify the taste, appearance, texture, or aroma of the food or alter its chemical makeup. This rule of inertia was applied even if the change could benefit the food product or lengthen its life cycle and therefore blocked innovation, which was not the case in the US or Japan where rules were less restrictive.

Regulation No 1935/2004 of October 27th 2004 legalised the active role of packaging with a certain number of rules.

Active substances which will improve the conservation of the food product must be part of the following two lists known as "positive":

- Substances authorised for regulations relating to food products, in particular additives,
- Substances on a European list specific to active materials.

The regulations provide for specific rules with regards to nano-materials.

5.3. INCO regulations on consumer information

Regulation No 1169/2011 of October 25th 2011 concerning the consumer information of food products.

◆ **Expiry Date (DLC)**

Article 24: *An expiry date must be present on the packaging in the case of micro-biologically very perishable food products and that, are susceptible, after a short period, to present immediate danger to human health. Beyond the expiry date, the food product is considered as dangerous.*

◆ **Best before date (DDM)**

La DGCCRF reminds⁶³ that, once this date has passed, the food product does not present a danger for a consumer, even though it may have lost some or all of its specific qualities as is the case, for example:

- Coffee, which after a certain time, loses its flavour.
- Infant diet products, which lose some vitamin content once the DDM is passed.
- Dry pastries, which over time, lose some flavour.

5.4. National pact against food waste and General State of Nutrition

Diverse work is being carried out within the framework of the Pact work groups as well as the workshops of the General State of Nutrition. In order to benefit from recent information, the reader may refer to the advice produced in these different instances on <https://www.egalimentation.gouv.fr/>

⁶³<https://www.economie.gouv.fr/dgccrf/Publications/Vie-pratique/Fiches-pratiques/Date-limite-de-consommation-DLC-et-DDM>

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Manufacturers of packaging materials,
Manufacturers of packages,
Industrials of consumer products,
Distribution companies,
Authorised businesses and operators within the collection and valorisation sector,
Consumer associations,
Environmental protection associations,
Local authorities,
Other federations, other companies.

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