Chapter 4
Complying with Regulations

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Abstract Around the world, packaging is subject to a wide range of environmental regulations, voluntary standards and codes of practice. While these vary greatly, there are common themes and expectations to be considered in the packaging design process: environmental design, resource efficiency (materials and energy), reduction in toxic substances, end-of-life recovery, use of recycled materials, restrictions on plastic bags and some takeaway food containers, and responsible environmental labelling. These should be addressed in the packaging design process, as well as specific regulatory requirements in end-markets, to be well prepared to meet current and future regulatory obligations. Appendix C: matrix of international regulations, policies and standards provides a detailed guide to packaging regulations and standards, by region and country, as a resource to support the packaging design process.

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4.1 Introduction

Around the world, packaging is subject to a wide range of regulations, environmental voluntary standards, and codes of practice. These have evolved from regulations in the 1970 and 1980s to manage litter and waste, through to voluntary standards and guidelines that promote 'sustainable packaging' in the 2000s (see Sect. 1.4).

⇒ See Appendix C: matrix of international regulations, policies and standards for packaging by region and country

Regulations Target Waste Reduction and Recycling

Most current regulations and standards are intended to promote environmental responsibility for packaging. Most, however, target waste reduction and recycling rather than broader sustainability goals. For example, 'bottle bills' (container deposit legislation), the European 'Green Dot' and Ontario (Canada) Blue Box programs involve the payment of a redeemable deposit or a recycling fee in order to promote packaging recovery.

These approaches contribute to:

- increasing packaging recycling rates
- reducing waste to landfill
- meeting country or regional recycling and waste reduction targets.

Some Regulations Do Not Promote Optimal Outcomes

An assessment of regulatory and policy approaches according to the principles for packaging sustainability introduced in Chap. 2 shows that many regulations do not

promote triple bottom line sustainable development (see Table 4.1). Those that focus on a single issue achieve limited environmental outcomes. Waste reduction and recycling should therefore be components in a broader plan.

Table 4.1 Policy instruments

Type of policy or regulation	Description	Sustainability principle(s)
Bottle bill/Container deposit legislation (CDL)	A mandatory deposit on beverage containers paid by the consumer and redeemed when they return the container to the retailer or another authorised agent	↻
Code of Practice (CoP)	A Code of Practice is a voluntary standard, generally developed by an industry or professional association to guide the behaviour of members	Depends on the code
Design requirements	Standards covering issues such as integration of environmental design in new product development, or specific requirements (e.g. packaging layers, void space etc.)	★ $ ↻ ✚
Extended producer responsibility (EPR)	A regulation that makes producers (and possibly other industries/businesses in the supply chain) physically or financially responsible for the recovery of packaging at end–of-life	↻
Labelling	Labelling to promote recycling is mandatory in some jurisdictions, e.g. the resin identification codes or recycling logos	↻
Product stewardship (voluntary agreement)	A voluntary commitment by businesses in the packaging supply chain to reduce the environmental impacts of packaging. Voluntary agreements may be supported by back-up regulation to catch free-riders ('co-regulation')	★ $ ↻ ✚
Packaging ban	A ban on the sale or issue of a particular type of packaging, e.g. plastic shopping bags or expanded polystyrene takeaway packaging containers	↻
Packaging tax	A tax imposed by government on the sale of certain types of packaging. The tax may differentiate packaging material, weight and/or carbon dioxide emissions	$ ↻ ✚
Packaging levy	While 'tax' and 'levy' are sometimes used interchangeably, a levy generally goes into a special fund (e.g. an environmental fund) rather than consolidated revenue	$ ↻ ✚
Recycling requirements	Some governments specify minimum recycling rates or recycled content	↻
Trade practices legislation	Trade practices regulations that restrict false and misleading claims applying to environmental claims and labels	★
Standards	Standards are developed by an independent national or international organisation, e.g. International Standards Organisation. Compliance with standards may be voluntary or regulated	Depends on the standard

★ (effective), $ (efficient), ↻ (cyclic), ✚ (safe)

Life Cycle-Based Approaches are Emerging

A new generation of packaging guidelines, standards and policies recognise that waste reduction is only one of the strategies required to achieve better environmental outcomes. These combine waste reduction and recycling strategies with considerations about water and energy consumption and packaging efficiency at every stage of the product environmental life cycle.

⇒ Learn more about LCA in Chap. 5 and the life cycle of common packaging materials in Chap. 6

Flexibility is Required to Achieve Optimal Outcomes

A more flexible approach enables strategies:

- to be identified and optimised on a case-by-case basis
- that balance environmental issues with economic and social objectives (triple bottom line)
- that do not consider the environmental impacts of packaging in isolation from the product it contains [1].

This approach is evident in the packaging sustainability indicators and metrics framework developed by The Consumer Goods Forum [2] (see Table 8.7). Other examples include the Sustainable Packaging Coalition's guidelines and indicators [3, 4] and the Packaging and the Environment standards (TC 122/SC 4—Packaging and Environment) currently under development by the International Standards Organisation.

4.2 Common Themes and Expectations

Despite the different regulatory approaches applied around the world there are many common themes and expectations including:

- environmental design
- resource efficiency (optimisation)
- reduction of toxic substances
- end-of-life packaging recovery
- use of recycled materials
- restrictions on the use of plastic shopping bags and takeaway packaging
- responsible environmental labelling.

Each of these is discussed separately below and linked to the relevant principles in the packaging sustainability framework.

4.2.1 Environmental Design ★ $ ↻

Many regulations, policies and standards require environmental impacts to be considered at the design stage, which is when decisions are made about materials and packaging formats. These decisions determine the environmental impacts of packaging at every stage of the life cycle.

⇒ Learn more about life cycle based environmental tools and guidelines in Chap. 7

The promotion of environmental design is central to a number of national packaging strategies. The United Kingdom's packaging strategy [5] is to be achieved through partnerships with organisations such as WRAP and Envirowise, both of which provide guidelines, tools and advisory services for businesses in the packaging supply chain. The Australian Packaging Covenant (see Case Study 4.1) and the New Zealand Product Stewardship Scheme require signatories to adopt and implement design guidelines. Businesses

Case Study 4.1 Design Requirements in the Australian Packaging Covenant

The Australian Packaging Covenant (APC) is the voluntary component of a co-regulatory policy to reduce the environmental impacts of packaging. Brand owners that choose not to participate can be regulated through state-based EPR regulations.

The first goal of the APC relates to design:

> 'To optimise packaging to use resources efficiently and reduce environmental impact without compromising product quality or safety.'

APC signatories are required to implement the Sustainable Packaging Guidelines for design and procurement. This requires signatories to evaluate all new and existing packaging against opportunities to:

- maximise water and energy efficiency
- minimise materials (source reduction)
- use recycled materials
- use renewable materials
- minimise risks associated with toxic and hazardous materials
- use materials from responsible suppliers
- design for transport
- design for reuse
- design for litter reduction
- design for consumer accessibility
- provide consumer information.

The review process must be documented and the evidence relating to decisions retained on file for independent auditing.

Case studies on the implementation of the guidelines are available from the APC website: http://www.packagingcovenant.org.au/.

Source: Australian Packaging Covenant [8]

that market packaged products in Europe need to demonstrate compliance with the 'Essential Requirements' of the Packaging and Packaging Waste Directive:

- Packaging weight and volume should be minimised to the amount needed for safety and acceptance of the packed product
- Noxious and other hazardous constituents of packaging should have minimum impact on the environment at end-of-life
- Packaging should be suitable for material recycling, energy recovery or composting or for reuse if reuse is intended.

The European Committee for Standardization (CEN) has produced six voluntary standards for implementing the Essential Requirements (CEN Standards 13427 to 13432). The influence of these standards extends beyond Europe. For example, the Asian Packaging Federation modelled their Guidelines for Environmentally Conscious Packaging on the CEN Standards, and they provide the basis for the Packaging and the Environment Standards being developed by the International Standards Organisation [6].

4.2.2 Resource Efficiency ('Optimisation') $

Resource efficiency, including the efficient use of materials, energy and water throughout the packaging life cycle, is promoted through a range of policies. Waste avoidance and minimisation of packaging is required, for example, under the European Union (EU)'s Essential Requirements and the Chinese Government's Excessive Packaging Law (Case Study 4.2).

Case Study 4.2 The Chinese Excessive Packaging Law

The Excessive Packaging Law (2009) introduced mandatory legal standards and controls for packaging including:

- instructions on the number of primary and secondary packaging layers allowed
- limits on the cost of packaging, which is to be no more than 15% of the sale value of the product
- formulae for the calculation of allowable free space enclosing the product and the permitted product-packaging cost ratio.

The government argued that excessive packaging wastes resources, pollutes the environment and disadvantages consumers. Specific mention was made of luxury items and gift products that are popular during festive periods, such as Chinese New Year.

A National Standard has been developed entitled 'Excessive restrictions on merchandise packaging requirements for food and cosmetics'.

Source: I-Grafix.com [7]

Within the context of international efforts to address global warming, policy makers and practitioners in many countries are starting to consider the energy use and greenhouse gas emissions associated with every stage of the packaging life cycle. The packaging strategy released by the UK Government in 2009 has two goals which reflect the new carbon agenda [5, pp. 21–22]:

- 'Optimise' packaging by reducing waste at source. The strategy claims that this is the 'most effective way to pave the way for a low-carbon economy and to drive resource efficiency'
- Increase recycling, and where this is not possible, 'find other carbon- and economically efficient recovery routes (including energy from waste)'.

The strategy includes a proposal to shift from weight-based recovery targets, currently mandated through the EU's Packaging Directive, to targets based on carbon dioxide emissions. The rationale is that some of the actions taken by industry and local authorities to achieve weight-based recovery targets are not achieving an overall reduction in environmental impact. For example, much of the effort to increase recovery rates has focused on heavier materials, such as cardboard and glass, and recycling them does not always result in a reduction in life cycle greenhouse gas emissions. 'Closed loop' recycling of glass containers (back into new glass containers) reduces energy and greenhouse gas emissions as well as cost, but when glass is recycled into aggregate for road base it does not generate the same level of environmental benefit. There are also perverse impacts in other areas of the packaging market; for example, when the use of recycled material increases packaging weight and greenhouse gas impacts. In the government's view, carbon is a good proxy measure for other environmental impacts [5].

The United Kingdom's approach is consistent with similar developments in other countries. While packaging taxes are not uncommon in Europe, the Dutch

Government introduced an innovative tax in January 2008 based on the amount of carbon dioxide generated in the manufacture of each type of packaging material. The Belgian Government proposed a carbon-based tax on all packaging in 2007, but following widespread opposition the tax was confined to plastic carrier bags, plastic films, aluminium foil and disposable cutlery.

Economy-wide policies designed to reduce greenhouse gas emissions, such as a carbon tax or emissions trading scheme, are also likely to have a direct impact on the packaging supply chain. By increasing the cost of energy they provide a stronger financial incentive for manufacturers to improve the efficiency of production and distribution. The cost of raw materials with high-embodied energy, such as glass and aluminium, may increase relative to other materials, and raw material processors will have a stronger incentive to implement closed loop recycling.

4.2.3 Reduce Toxic Substances ✚

⇒ Learn more about toxic substances in Sect. 2.4.4

Avoiding or reducing the use of hazardous substances such as heavy metals is important for packaging sustainability. This is in line with the principle of safe packaging, one of the four principles introduced in Chap. 2. The EU Packaging and Packaging Waste Directive Essential Requirements and the US Toxics in Packaging Bill have become the default international standards for heavy metals in packaging.

The EU Essential Requirements state that the total weight of cadmium, mercury, lead and hexavalent chromium in packaging or packaging components must not exceed 100 parts per million (ppm). There are exemptions (derogations) for lead crystal glass, enamelled glass, glass that may have been contaminated with lead from old glass in the recycling process, and plastic pallets and crates manufactured with at least 80% recycled content where no heavy metals have been intentionally added during the production process.

The heavy metal limit is not enforced in all EU countries. In the United Kingdom, Trading Standards Officers may assess compliance by asking for technical documentation on any item of packaging [9]. A report on implementation of the European Packaging and Packaging Waste Directive found several packaging formats that commonly exceeded the 100 ppm limit (Table 4.2).

The US Toxics in Packaging Bill was introduced in 1990 by the Coalition of Northeastern Governors and has since been adopted by 19 US states. The Bill calls for:

- a ban on the intentional use of lead, cadmium, mercury and hexavalent chromium in packaging
- a limit on the sum of the concentration of incidentally introduced lead, cadmium, mercury and hexavalent chromium to 600 ppm 2 years after the law is introduced, 250 ppm after 3 years and 100 ppm after 4 years.

Table 4.2 Heavy metals in packaging

Packaging Component	Heavy Metal	Source
Coloured nets	Lead and chromium	Pigments linked to the colours of yellow and orange
Plastic caps	Cadmium	Pigments linked to the colours of yellow, orange, red and green
Plastic bags	Lead and chromium plus some hexavalent chromium	Pigments linked to the colours of yellow, gold, orange, red and green
Plastic non-food bottles	Lead, cadmium and chromium plus some hexavalent chromium	Pigments linked to the colours of yellow, orange and green

Source: Based on PIRA International Ltd and ECOLAS [10]

There are a number of exemptions including packaging made from recycled materials.

⇒ More information on BPA and phthalates can be found in Sect. 2.4.4

Chapter 2 highlighted other emerging issues for packaging safety, such as migration of Bisphenol A (BPA) and phthalates into foodstuffs (Sect. 2.4.4). Several jurisdictions in the United States have introduced or are considering regulations to restrict the use of BPA in packaging applications, particularly for products targeting children or infants. Connecticut, for example, bans the use of BPA in containers for infant formula and baby food. BPA is a component of polycarbonate plastic and the epoxy lining of metal cans. Canada has banned the use of BPA in plastic baby bottles and in 2010 declared BPA to be a toxic chemical, paving the way for further restrictions [11].

Another group of chemicals that face increasing scrutiny is the phthalates used to soften PVC. In 1999 the European Union banned six phthalates in toys likely to be placed in the mouths of children under 3 years of age. A similar ban was introduced in California in 2007, and a number of other states followed. In 2008 the US Government prohibited the sale of children's toys or childcare items that contain more than 0.1% DEHP, DBP or BBP (for full chemical names see Table 2.16). An interim ban was imposed on DINP, DIDP and DNOP while more research was undertaken [12, pp 57–66]. The European Union has set very low limits for phthalates in food: 1.5 ppm for DEHP and 9 ppm for DIOP and DINP [13].

These examples highlight the need to understand chemicals used across the packaging life cycle in order to identify potential toxicity issues. One media commentator based in the US identified 'toxics' as one of the key strategic business issues in 2010 because of the accelerating level of regulatory activity in this area [14].

4.2.4 End-of-Life Recovery

Producer responsibility for packaging at end-of-life is regulated through EPR laws, voluntary agreements (for example, in Australia and New Zealand) and bottle bills.

Businesses that sell packaging in Europe can comply with EPR laws by joining one of the producer responsibility organisations that recover packaging for a fee. Many of these schemes license member organisations, which pay an amount per package based on weight and material type to display the 'green dot' logo on their packaging.[1] EPR laws for packaging have also been introduced in South Korea and Japan. In the United States, there are moves to introduce EPR regulations for packaging at a state level, driven by tight waste management budgets and the need to reduce greenhouse gas emissions [15].

Signatories to the Australian Packaging Covenant pay an annual fee to support recycling and litter reduction projects. There is no requirement for individual businesses to take back and recycle packaging, although brand owners that choose not to participate voluntarily in the Covenant or do not meet their Covenant obligations can be regulated under free-rider legislation. This requires them to ensure recovery of their own packaging.

Bottle bills are in place in many countries or states and apply to certain beverage containers. Brand owners are required to collect a specified deposit on each container and to refund consumers on the return of the empty bottle. This exchange normally occurs through a third-party recycling organisation, which charges businesses for the amount of money paid to consumers for the return of their branded packaging.

4.2.5 Use of Recycled Materials

Recycled content is not required by law in most jurisdictions, although it is important for packaging sustainability because it helps to 'close the loop' for recovered packaging. This is in line with 'cyclic' material flows, one of the four principles for packaging sustainability identified in Chap. 2.

It is regulated in two US states—Oregon and California—where a minimum level of post-consumer recycled content (25%) is one option for compliance with the Rigid Plastic Packaging Container statute. Mostly, however, increased use of recycled materials to help close the loop in recycling systems is encouraged through voluntary initiatives. For example, packaging manufacturers in the Netherlands have agreed to a voluntary target of 25% post-consumer recycled content in plastic bottles, while signatories to the Courtauld Commitment in the United Kingdom have agreed to increase recycled content in packaging.

[1] More information can be found at http://www.pro-e.org. In 2010 the green dot system was in use in 29 European countries.

The use of recycled materials in food packaging is controlled by health regulations or standards in each country. Compliance with these regulations is evaluated by testing for any migration that might occur when the material is in contact with food.

According to the US Food and Drug Administration (FDA), post-consumer glass and metals are not a concern because they are generally impervious to contaminants and are readily cleaned at the temperatures used in recycling processes [16]. Recycled pulp from recovered paper and paperboard and recycled plastics may be used for food contact packaging as long as they meet specific criteria in the Code of Federal Regulations. The test standard for recycled plastics is the FDA's Guidance for Industry: Use of Recycled Plastics in Food Packaging: Chemistry Considerations [16].

In the European Union, the use of recycled materials in contact with food is governed by the Framework Regulation (EC) 1935/2004. This is based on the principle that:

> 'any material or article intended to come into contact directly or indirectly with food must be sufficiently inert to preclude substances from being transferred to food in quantities large enough to endanger human health or to bring about an unacceptable change in the composition of the food or a deterioration in its organoleptic properties' [17, p. 1].

Recycled plastics for use in food contact packaging needs to be approved by the European Food Safety Authority.[2]

4.2.6 *Restrictions on Plastic Shopping Bags and Takeaway Food Packaging*

Plastic bags and takeaway food packaging are regulated in many jurisdictions, primarily because they are highly visible in litter. Some national and municipal governments have banned all lightweight plastic shopping bags (Photo 4.1), while others have only banned non-biodegradable bags. For example:

- China banned lightweight plastic shopping bags from 1st June 2008. Businesses are prohibited from manufacturing, selling or using bags less than 0.025 mm thick. More durable bags are permitted as long as they are sold to consumers
- Corsica was the first French region to ban non-biodegradable bags in 1999, and a similar ban was introduced in Paris in 2007. The French Senate approved a ban on non-biodegradable plastic supermarket bags from 1 January 2010
- In 2000 the Indian Government introduced a law banning the manufacture and use of plastic bags thinner than 20 microns in Bombay, Delhi and the entire states of Maharashtra and Kerala.

While plastic bags are highly visible in litter and waste, particularly in busy commercial precincts and popular recreational areas, they are not necessarily the

[2] http://www.efsa.europa.eu/en/ceftopics/topic/foodcontactmaterials.htm, accessed 20 November 2010.

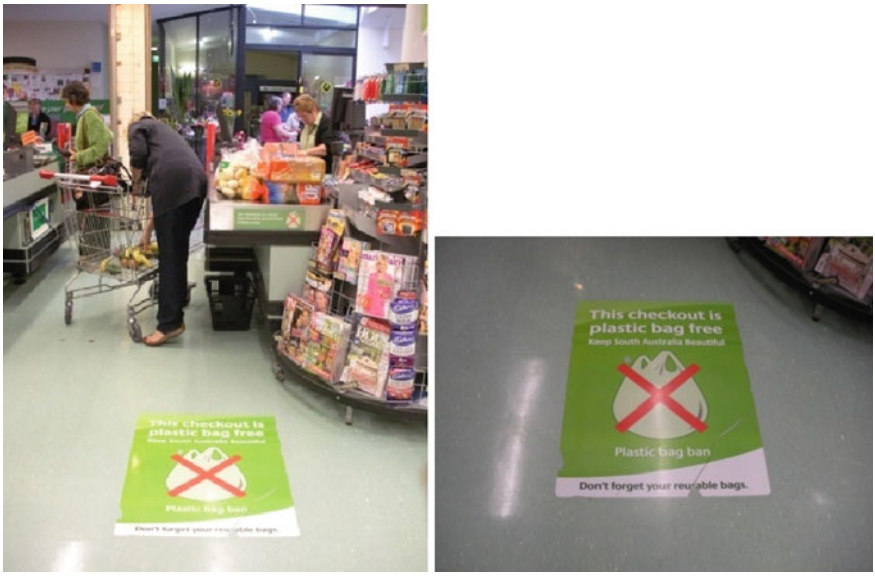

Photo 4.1 Painted message on the floor of a Woolworths store in South Australia, where non-biodegradable plastic bags were banned in 2009

most commonly littered items. In Australia, for example, plastic bags make up less than 1% of all littered items [18]. There are concerns, however, about the risk of injury or death to wildlife from ingestion of plastic bags [19]. In Bangladesh and some Indian cities, plastic bags were banned because they contribute to blocked stormwater drains and flooding during the wet season.

Takeaway food packaging manufactured from expanded polystyrene packaging is banned in some jurisdictions in the United States. Foamed plastic packaging is also banned in a number of Chinese cities, including Beijing. South Korea and Taiwan have both restricted the use of disposable packaging in restaurants and stores.

4.2.7 Responsible Environmental Labelling ★

Environmental labels, which include written claims and logos that promote the environmental attributes of a product or packaging, are regulated through trade practices legislation in most countries (see Sect. 3.3.3). Unsubstantiated or exaggerated claims have prompted authorities in some countries to publish advice on the implications of trade practices law for environmental claims and guidelines on the use of specific terms such as

⇒ Chapter 3 provides information on the labels most commonly used on packaging, and explains how they can support a sustainability marketing strategy.

Photo 4.2 Voluntary label promoting the recyclability of cardboard packaging on a Woolworths Private Label product, Australia

'recyclable' and 'biodegradable' [e.g. 20, 21]. The general advice provided to industry is that claims need to be:

- truthful and accurate
- relevant to the product
- specific and unambiguous.

Guidelines are also provided in the voluntary ISO standard 14021 Environmental labels and declarations—Type II environmental labelling—Principles and procedures [22]. Apart from trade practices law, the only other relevant legislation is the mandatory use of the resin identification codes in many US states (see Sect. 3.5.2). In most countries, the use of the codes to support recycling is voluntary. Photo 4.2 shows a recyclability label on packaging.

4.3 Conclusion

There are common themes and expectations in regulations that target environmental impacts of packaging. These should be embedded in the packaging design process and are reflected in the packaging sustainability framework described in Chap. 2 (see Table 4.3). By applying this or a similar framework for packaging

Table 4.3 Regulatory themes

Regulatory theme	Sustainability principle	
Environmental design	All	★ $ ↻ ✚
Resource efficiency ('optimisation')	Efficient	$
Reduction in toxic substances	Safe	✚
Recovery at end-of-life	Cyclic	↻
Use of recycled materials	Cyclic	↻
Restrictions on plastic bags and takeaway packaging	Efficient	$
Responsible environmental labelling	Effective	★

design, a business will be well positioned to meet current and future packaging regulations.

Businesses also need to stay ahead of the game by monitoring regulatory trends and continually updating their design processes to reflect current best practice sustainable development strategies in product and packaging design. A new generation of packaging guidelines, standards and policies are emerging that combine waste reduction and recycling strategies with considerations about water and energy consumption and packaging efficiency at every stage of the product environmental life cycle. Chapter 5 provides an introduction to life cycle assessment and its application to packaging. This needs to be considered alongside regulatory requirements as part of a packaging for sustainability strategy.

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