

CORE GUIDELINES

ECO DESIGN OF PLASTIC PACKAGING

Round Table Management Guidelines



TESTIMONIALS



DR. TOBIAS LÜHRIG

CEO, Bischof + Klein Holding SE & Co. KG

“Customers have high expectations of Eco Design packaging. To best meet these expectations, we need close cooperation based on a shared understanding of Eco Design. The guidelines provide an excellent foundation for this.”



PROF. DR. HORST-CHRISTIAN LANGOWSKI

Director, Fraunhofer Institute for Process Engineering and Packaging IVV

“Maximum product protection and recyclability are two key components of Eco Design. These guidelines have managed to convincingly combine existing knowledge with the practical experience of members of the Eco Design Round Table.”

TESTIMONIALS



PROF. DR. THOMAS MÜLLER-KIRSCHBAUM

Head of Global Research and Development, Laundry & Home Care, Henkel

“Our goal is smart packaging that uses fewer resources, contains more recycled material and is easier to reuse.”



DR. MICHAEL SCRIBA

CEO, mtm plastics GmbH

“Eco Design benefits everyone: consumers who want sustainable packaging; recyclers like us who keep recoverable materials in the cycle as well as manufacturers and retailers who not only champion the cause of sustainability but for whom it is a real way of life.”



ADDITIONAL ELEMENTS

of the Round Table Guidelines are available online. **Instructions** with detailed background descriptions, **specific checklists for practical packaging development** and **illustrative examples** and a **collection of practical tools**, for instance for **assessing recyclability**, are additional aspects of the Round Table Guidelines.

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ABOUT THESE GUIDELINES

With approximately 14 million tonnes of plastic packaging coming onto the European market each year, plastic has become the material of choice to pack the majority of consumer goods and foodstuffs. Barrier protection, transparency, low weight and competitive costs are just a few of the valued properties of this versatile material. Plastic packaging protects goods during transport, in stores and in the home, playing a vital role in conserving valuable resources and protecting the climate.

In recent years, plastics packaging has come under increasing pressure due to insufficient waste management and recovery solutions around the world that have resulted in large amounts of plastic material remaining unused in landfill or even littering the environment. “Design for recycling” is therefore a demand that is increasingly being placed on manufacturers and users of plastic packaging in order to keep plastic permanently in the reusable material cycle. However, there are many more aspects to the design of plastic packaging and, consequently, requirements for recycling-friendly design need to be brought into line and balanced with other important environmental factors and key functions of packaging, above all with product and consumer protection.

The Round Table Management Guidelines for Eco Design of Plastic Packaging aim at highlighting and implementing management procedures, strategies and methods for the development of packaging design in line with the corporate and brand environmental policies. The Guidelines assist senior managers, product managers, marketing directors, packaging developers and designers in the development of modern plastic packaging.

While a number of design guidelines and tools have already been developed in recent years, particularly for design for recycling, the present guidelines focus on communicating a comprehensive understanding of Eco Design to allow an appropriate focus in the early product development phase (ideation phase) as well as the integration of Eco Design into organisational procedures, including ways of resolving conflicts in objectives. In addition, the Guidelines contain a toolbox with references to specialised practical tools for the design and development of environmentally friendly packaging.

The Guidelines have been developed for plastic packaging by the Eco Design of Plastic Packaging Round Table. They are the result of an intensive stakeholder dialogue among experts from all parts of the supply chain, including packaging manufacturers, international brand manufacturers, retailers and recyclers as well as environmental and consumer organisations and scientists, and aim at being as practice-oriented as possible. Although they were developed with a view to Europe, the Guidelines are in principle applicable at a global level. These Guidelines make an important contri-

bution to a circular economy in the plastics packaging value chain.

The basic concept of Eco Design

The members of the Round Table agreed on the following basic concept as the basis for developing the Guidelines.

Eco Design of plastic packaging:

- Aims to minimise the environmental impacts of plastic packaging and packed goods over their entire life cycle
- Is part of the decision-making process for developing and marketing a packaged product
- Includes a holistic view of the entire packaging system (primary, secondary and tertiary packaging)
- Ranges from incremental product improvements (e.g. material reduction) to process innovations (e.g. optimised goods logistics and waste recycling)
- Addresses conflicting goals at various levels:
 - Between various environmental factors (e.g. using less material versus recycling) as well as
 - Between environmental and other factors (e.g. functionality, consumer protection and costs).



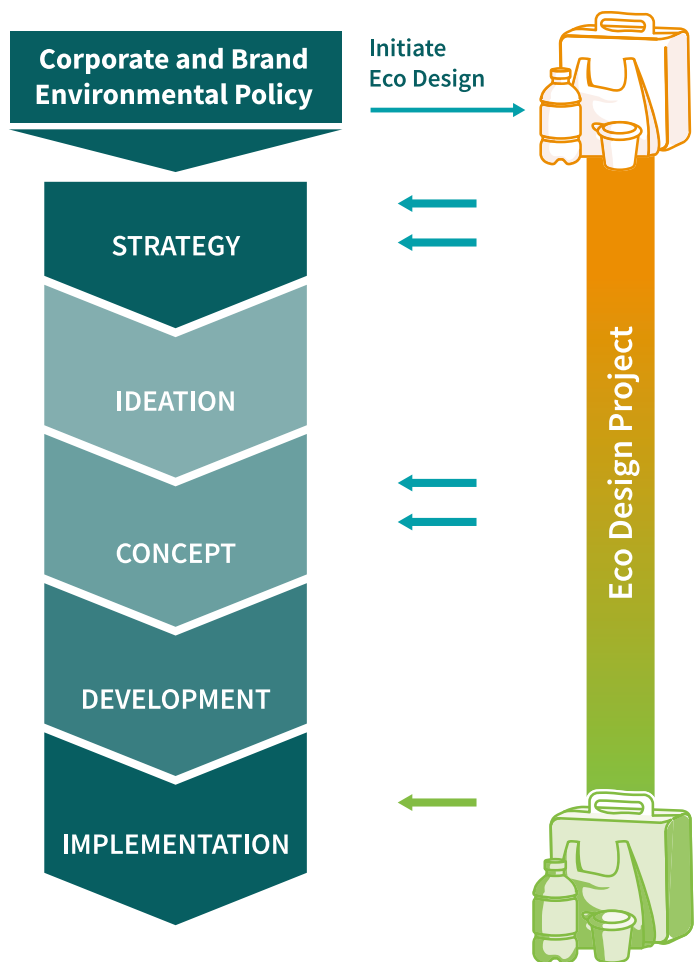
INTRODUCTION TO THE GUIDELINES

ECO DESIGN OF PLASTIC PACKAGING – FOR WHOM IS IT RELEVANT?

Eco Design of plastic packaging aims to minimise the environmental impacts of plastic packaging and packed goods over their entire life cycle. In order to achieve this, Eco Design must become an integral part of management decision-making concerning the development and marketing of goods and their packaging.

The Round Table Guidelines consist of different elements. The Key Guidelines describe how to implement Eco Design effectively in the management of packaging projects and how to develop brand-specific environmental strategies for packaging design projects.

Additional elements of the Round Table Guidelines are available online. Instructions with detailed background descriptions, specific checklists for practical packaging development and illustrative examples and a collection of practical tools, for instance for assessing recyclability, are additional aspects of the Round Table Guidelines.



Marketing relevance

Beyond its functional purpose, packaging is also the bearer of marketing messages and is thus an important part of brand communication. While a few years ago environmentally friendly design and sustainability were key messages limited to “green” target groups, most consumers nowadays expect to see this as a natural feature of all quality products and their packaging. A brand image can be seriously damaged if the consumer does not perceive it to be environmentally friendly and sustainable.

Political relevance

Plastic packaging is increasingly becoming the subject of critical societal and political discussion. This debate is being fuelled in particular by

- The haunting images of plastic litter accumulating in the oceans and on our coasts.
- Endeavours to establish a circular economy aimed at closing material cycles and thus conserving natural resources and protecting the climate.



Target groups

In light of these arguments, Eco Design of plastics packaging is a relevant issue for a broad group of people with different functions in corporations. These Management Guidelines primarily, but not exclusively, address:

Senior management in the packaging, food, consumer goods and retail industries:

Top management is given a brief description of the key strategic decisions to be taken and the procedures that need to be established to create the basis for a meaningful implementation of Eco Design in their organisations.

Product managers, marketing directors and other decision-makers in packaging projects:

These functions are supported in developing a specific Eco Design strategy for the packaging project by a set of possible Eco Design strategy elements addressing the relevant environmental impact areas and critical questions from interest groups. The four available strategy elements of the Guidelines address various relevant environmental issues and should be selected in line with the relevant corporate and brand strategies.

Packaging developers and designers as well as specialist marketing and consulting agencies:

These target groups will find the necessary background information as well as practical tips for understanding and implementing the details of the selected Eco Design strategy elements. This information includes:



Instructions that provide detailed explanations and background information on the specific optimisation approaches within the four strategy elements.



Checklists asking the most relevant questions for approaching an Eco Design project as such and,

more specifically, the different possible areas for optimisation. Their use leads to clearly structured decision-making processes. They also provide assistance in handling conflicts between different environmental objectives as well as with contradictions with other key requirements of packaging design such as consumer protection and cost-effectiveness. Applying the guidelines will not eradicate conflicting objectives but it will help to deal with them in a transparent and sustainable way.



Practical examples that successively illustrate potential challenges and appropriate solutions and thus help to translate the information provided into 'real' project work.

THE ROUND TABLE MANAGEMENT GUIDELINES AND HOW TO USE THEM

The Management Guidelines are available in a print version as well as online:

<https://ecodesign-packaging.org/>

The online version also includes additional helpful elements such as detailed instructions, checklists and illustrative examples. Three points of entry offer users direct access to the specific areas of information that interest them.

Overview

This section provides a brief overview of the contents of the Guidelines and the option of downloading the Management Guidelines.

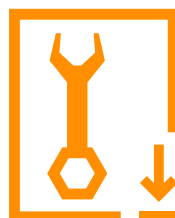
Strategies

The description of the four strategy elements and the relevant approaches to optimisation are accompanied by instructions containing more detailed information and specific proposals on how to proceed with verifying optimisation. Checklists for use in your own optimisation projects are also provided.

Applications

This section shows you how Eco Design optimisation can be systematically integrated into management processes for packaging development projects. The individual steps of this approach and dealing with conflicting objectives are explained and relevant checklists provided.

Four **Practical examples** demonstrate how optimisation verification can be performed for the different strategy elements based on definitions from the management process.



The **Toolbox** contains an up-to-date collection of additional guidelines, helpful tools and useful information with direct links to them. Appropriate search fields allow a targeted selection to be made.

ECO DESIGN OF PLASTIC PACKAGING

The management guidelines of the "Round Table for the Eco Design of Plastic Packaging" show how management processes, strategies and methods to develop packaging solutions can be implemented that are easy on the environment and conserve resources. It provides support for the development of suitable and modern packaging solutions. They are necessary for a circular economy that closes material loops, conserves natural resources and protects the climate.



OVERVIEW

This gives you a summary of and introduction to the contents of the management guidelines and the possibility to download the complete key guidelines.



STRATEGY

This is where you can find the four elements of the Eco Design strategy and their respective approaches to optimisation as well as suggestions on how to proceed with optimisation verification.



APPLICATION

This area shows you how Eco Design optimisation can be systematically integrated into the management processes of your packaging development project.

WHAT IS ECO DESIGN OF PLASTIC PACKAGING ALL ABOUT?

ADDRESSING AN ADDITIONAL CORE REQUIREMENT

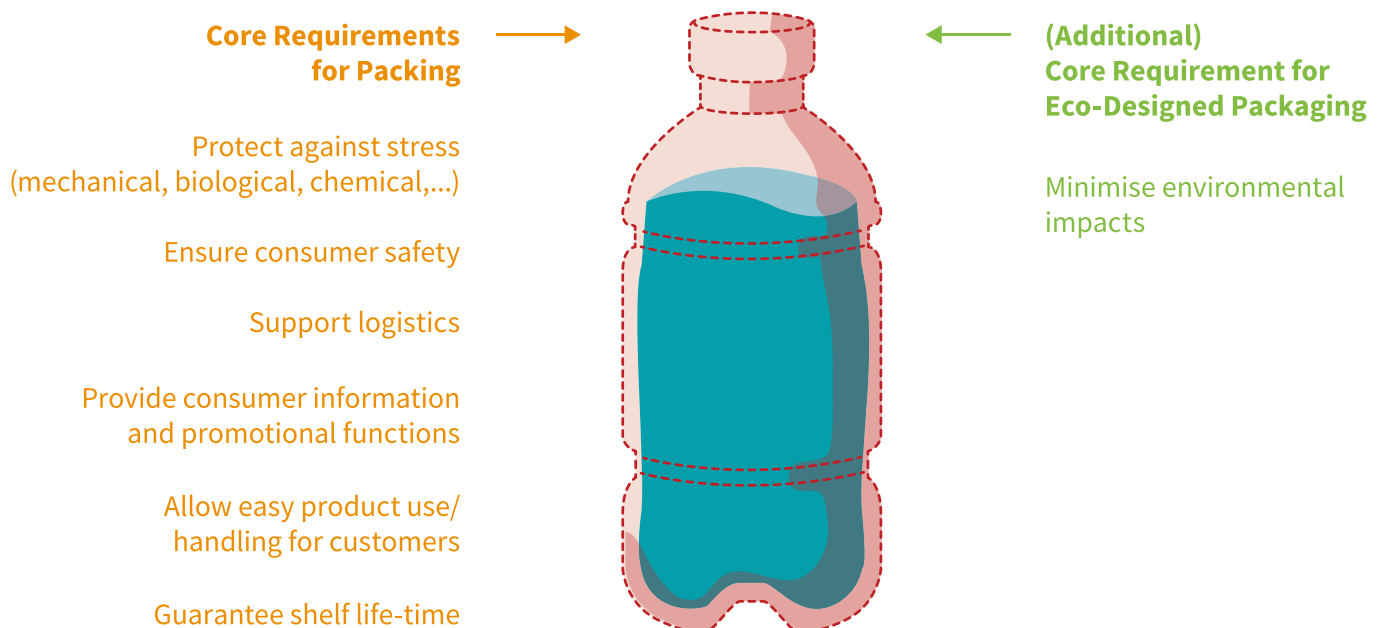
Packaging plays a fundamental role in the delivery of goods and foodstuffs to consumers.

A key function is to protect the packaged goods against mechanical damage and other stressors such as oxygen, dust and dirt, biological contamination, humidity and temperature in order to maintain perfect functioning and quality of the product including, for instance, guaranteeing a minimum shelf life and the genuine flavour of the product.

In addition, there are several more functions packaging performs, such as

- Allowing safe and easy product use for consumers
- Providing helpful consumer information and promotional messages, and
- Supporting optimised logistics.

To some extent, these functions are subject to legal requirements.



Beyond these “traditional” key requirements, well known to anyone involved in the design and development of packaging, any meaningful attempt at Eco Design needs to include another key requirement in this multi-dimensional set of functions – minimising negative environmental impacts.

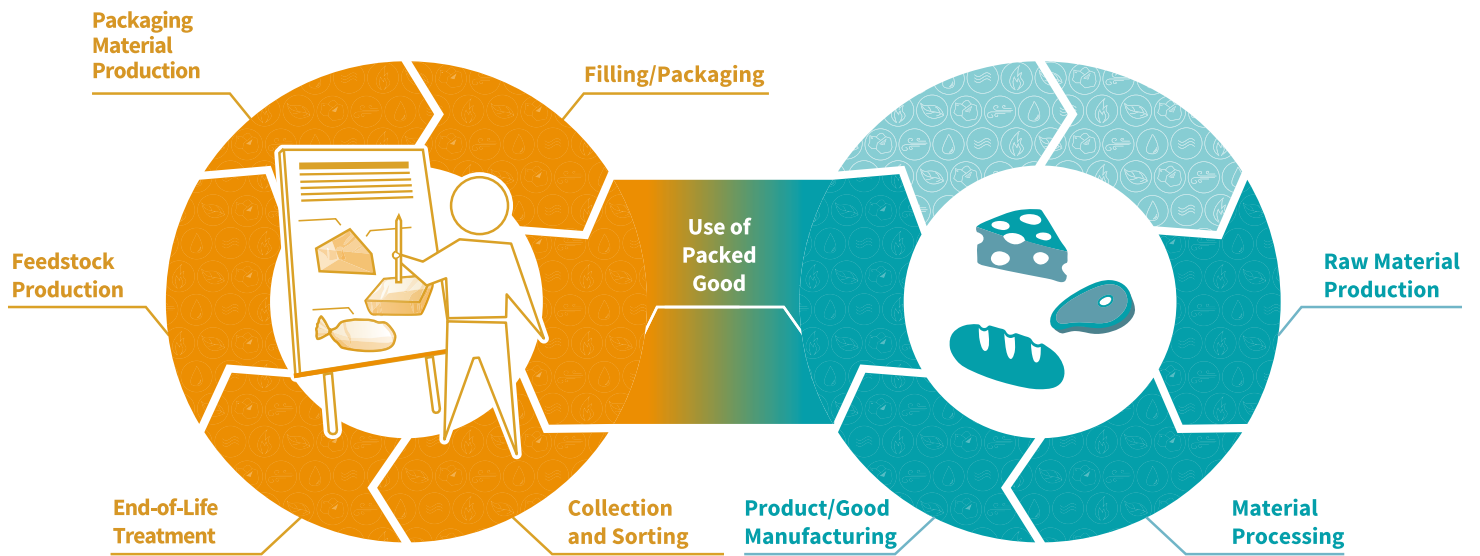
Eco Design of plastic packaging includes a holistic view of the entire packaging system (primary, secondary, and tertiary packaging) from incremental improvements to packaging to fundamental system innovations, e.g. establishing return logistics for used packages or setting up recycling systems.

Eco Design of plastic packaging needs to deal with conflicting objectives at different levels. Conflicts may arise between different environmental goals as well as between environmental goals and other key aspects of packaging.

LIFE CYCLES OF PACKAGING AND PACKED GOODS ARE CLOSELY INTERLINKED

As a result of the variety of functions outlined above, today’s packaging often requires complex and highly specialised products. As with all products, natural resources are used over the entire life cycle, which is something that affects the environment. Impacts occur during feedstock production, processing of the actual packaging material and the packaging itself, the filling/packaging process, during the use of the packaged goods and the collection, sorting and subsequent recycling of the packaging waste.

On the one hand, packaging itself thus has an environmental impact during its own life cycle. On the other hand, it also helps reduce the environmental impacts of packed goods through its protective function.



Cumulative energy consumption – to be considered with respect to possible under-packaging



In the implementation of the different functional requirements in the packaging design process, designers make a variety of decisions that largely determine environmental impacts. The decisions relate to the manner in which functional requirements for the packaging are met, how the materials are selected and how they are combined, which labels and coatings are applied as well as the weight and geometry of the packaging.

From an environmental protection point of view, the use of natural resources should be minimised as far as possible without compromising protective functions. It must be noted here that the environmental footprint of the packed good is typically much higher than that of the packaging. With food, for example, packaging accounts for five to ten percent of total energy consumption, while over 90 percent relates to the manufacturing, transport, storage and preparation of the food.

It would be counterproductive from an overall ecological perspective if the necessary protection of the packed goods were impaired as a result of a reduced use of resources for the packaging. If packed goods are damaged, resources used in their production are wasted.

It goes without saying that excessive packaging must also be avoided. Overpackaging designs will lead to increased resource consumption that is not required for the protection of the packed goods. In addition to an extreme protective function, which is unnecessary under the relevant logistical and usage conditions, overpackaging can also result from excessive requirements in the information and marketing function of packaging.

It should be noted that when packaging designs are being optimised, the entire system of packaging and packed goods ("packaging solution") must be considered.

ECO DESIGN – MORE THAN JUST CHANGING THE PACKAGING

FUNDAMENTAL QUESTIONS THAT NEED TO BE ADDRESSED

If Eco Design of plastic packaging is viewed as an integral part of innovation and decision-making processes when developing packaging solutions, a number of fundamental questions need to be addressed during these processes:



Level of the packed goods

Is it possible to modify the packed goods so that they place fewer demands on the packaging?

Examples: adapting the packed goods (e.g. a more stable design or using longer-lasting ingredients) leading to a reduction in the protection requirement (e.g. regarding mechanical protection or the shelf life requirement).



Level of the logistics system

Can logistics be adapted so that the primary/secondary packaging has fewer functions to fulfil?

Examples: moving customer information to the shop shelf or putting it online instead of on the packaging; more careful transport and reloading processes instead of particularly robust packaging; multi-use or refill solutions instead of single-use packaging etc.



Level of the packaging

Is radically redesigning the packaging a permissible option?

Example: is it possible to use completely different materials, colours, geometric designs and so on due to Eco Design considerations?

There is a clear hierarchy among these questions. In most cases, changes to the goods or logistics will have a greater effect on the reduction of the environmental footprint than changes to the actual packaging. In many cases, this applies to improvements in both environmental and economic performance.

FURTHER OPTIMISATION POTENTIAL BEYOND ECO DESIGN

It needs to be emphasised that the implementation of a fully holistic environmental strategy cannot be limited to the Eco Design of the packaging but must also include additional optimisation areas. For example, improving the environmental performance of production facilities (e.g. better energy efficiency, lower rate of deficient packaging) or means of transport may often deliver significant environmental impact reductions.

In most companies, however, each of these areas is an issue of separate complex consideration independent of the packaging design, decisions

on investment cycles, internal responsibilities and external agreements. In the light of these practical considerations, the further minimisation of environmental impacts beyond Eco Design is not within the scope of these Management Guidelines.

REDUCING THE ENVIRONMENTAL IMPACT – A MULTIDIMENSIONAL OBJECTIVE

The overarching goal of Eco Design is to minimise negative environmental impacts. However, this reduction of environmental impacts is a multidimensional objective covering various environmental impact categories such as climate change, loss of biodiversity and fresh water depletion. These environmental impacts are relevant independent of each other and there is no overarching indicator that can be used to measure them.

MINIMISE ENVIRONMENTAL IMPACTS



While there is no hierarchy among different environmental impact categories from a scientific point of view, priorities are regularly set either explicitly or implicitly in the socio-political debate. Climate change mitigation, for example, draws on broad social consensus and clear political targets with quantitative indicators. Another subject increasingly at the centre of public debate is the problem of marine littering. Due to a lack of binding political targets and clear metrics to date, it remains rather less clearly tangible, however.

At the same time, many companies have defined their own environmental policy at corporate or brand level. These objectives need to be considered carefully in the development of a specific Eco Design strategy for a packaging project.

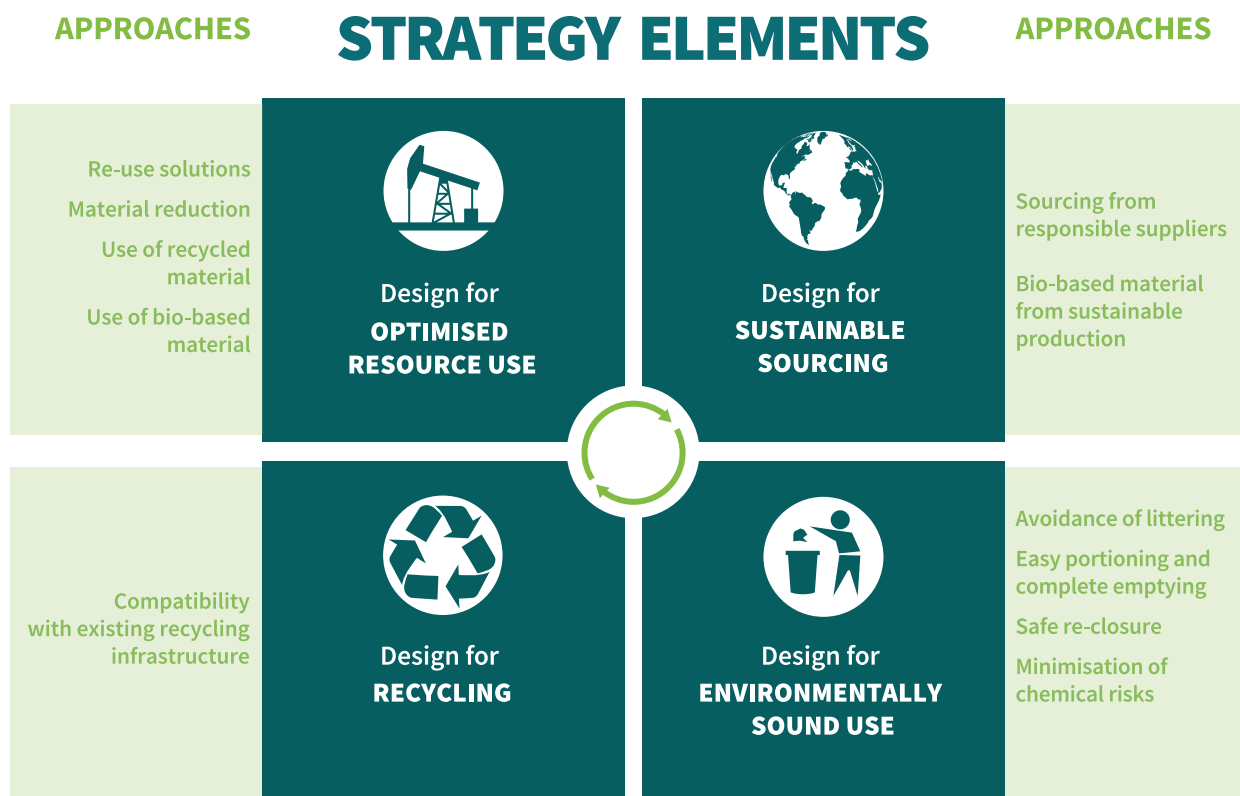
The environmental objectives that an Eco Design strategy such as this focuses on should meet certain criteria. They should be

- Relevant – they should address relevant environmental impacts in the life cycle of the packaging and packed goods
- Attainable – it must be possible to attain the objectives by changes in the design of the packaging-solution
- Communicable – it must be possible to communicate the objectives in terms of their relevance and improvements achieved to target groups (customers and stakeholders).

KEY ELEMENTS FOR AN ECO DESIGN STRATEGY

A set of four strategy elements are available to develop an Eco Design strategy for a packaging project. These “Design for ...” elements include:

1. **Design for Optimised Resource Use**
Design packaging so that it reduces the use of natural resources and, consequently, the carbon footprint.
2. **Design for Sustainable Sourcing**
Design packaging in such a way as to ensure that the materials are sourced sustainably.
3. **Design for Environmentally Sound Use**
Design packaging in ways that support responsible use through reducing littering, the ability to be easily portioned, safely resealed and completely emptied in order to avoid product waste.
4. **Design for Recycling**
Design packaging in such a way as to enable high-quality recycling of the packaging materials after the end of life of the packaging.



These four strategy elements address different life cycle stages of the packaging and, to some extent, different environmental goals. But they all contribute to improving the environmental performance of the packaging overall.

An Eco Design strategy for a specific packaging project does not necessarily have to include all these elements, but careful consideration should be given to which elements and approaches are useful and necessary, taking into account the environmental objectives set for the relevant project and the corporate and brand strategy. These basic decisions will usually be made by senior management in accordance with the corporate or brand strategy.

As well as company-specific and/or brand-related relevance of the strategy elements, there is often also socio-political relevance or even dominance of one or other Eco Design strategy element for certain periods. This may – but does not necessarily have to – affect business decisions taken in a company. For example, in the 1990s there was a focus on the strategy element “Design for Optimised Resource Use” with the introduction of a

weight-related licence fee in Germany. Since the publication of the New Plastics Economy 2016 and the EU Plastics Strategy 2018 there has now been a stronger focus in Europe on the strategy element “Design for Recycling”.

The four strategy elements and the main approaches are explained in brief below in order to support this decision process.

In addition, for each strategy element, there is a checklist on the website that can be worked through step by step as well as a instructions explaining the relevant optimisation approaches and the proposed procedures in more detail.

Descriptions and links to various tools and other supporting information available on the market are provided. You will also find further help in applying the different approaches to optimisation and pursuing actual packaging projects.

FURTHER INFORMATION

<https://ecodesign-packaging.org/>

- » **Application instructions specifying environmental objectives for a packaging design project**

DESIGN FOR OPTIMISED RESOURCE USE



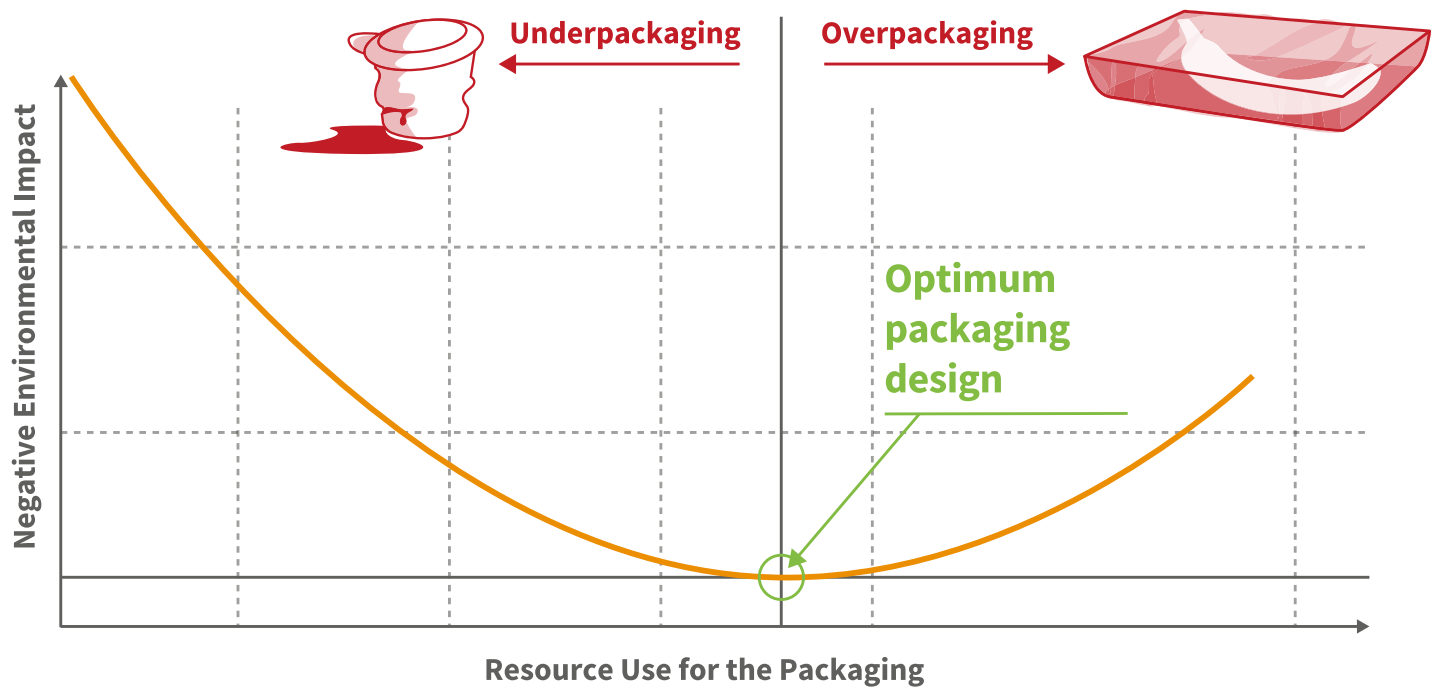
Design for optimised resource use aims to reduce the amount of natural resources utilised for producing the packaging materials. At the same time, the amount of material entering the waste stream at the end of their life is reduced, thus decreasing the environmental impacts treatment.

Approaches to achieving a **design for optimised resource use** include

- **Re-use solutions**
- **Use less material**
- **Use of recycled material**
- **Use bio-based materials**

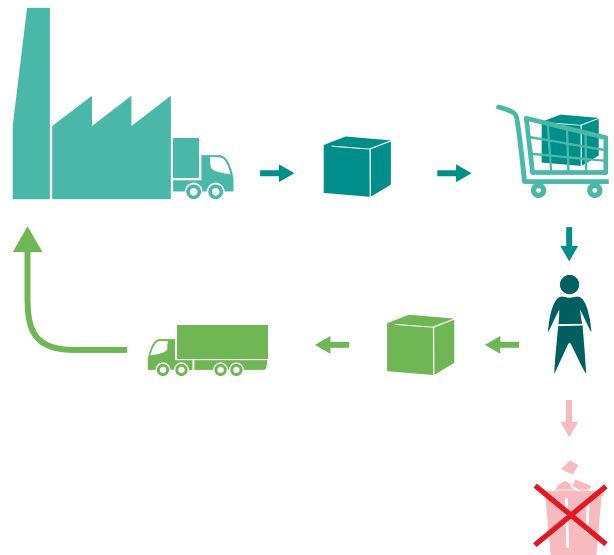
Despite their differences, each of these different approaches ultimately addresses the same aspect: they minimise the impact on the environment from feedstock and packaging material production. This includes energy consumption and related CO₂ emissions, the extensive use of natural resources and possible emissions of substances harmful to the environment.

A balance between overpackaging and underpackaging needs to be found with regard to the protection of packed goods.



OPTIMISATION APPROACHES

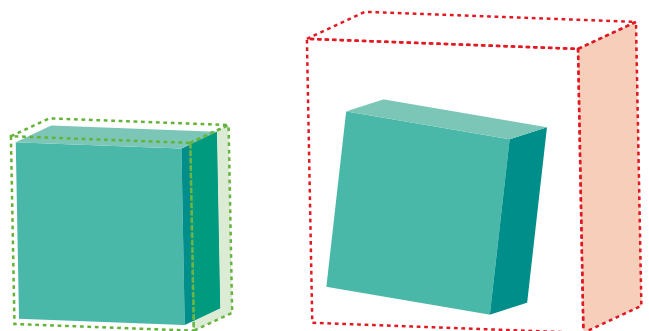
Re-use solutions means developing a multi-use system in which packaging is returned to the filler and then refilled there. Since the benefit of packaging is generated multiple times, the resource efficiency (the ratio of resource use to benefit generated) of the natural resources used for producing the packaging increases significantly.



At the **system level**, this can mean developing a functioning multi-use system that ensures packaging is returned by the customer and used multiple times. The environmental benefits gained by economising on material, however, need to be weighed against additional resource needs of the return logistics, including cleaning the used packaging to avoid adverse environmental effects. Studies show that it is safe to assume that no adverse effects will occur from an average of around ten rounds onwards.

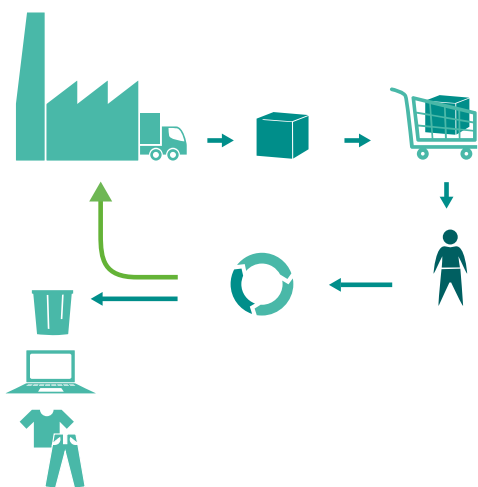
At the **packaging level**, this means designing the packaging to allow it to be used multiple times under the conditions of the multiple-use system.

Using less material means designing the packaging so that it requires less material while still maintaining its key functions. There are different ways of achieving this.



At the **system level**, more efficient transport solutions, e.g. decreasing the number of steps in the loading process or a continuous cold chain, may allow material reductions without hampering the protective function of the packaging. Refill solutions where lower functional demands are placed on the refillable packaging than on the disposable packaging can also be a practical way of implementing the optimisation approach here.

At the **packaging level**, reductions in wall thickness can help. Changing the size of the packaging (e.g. eliminating unnecessary headspace), adapting the dimensions of the packaging (a better ratio of surface and volume), or improving the interaction among primary and secondary (and possibly tertiary) packaging as well as alternative material combinations with enhanced barrier functions may facilitate this material reduction.



Using recycled material means substituting recycled materials for (primary) packaging materials by. Recycled (or secondary) materials usually have a smaller environmental footprint resulting from their pre-production compared to primary materials. Using secondary materials is an important contribution to a circular economy, as it is the final step in closing the material loop.

At the **system level**, this requires evaluating whether recycled material may be used for primary packaging under existing legal requirements and whether the necessary volumes of recycling materials of an adequate quality can be ensured.

At the **packaging level**, this means substituting primary packaging material with recycling material while ensuring that possible differing technical characteristics and existing legal requirements are taken into account by modified design solutions.

Using bio-based materials means that bio-based plastics are selected, thus reducing the utilisation of non-renewable resources. Bio-based plastics may, however, have some other negative environmental impacts (e.g. land use conflicts, impact on biodiversity etc.) that need to be considered. These aspects covered by the Eco Design strategy element “Sustainable Sourcing” in greater detail.

FURTHER INFORMATION <https://ecodesign-packaging.org/>

- » **Instructions – Design for optimised resource use**
- » **Checklist – Design for optimised resource use**
- » **Practical Examples**

DESIGN FOR SUSTAINABLE SOURCING



Sustainable sourcing addresses the way in which raw materials are extracted or grown, refined and processed before they are used in packaging materials. These processes might involve significant negative impacts on the environment, such as the non-sustainable use of rare natural resources, damage to fragile ecosystems and biodiversity or pollution of air, water and soil. Furthermore, the question of how and by whom these processes are performed is often closely interlinked with the living and working conditions of people resident in the geographic sourcing areas concerned. This can involve, for example, conflicts over the use of land for resource extraction as opposed to food production.

Bio-based polymers and other bio-based materials are often selected because this enables the use of non-renewable resources for packaging materials to be reduced. However, the possible environmental impact areas mentioned above need to be considered carefully for these types of raw material.

The use of recycled polymers also helps to reduce the use of non-renewable natural resources. Nevertheless, even if the other possible negative environmental impacts already mentioned are not relevant here, recycled materials should of course be sourced from suppliers who are transparent regarding the origin of the materials and operate under environmentally and socially sound conditions.

As it is virtually impossible in practice to trace all precursor materials back to their origins, these Guidelines on **“Design for Sustainable Sourcing”** focus on the use of

- **Sourcing from responsible suppliers**
- **Bio-based material from sustainable production**



OPTIMISATION APPROACHES

Sourcing of **bio-based materials sustainably** means maintaining the productivity of natural ecosystems without compromising their capacity for future generations.

For this reason, the following adverse aspects need to be considered thoroughly and avoided wherever possible:

- Land use conflicts with food production
- Negative impact on natural surroundings, in particular on biodiversity
- Use of pesticides and fertilisers and their impact on soil and water
- Additional energy demand for agricultural activities
- Extensive use of water (especially the extraction of ground water or other drinking water resources).





Furthermore, a safe and healthy working environment and fair labour and trading conditions are important from an ethical perspective.

The latter requirements also apply to **responsibly sourced recycling materials**. In addition, it must also be possible to trace where they come from and the environmental compatibility of the recycling processes.

In order to meet these complex requirements regarding responsible and sustainable material sourcing, corresponding management of the pre-material supply chain is indispensable.

At the **system level**, therefore, strategic partnerships should be sought with organisations that develop and lay down specific criteria for aspects like

- The selection of environmentally sound growing areas and conditions for bio-based raw materials
- Requirements for environmentally friendly process management
- Safe and healthy working environment
- Fair working and contractual conditions

Regular reviews of implementation should also be conducted “on site” together with these organisations.

At the **packaging level**, only materials certified as having come from sources managed in this way should be used.

FURTHER INFORMATION

<https://ecodesign-packaging.org/>

- » **Instructions – Design for sustainable sourcing**
- » **Checklist – Design for sustainable sourcing**
- » **Toolbox**

DESIGN FOR ENVIRONMENTALLY SOUND USE



The accumulation of plastic residues in the (marine) environment has become an issue of high public awareness. Some of these residues result from carelessly discarded plastic packaging (littering). This may involve the packaging as a whole or parts of the packaging such as closures or lids and residues of packaging breaking down into smaller pieces in the environment.

Possible approaches that may be included in **design to avoid littering** are:

- Careful product design in order, wherever possible, to prevent littering of small pieces of packaging that can easily be lost
- Easily comprehensible consumer communication including clear recommendations regarding the importance of correct disposal

Other potential environmental problems from the use phase of plastic packaging are unintended leakage of harmful packed goods or the deterioration of packed goods resulting from improper resealing of the packaging after initial use.

Residues of contents that cannot be removed, or which can only be removed with great difficulty, from the packaging are also problematic from an environmental perspective. The contents produced using valuable resources are thus wasted and this can also significantly impair the recycling of packaging materials.

The specific approaches addressing this are

- **Safe resealing**
- **Easy portioning and complete emptying**

When considering the environmental footprint of packed goods, it may be justified to use a little extra packaging material to achieve this goal.

In addition, bearing in mind the inadequate waste disposal structures in some supply regions, it cannot be ruled out that packaging waste may be disposed of there under primitive conditions, for example for heating or cooking purposes, may be reused for entirely different purposes such as building material, or may simply be dumped in the

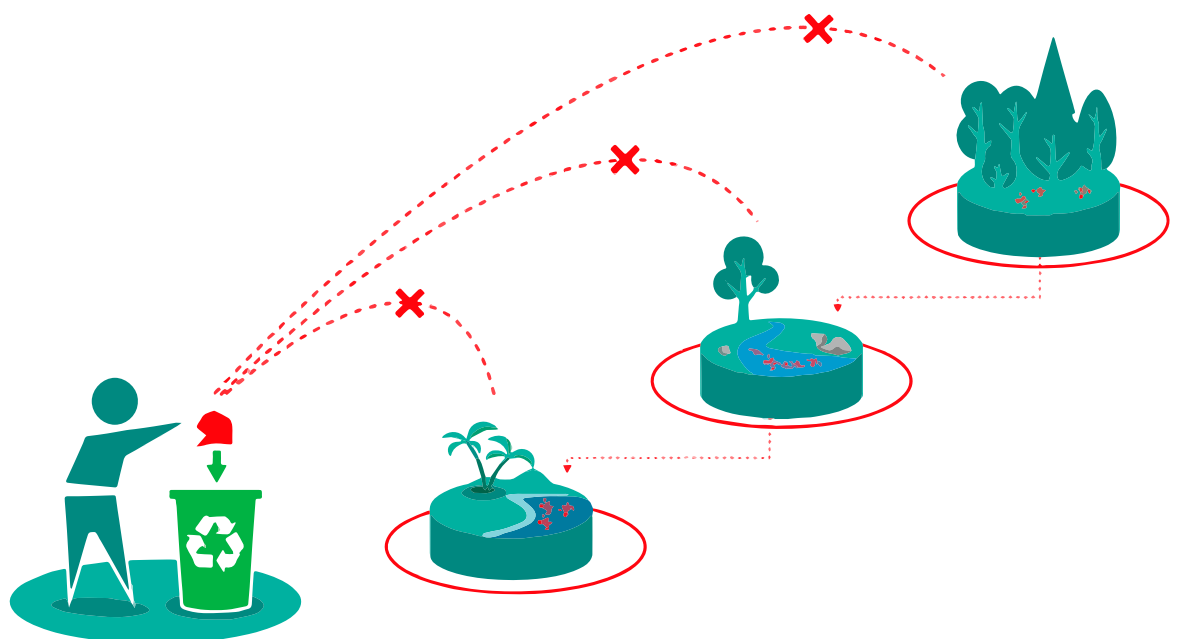


environment. In unfavourable conditions, health risks can result from such unexpected improper uses. A **design to reduce material risks** as a result of improper use is helpful here.

OPTIMISATION APPROACHES

To **avoid littering** with plastic packaging, at the **system level** it needs to be ensured that functioning waste collection and treatment systems are in place in the market regions concerned. If the effectiveness of such systems is not completely assured, checks should be made as to whether:

- Take-back systems can be implemented with strong incentives for high return rates
- The supply of packaging that is fully “recycling-ready” – even in simple technological conditions – can provide an effective incentive for widespread collection and recycling efforts
- The use of packaging types with a widespread secondary use (e.g. stable buckets or resealable containers) can help to avoid littering effectively



At the **packaging level**, a reduction of littering risk by design can be achieved with the following measures, for example:

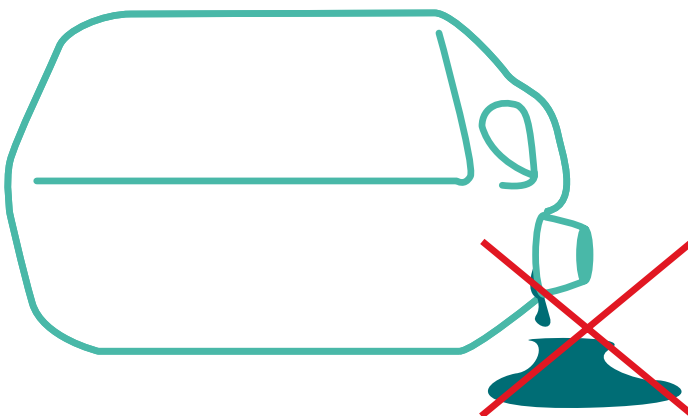
- Provide clear indications for proper disposal, e.g. “tidy man” symbol



In addition, packaging should as far as possible be free of problematic substances that, in the unintended event of littering, may leak from the plastic matrix into the environment.

Safe resealing of plastics packaging can be achieved by a wide range of design solutions at the **packaging level** to exploit the properties of plastic materials in a technically sound way.

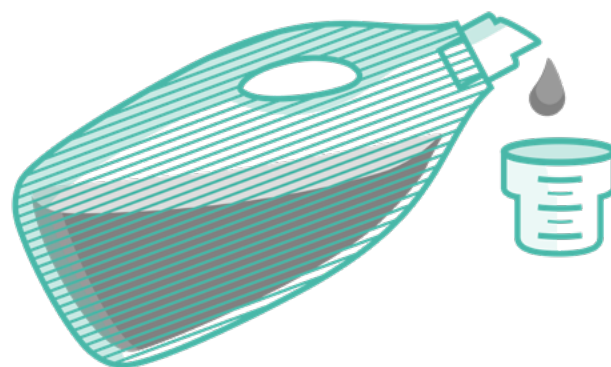
- Avoid small parts, e.g. closures or anti-tampering mechanisms that can be lost during use when not firmly attached



At the **packaging level**, solutions for **easy portioning, emptying residues and dosing** from multi-portion packaging are generally very specific to the contents involved. It is therefore important to carefully anticipate the product properties, use conditions and consumer behaviour.

Packaging that makes it possible, on the one hand, to easily remove (just) the required quantity of product (“portioning” or “dosing”) and, on the other hand, wherever possible to just as easily remove residual amounts completely helps to reduce adverse environmental impacts as this avoids wasting the contents.

Reduction of substance-related risks deriving from misuse. It is not feasible to systematically and completely reduce risk owing to the great variety of forms of misuse. From a precautionary perspective, however, efforts can be made to ensure that packaging is as free as possible of substances that, in uncontrolled conditions, have an increased probability of causing health or environmental damage.



FURTHER INFORMATION

<https://ecodesign-packaging.org/>

- » **Instructions – Design for environmentally sound use**
- » **Checklist – Design for environmentally sound use**
- » **Practical example**

DESIGN FOR RECYCLING



When packaging reaches the end of its life, it is preferable – from an environmental perspective – to reuse the resources invested during its production for maximum benefit and not simply dispose of the packaging.

Design for recycling aims at facilitating the recovery of the packaging materials for additional use. Among other environmental benefits such as reducing the consumption of fossil resources, this makes a significant contribution towards lowering the release of greenhouse gas emissions, which are responsible for climate change.

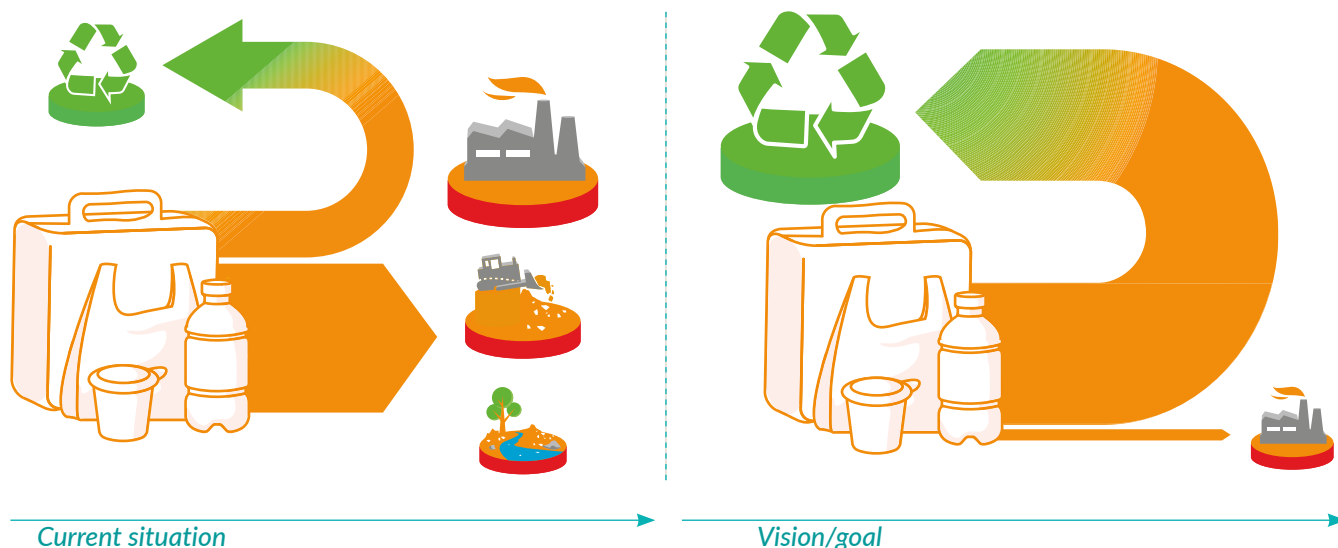
If a remaining part of packaging cannot be recycled in the existing conditions of the recycling infrastructure, the energy (calorific value) included in this should at least be recovered for heating or other energy supply.

One prerequisite for effective plastic packaging recycling is the existence of a well-established waste

collection and recycling infrastructure with sorting of plastic packaging for subsequent appropriate treatment. However, “recycling-ready” packaging designs may stimulate investment in the collection, sorting and recycling infrastructure even in countries where such infrastructure is still lacking today.

A policy framework has been established in the European Union that aims to ensure the proper implementation of such waste collection and treatment infrastructures supporting the ultimate goal of a circular economy that “closes the loops” of product and material life cycles and covers packaging as well as all products.

Design for recycling allows existing potential to be exploited in order to increase recycling rates and close loops.



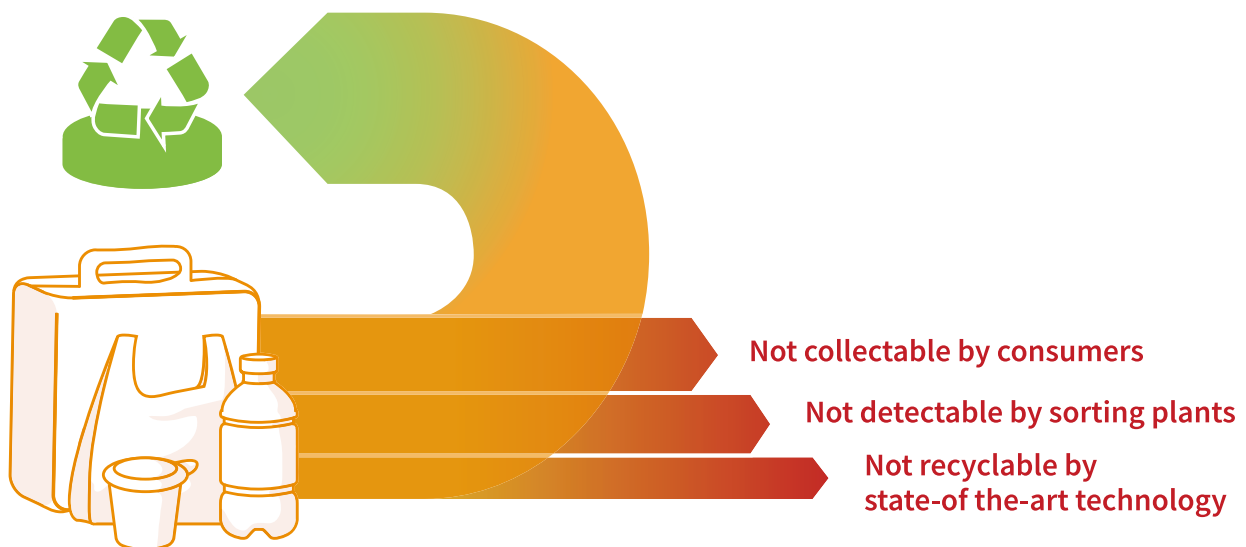
OPTIMISATION APPROACHES

Supporting material recycling through **design for recycling** is the preferred Eco Design approach in all regions with well-established collection, sorting and recycling infrastructures for packaging waste. This approach may also be taken to mark packaging as recycling-ready for the future.

At the **system level**, this means that if there are no or insufficient collection, sorting and recycling infrastructures and schemes already in place, they need to be implemented to ensure collection of the packaging for separation, followed by specific sorting and recycling steps. Additional incentives for the consumer such as take-back systems or deposit systems may support such efforts with increased return rates.

At the **packaging level**, it is a question of designing the packaging so that it is:

- Collectable by consumers – meaning it is clearly identifiable as plastic packaging by the consumer
- Detectable by sorting plants – meaning it ends up in the sorting fraction designated for recycling
- Recyclable by state-of-the-art recycling technologies – so that secondary materials can be produced according to market requirements.



FACILITATING ENERGY RECOVERY

Energy recovery should remain a last resort in order to recover the feedstock energy invested in the packaging to some extent if it is not (yet) possible for all packaging components to be fully recycled.

At the **packaging level**, this requires the composition of the packaging material to allow a significant proportion of the feedstock energy to be recovered as electricity, steam or substitute fuel. It also means avoiding substances that result in extra effort needing to be invested in cleaning exhaust gases, thus reducing the efficiency of energy utilisation.

Implementing these requirements does not conflict with the overarching aim of recyclability – they are also in line with the overall aim of stimulating material recycling.

FURTHER INFORMATION

<https://ecodesign-packaging.org/>

- » **Instructions – Design for recycling**
- » **Checklist – Design for recycling**
- » **Practical example**

HOW TO APPROACH ECO DESIGN OPTIMISATION

IMPROVING THE ENVIRONMENTAL PERFORMANCE OF EXISTING PACKAGING STEP BY STEP

The step-by-step improvement approach starts conceptually with an existing packaging design – or at least a possible draft packaging design resulting from brainstorming – which typically fulfils the ‘traditional’ key requirements but is not optimised in terms of minimising environmental impacts. This packaging is then improved step by step according to the Eco Design strategy developed for this packaging project. Here, the Eco Design strategy is based on selected Eco Design strategy elements.

Example: The strategy element “Design for Recycling” is applied to an existing packaging. A check is made as to whether incompatible materials that compromise the recycling of the main packaging material can be replaced (e.g. a paper sleeve on a plastic packaging substituted with a plastic label) in order to increase the yield and the quality of the recycling process.

With the strategy element “Design for Sustainable Sourcing”, additional steps are taken to check whether it is possible to achieve the same technical quality

with bio-based or recycled polymers from sustainably managed sources for renewable or recycled materials. If such polymers are available at a competitive price within the economic limits set for the packaging project, the polymer base will be changed correspondingly.

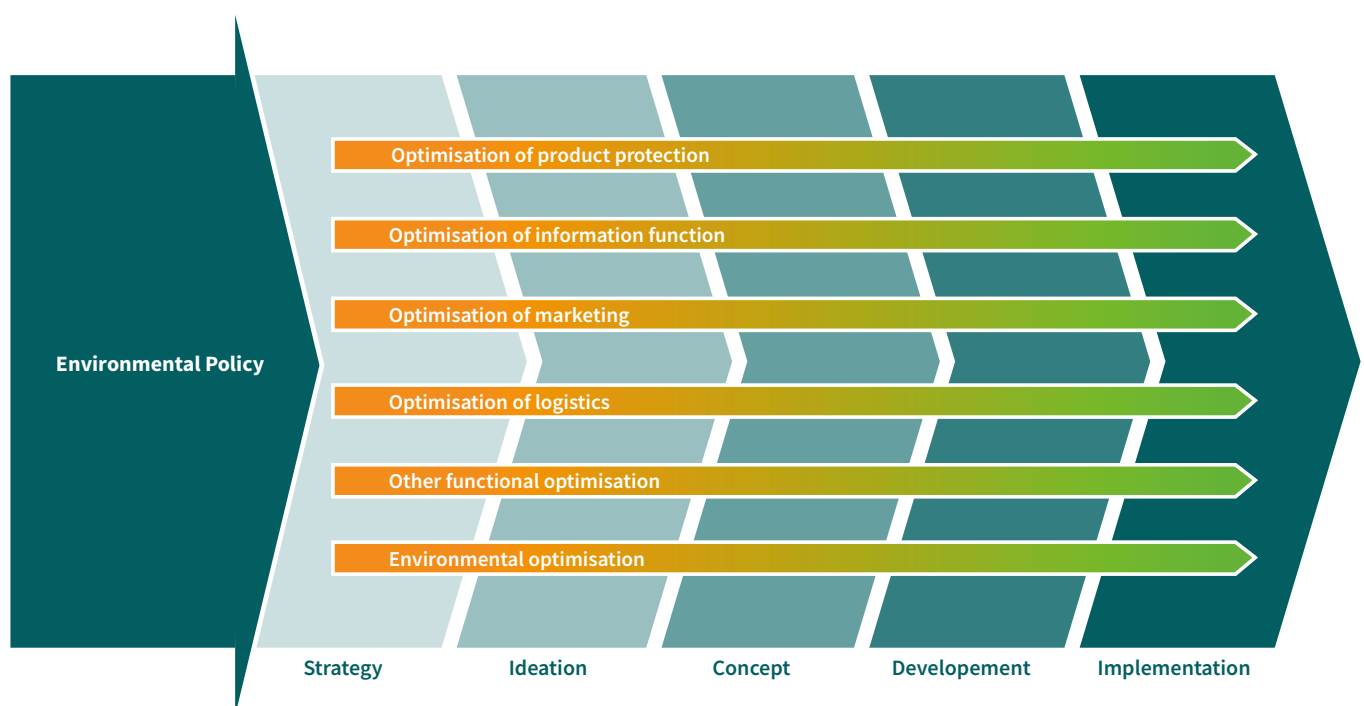
The result of this process is packaging produced with reduced environmental impacts, in particular in the areas of overall CO₂ emissions and the conservation of natural resources.

ECO DESIGN OPTIMISATION IS JUST ONE ELEMENT IN COMPLEX PACKAGING DESIGN PROJECTS

When packaging projects are implemented in practice, however, environmental optimisation has to be undertaken in parallel with many other optimisation efforts made in other requirement areas. This means that repeated reviews of potential environmental improvements are normally necessary since the initial versions of the packaging change during the course of the project due to optimisation work carried out in other requirement areas.

The following diagram shows the parallel nature of the various optimisation processes.

Variety of optimisation processes



INTEGRATION OF ECO DESIGN PROCEDURES INTO THE MANAGEMENT PROCESS

Based on the understanding of Eco Design as a further key requirement of equal importance, developing and implementing of an Eco Design strategy must become an integral part of the entire management of packaging design and the relevant decision-making processes in the company. Senior management decisions must form the foundation for this integrated implementation of Eco Design.

The integration of Eco Design in the management process of a specific packaging project then involves the following five steps as a minimum.

The steps performed and decisions taken for each Eco Design project must be documented systematically to support the continuous improvement of internal procedures as well as transparent and reliable communication with customers.

Step 1: Definition of environmental targets for the packaging project

As a first step, it is crucial for an Eco Design packaging project to define what actual environmental impacts (climate change, loss of biodiversity or littering) are to be addressed during the project. In addition, priorities between these different environmental goals are to be set, with the environmental policy of the company and any possible environmentally relevant brand messages of the contents also being taken into account.

This step should be taken at a very early stage, i.e. in the strategy phase of the project.

Step 2: Development of the Eco Design strategy of the project

In order to put the environmental goals defined and prioritised in the first step into practice, suitable Eco Design strategy elements should be selected as proposed in these Guidelines, for example.

The specifications for the packaging project should be evaluated in order to set ambitious but also achievable targets for the various environmental goals for the Eco Design process.

The selected strategy elements and the measurable objectives form the core of the project's Eco Design strategy and are therefore part of the briefing for creative brainstorming, e.g. in the ideation phase of the packaging project.

Step 3: Application of the Eco Design strategy

In step 3, the selected Eco Design strategy elements are applied to the packaging alternatives resulting from the ideation process. For each selected Eco Design strategy element, the proposed optimisation approaches must be verified and if necessary applied step by step. A check should first be made in each case as to whether optimisation can be implemented at the system level before focusing on improvements to the packaging. The relevant checklists in these Guidelines support this structured process of improvement.

Any conflicts that arise among different optimisation options need to be flagged for the following decision steps.

Step 4: Verification of target achievement and resolution of conflicting goals

After completing verification and optimisation of the Eco Design (see step 3), the resulting packaging variants need to be assessed regarding their environmental impacts and the outcomes evaluated against the defined objectives (see step 2).

Relevant evaluation tools can be used for some of these reviews. A selection of these tools can be found online in the toolbox for these Guidelines. Depending on the scope and importance of the relevant project, (just) a qualitative assessment can sometimes also be sufficient here.

If none of the verified packaging solutions meets the defined environmental targets, it is necessary to go back to step 2 and check whether the other key requirements can be modified. If this is not feasible, the environmental objectives need to be redefined.

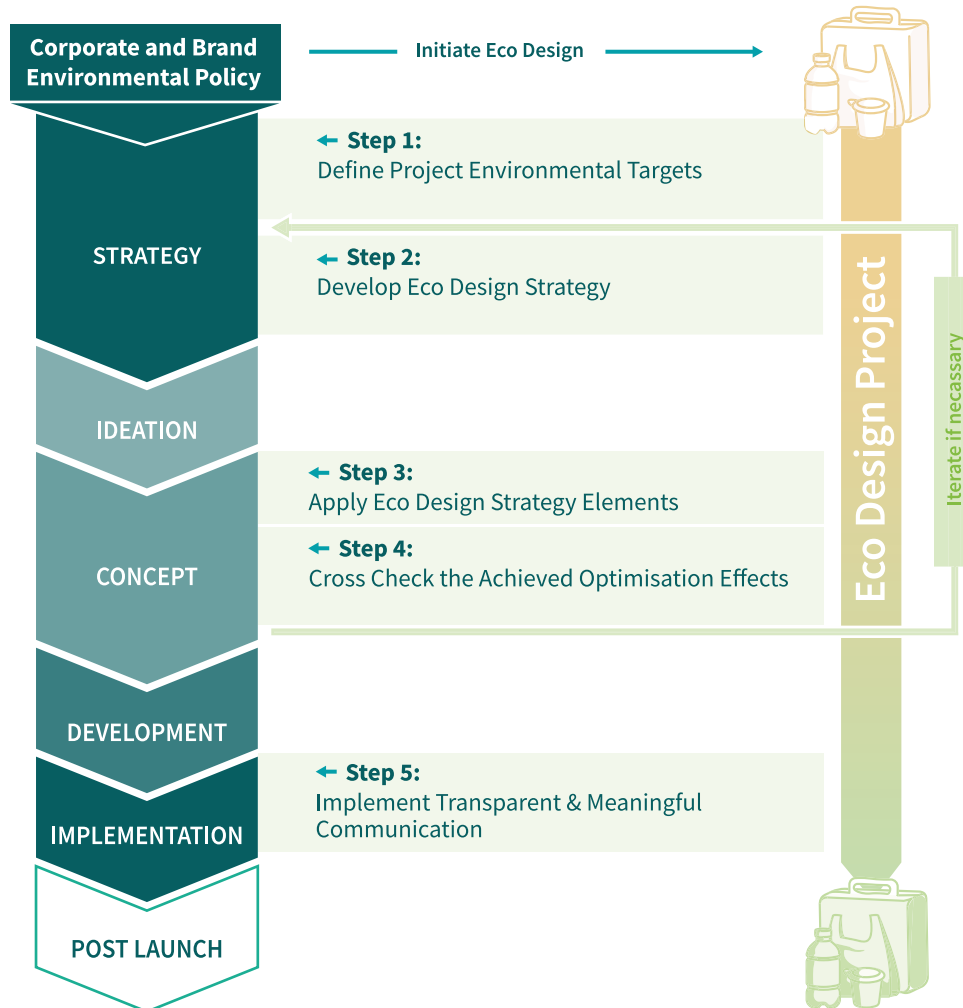
Any conflicting objectives identified must be made transparent and resolved based on environmental priorities.

Step 5: Implementation of transparent and responsible communication

Responsible communication should be clear, balanced and evidence-based. Consequently, along with other brand messages, only significant environmental improvements should be communicated. Here, established standards for environmental communication should be observed. Any environmental burdens shifted to other areas of activity or stages of the life cycle must be made transparent.

Structured documentation of the optimisation steps taken makes it possible to provide substantive answers to questions from consumers or other interest groups. This documentation should include all decisions taken and results achieved as well as obstacles identified with regard to even more extensive optimisation.

The following diagram illustrates how these five steps of Eco Design correspond to a typical stage-gate process of a packaging design project.



FURTHER INFORMATION

<https://ecodesign-packaging.org/>

- » Instructions – Management of Eco Design in packaging projects
- » Checklist – Management of Eco design in packaging projects
- » Practical Example

HANDLING CONFLICTING ENVIRONMENTAL TARGETS

During a packaging Eco Design project, there may be conflicts among the different optimisation approaches. Whereas in some cases the optimisation of different environmental aspects go hand-in-hand, in other cases optimising one environmental aspect may have adverse effects on another (e.g. weight reduction versus recyclability). In such cases, trade-offs need to be sought by management.

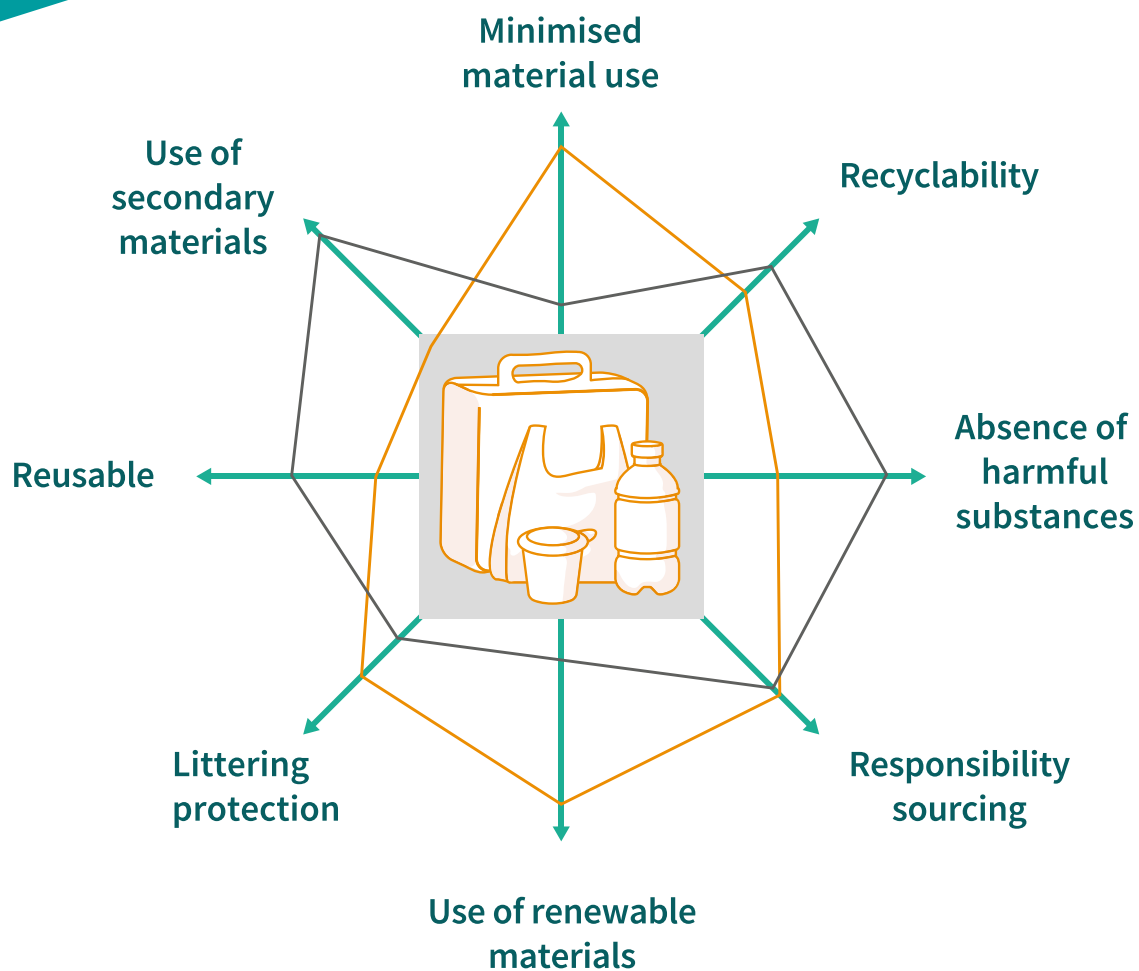
Life cycle assessments (LCAs) can make it easier to compare different packaging options with regard to defined environmental impact categories such as climate change potential or resource consumption. However, the limits of life cycle assessments must be taken into consideration here. For instance, littering is unquestionably an important environmental impact, but it is not covered by life cycle assessments and therefore has to be considered separately. Also, the results of LCA tools may only be valid for a certain geographical area.

Furthermore, the minimisation of environmental impacts by Eco Design remains a multidimensional target. Since the various environmental impacts do not represent a predefined and clearly hierarchical target system, there is no science-based approach

for solving conflicts resulting from burden shifting from one impact area to another (e.g. climate change versus loss of biodiversity).

Within the Eco Design process, conflicting objectives must, however, be made transparent and 'resolved' through appropriate decisions referring to the priorities set for the design project (see step 4 in the Eco Design process). Depending on the complexity, either a table or a spider chart can be used to create transparency and visualise the pros and cons of each design option.

In order to reduce the complexity of the decision-making, it is also useful to define minimum requirements for all relevant environmental targets while defining the environmental targets of the packaging project (see steps 1 and 2 of the management process).



As well as conflicts among different environmental targets, conflicts with the other key requirements, including, for instance, convenience, marketing functions or cost, may also occur within the Eco Design project. These conflicts can in principle be addressed in the same way as conflicts within the environmental domain.

FURTHER INFORMATION
<https://ecodesign-packaging.org/>

» **Checklist – Dealing with conflicting issues**

THE ECO DESIGN OF PLASTIC PACKAGING ROUND TABLE

The Round Table was founded in 2014 by IK. It includes experts from the plastics packaging supply chain (packaging manufacturers, brand owners, retailing), recycling, academia, and consumer protection.

The Round Table aims to:

- Establish a **competence platform** for plastics packaging Eco Design;
- Agree on a **common understanding** of packaging Eco Design and its criteria;
- Develop **recommendations** for plastic packaging manufacturers and other actors in the supply chain.



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Further information on the Eco Design of Plastic Packaging Round Table and the Management Guidelines is available at:

<http://ecodesign-packaging.org/>
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This publication is also available online and as a download.

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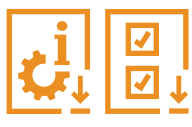
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SUPPORTING ELEMENTS OF THE GUIDELINE






Checklist & Instruction: Management of Eco Design in Packaging Design Projects

←  **Instruction:**
Defining Environmental Targets
for Packaging Design Projects



→  **Checklist:**
if neccassary Dealing with Conflicting Issues
←



Practical examples:
Four examples
to illustrate the approach



Toolbox:
With links to

- Further guidelines
- Useful tools
- Sources of helpful information
- Relevant databases

