

# Guide for sustainable plastics use

Principles, advice and examples for design and requirements

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# Guide for sustainable plastics use

Plastic can be found everywhere in society. Nothing strange about that, because plastics are versatile materials that can be given almost any properties. They are also often light and inexpensive compared to other materials and last a long time. However, the diversity and variety of plastic additives can also make use of certain plastics challenging in circular flows.

This guide provides hands-on tips, advice and good examples on the sustainable and circular use of plastics. Part 1 is mainly intended for designers and manufacturers, while Part 2 is intended for purchasers/procurement officers.

The authors are Hanna Ljungkvist Nordin and Katja Dvali, Profu, as well as Emma Strömberg and Hanna Unsbo, IVL Swedish Environmental Research Institute. The Swedish Environmental Protection Agency has not taken a position on the content of the report. The authors are responsible for the content.

## Glossary of plastic types

**ABS:** Acrylic nitrile butadiene styrene

**Bio-HDPE\*:** Bio-based high density polyethylene (hard plastic)

**Bio-LDPE\*:** Bio-based low density polyethylene (soft plastic)

**EPS:** Expanded polystyrene (sometimes called foam plastic, Styrofoam)

**HDPE:** High density polyethylene (hard plastic)

**LDPE:** Low density polyethylene (soft plastic)

**PA6 Polyamide 6 PC:** Polycarbonate PE: Polyethylene

**PET:** Polyethylene terephthalate

**PLA:** Polylactide (aka Polylactic acid)

**PP:** Polypropylene

**PS:** Polystyrene

**PUR (foam):** Polyurethane

**PVC** Polyvinyl chloride

\* Plastics with less bio-based polymers (for example 30 per cent) are also sometimes referred to as bioplastics

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# Innehåll

<b>Part 1: Designers and manufacturers</b>	4
General design advice	4
Single-use items	13
Healthcare articles and medical devices	16
Outdoor articles	18
Construction products	20
Furniture	23
Packaging	27
Reusable packaging	27
Recyclable packaging	29
<b>Part 2: Procurement and purchasing</b>	31
General advice for sustainable procurement and purchasing of plastics	31
Healthcare products	34
<b>References</b>	37

# Part 1: Designers and manufacturers

## General design advice

According to the Swedish Environmental Protection Agency's roadmap for sustainable plastic use, long-term and sustainable plastic use must mean that the material is part of a circular system. The right plastic in the right place, efficient flow from a resource and climate perspective, non-toxic plastics and minimised leakage are important aspects of sustainable plastic use.

To achieve this, the Swedish Environmental Protection Agency highlights four areas of impact:<sup>1</sup>

- Raw materials and production with minimal environmental impact
- Resource-smart usage
- Reduce plastic leakage in nature
- Significantly increased and high-quality material recycling

As a designer, you have a great influence on the design of a new plastic product. Your responsibility is to develop a sustainable product that is aesthetically pleasing while meeting the requirements for functionality. However, your influence as a designer does not end there. The choices you make on the use of the raw materials, the volume and quantity of material in the product, and whether it is recyclable or reusable has a direct effect on the overall environmental impact of the product throughout its life cycle. According to the EU's circular economy action plan, up to 80% of the environmental impact of a product can be attributed to the design phase.<sup>2</sup>

To contribute to the sustainable use of plastic, designers can take responsibility for deliberate choices for both the product they develop and its packaging. When products are developed that can be repaired, reused or recycled, both the product's and material's life span can be extended. Designers can benefit from developing an understanding of a product's entire life cycle. With this knowledge, it becomes easier to develop a product that has the least possible environmental impact during manufacture, use and final disposal.

The next page provides an overview of important questions to ask when designing a product containing plastic.

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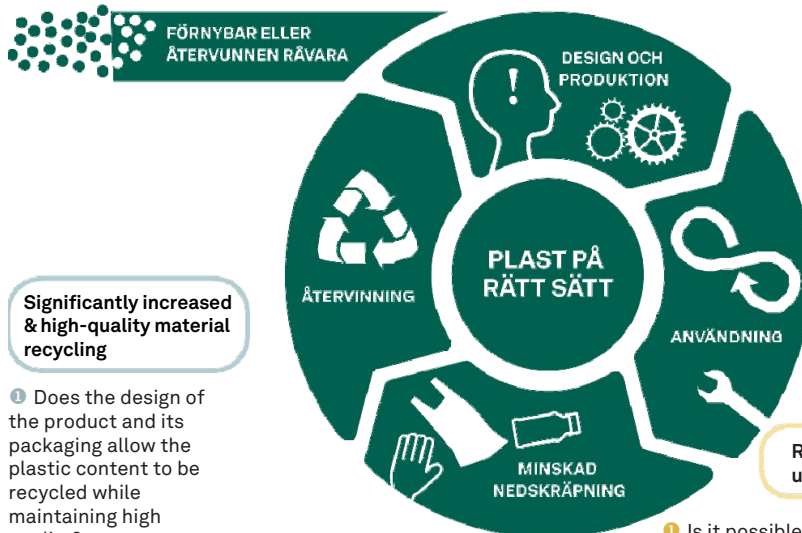
<sup>1</sup> Swedish EPA. (2021). *The Swedish EPA's roadmap for the sustainable use of plastics; Inspiring action.*

<sup>2</sup> European Commission. (2015). *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Closing the loop – An EU action plan for the circular economy.*

## Questions that lead to sustainable plastics use

### Raw materials & production with minimal environmental impact

- 1 Does the plastic raw material contain hazardous substances and, if so, can they be removed or replaced?
- 2 Can the climate impact of plastic in the product and its packaging be reduced from a life cycle perspective?
- 3 Is it possible to use bio-based or recycled plastic in the product and its packaging?
- 4 Is there market demand for recycled material from the type of plastic used in the product and its packaging?



### Significantly increased & high-quality material recycling

- 1 Does the design of the product and its packaging allow the plastic content to be recycled while maintaining high quality?
- 2 Does the product and its packaging contain information that assists the user to sort them correctly when they become waste?
- 3 Can the product back be reverted back to the manufacturing stage when it becomes waste so that the plastic can be recycled into new products?

### Reduce plastic leakage in nature

- 1 If there is a risk that the product and/or its packaging leads to microplastics during its life cycle, can this be minimised by changing the design?
- 2 If there is a risk that the product and/or its packaging will end up in nature as plastic litter, can this risk be minimised by changing the design?

### Resource-smart usage

- 1 Is it possible to use less material in the product and its packaging and still have the same function?
- 2 Is it possible to use a reusable plastic packaging for the product?
- 3 Can design extend the product's life?
- 4 Is it easy to repair the product if it is damaged?
- 5 Is it possible to design the product to support reuse of all or part of it?

## Design for function

When designing for function, the following should be considered:

- Is the product needed? Can the function be fulfilled in another way?
- How can I minimise material usage?
- Use as few different materials as possible.
- Select materials that fulfil the function with the lowest possible environmental impact.

## Design for reuse and optimal lifetime:

Using products for a long time instead of buying new ones reduces the resource needs, climate emissions and other environmental impacts. Keep this in mind when designing something that can be used for a long time:

- Select the material and design based on function and use, such as whether the product can be washed or heated.
- Ensure long life through timeless design for high second-hand value.
- Use standardised solutions.
- Enable products to be updated and repaired.

## Design for recyclability:

There are many aspects to consider when designing for recycling a material. Different aspects of the design need to be weighed: system, product, material and additive levels.

Here are some important points:

- The material has a resale value in the recycling market.
- The material does not contain additives (chemicals, fillers, etc.) that make difficult recycling or use of the recycled material in new applications.
- Alternatively, specific materials may circulate in defined loops to make new products within the same segment (e.g., electronics plastic with specific additives required by new electronics).
- The product can be collected and sorted for material recovery in aggregated flows.
- The product can be recycled using existing technology that preserves the value of the material and uses the recycled material in new products.
- New products made from recycled materials are of high quality and can be recycled in their turn.

## Example: The material Wheel

The strategic innovation program RE:Source has developed a variant of the waste hierarchy called the Material Wheel. The idea is to visualise how materials can be used as efficiently as possible in terms of resources by extending the useful life of products, components and materials, and maintaining functionality and structure for as long as possible. Energy recovery is the last segment of the wheel. Prevention and minimising use are not included in the model. More info on the [RE:Source website](#).

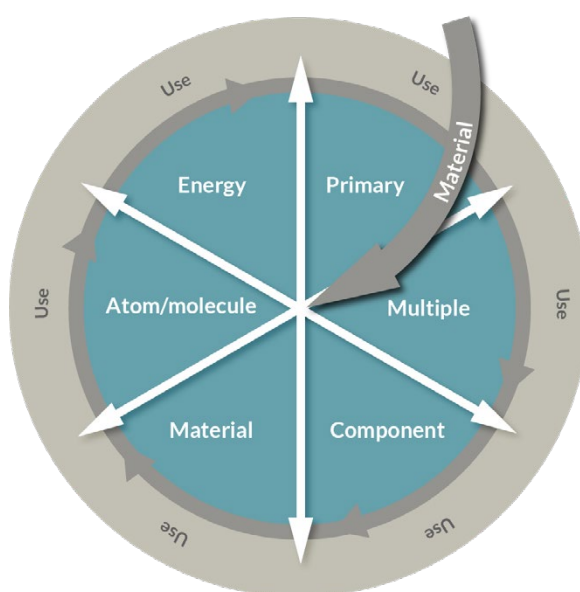


Figure 2. The Material Wheel from RE:Source.

## Choose between types of plastic

Table 1 presents values for some types of environmental impact for a selection of plastic materials that are used in large volumes and that are currently in use on the market. The values represent the production of one kilogram of plastic but do not include the use of the raw material or waste handling. Recyclability and availability of bio-based alternatives are also shown in the table. To get a complete picture of the environmental impact of the product, a full life cycle analysis needs to be done for the specific product.

Another important factor to consider is whether hazardous substances are used in production. For this purpose, specific support and assessment tools, such as the Substitution Guide, GreenScreen and Chemsec Market Place, are described in the *General Designer Guides, Tools and Frameworks* section (page 12).

**Table 1. Overview of environmental impact, recyclability and availability of bio-based alternatives for a selection of common plastic materials.**

Plastic type	Climate impact [kg CO2 equiv.] <sup>3</sup>	Acid rain [mmol H+ equiv.]	Eutrophication [g phosphate equiv.]	Can the materials be recycled using existing technology?	Is there a bio-based alternative?
PUR (foam) rigid:	4.3	21	3.1	Yes	Yes
PUR (foam) flexible	3.6	9.2	1.2	No	Yes
PLA	2.5	9.3	1.4	No	Is bio-based
PC	3.4	6.3	0.73	Yes	No
PA6.6	6.4	16	4.0	Yes	No
PA6	6.5	15	4.6	Yes	No
EPS:	2.4	7.7	0.57	Yes	No
ABS	3.1	9.3	1.0	Yes	Yes
PVC	3.3	17	1.2	Yes	Yes
PS	2.1	3.0	0.35	Yes	No
PET	2.8	3.9	0.45	Yes	Yes
PP	1.8	6.3	1.8	Yes	Yes
Bio-LDPE	1.7	30	30	Yes	Is bio-based
HDPE	1.8	5.1	2.8	Yes	Yes
LDPE	1.9	5.1	2.8	Yes	Yes

Assigning the plastics presented in Table 1 a number between 1 and 15 according to their environmental impact gives us the ratio presented in the diagrams on the next page (Figure 3, Figure 4 and Figure 5). A higher value indicates a greater impact on climate, acidification and eutrophication than a lower one.

The EU Joint Research Centre has recently published a report proposing a method for making harmonised and comparable LCA calculations for plastics from various sources. [Read more here.](#)

<sup>3</sup> LCI data obtained from the LCM group at IVL. A complete list and references will be available at a later stage.



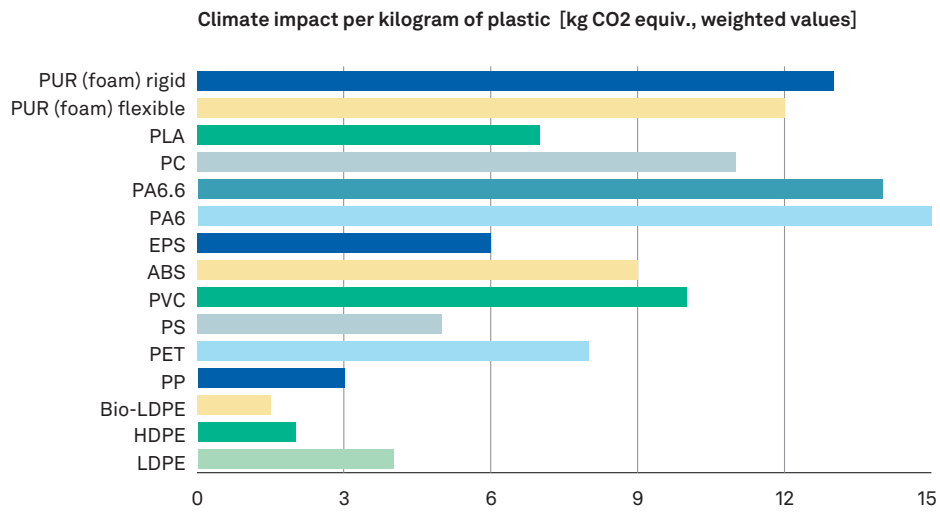


Figure 3. Weighted values based on plastics' potential for climate impact per kilogram of plastic.

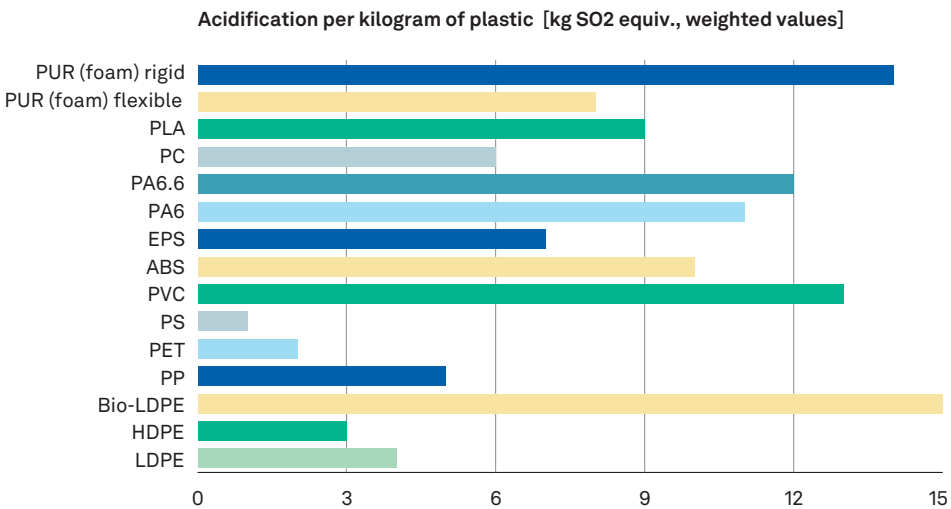


Figure 4. Weighted values based on plastics' potential for acidification per kilogram of plastic.

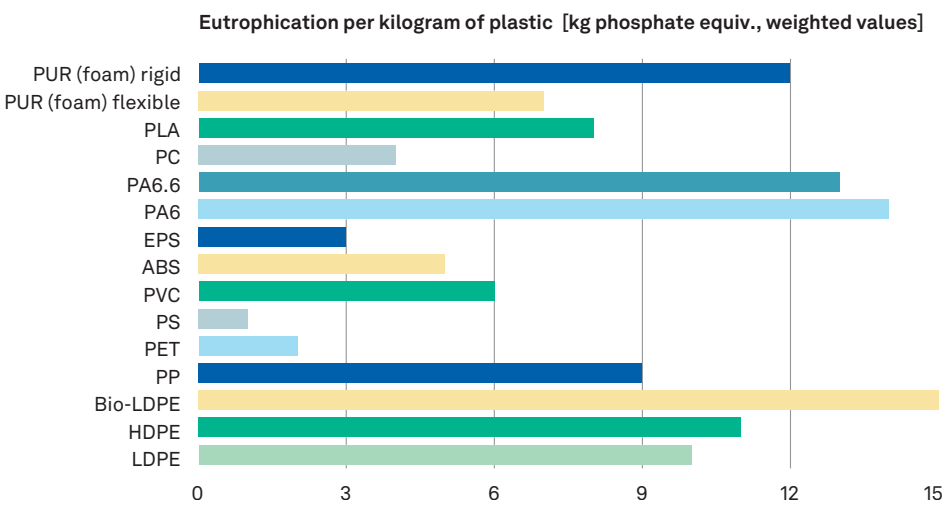


Figure 5. Weighted values based on plastics' potential for eutrophication per kilogram of plastic.

## Environmental trade-offs and key considerations

It is sometimes necessary to make trade-offs between and/or place a priority on different environmental aspects. For example, attaining a long life for a product may require using more materials or additives that have a higher climate impact or make recycling difficult. To avoid suboptimization, it is important to understand how the product will be used when considering the design. For example, a short-lived product (plastic packaging) needs to focus on material recyclability, while a longer-lived product (plastic furniture) needs to focus on quality and repairability.

It is important to consider several parameters when selecting materials. The different positive and negative impact factors need to be considered. For example, when selecting bio-based materials (see section below for the definition), more factors than just climate impact need to be considered, such as acidification, eutrophication and water use. These materials should then be compared with fossil materials to see differences in environmental impact. If you are going to look at the entire life cycle and not just the design and production phases, you also need to ensure the lowest possible environmental impact from waste management.

The most important parameter is that the material can be recycled, preferably several times, but when its lifecycle concludes and it goes to incineration, the climate impact should be minimal.

For example, the incineration of fossil plastic affects the climate through emissions of fossil carbon dioxide, while the carbon dioxide emitted from the combustion of bio-based materials is part of the natural carbon cycle.

**Be aware of conflicts between different environmental considerations and set priorities on the basis of the product's function and use!**

## Bio-based plastic and biodegradable plastic

Bioplastic is a broad concept that includes the plastic being biodegradable or compostable and/or the raw material for the plastic being renewable or bio-based. This makes the word vague, and it should be avoided.

**Bio-based** products contain materials that are wholly or partly made from renewable raw materials (biomass). Some of these are biodegradable but not all. Some (so-called drop-in materials) have the same material properties as fossil-based plastic and therefore work in traditional recycling flows.

Bio-based raw materials should be used when the environmental impact of the materials throughout their life cycle is lower than that of fossil or recycled raw materials.

Bio-based raw material can be divided into three generations. First generation raw materials are made from different types of plants, such as sugar cane, sugar beet and maize. Second generation raw materials are those that do not compete with food production but come from waste and by-products. These include used cooking oil, technical maize oil (by-product of ethanol production), slaughterhouse waste and pine oil. The third generation is still in its infancy but could include seaweed, algae and carbon dioxide.

Drop-in plastic is bio-based plastic that has the same chemical and mechanical properties as the corresponding fossil material. These plastics break down in the same way as fossil alternatives.

**Biodegradability** means that the material can be broken down into water, carbon dioxide and biomass by micro-organisms. The additives in a biodegradable material

must also be completely decomposed without adversely affecting the surrounding environment. High temperature is often required, and other specific conditions if complete decomposition is to be achieved. As such, these materials must not be regarded as a solution to the problem of litter.



Keep this in mind if you are considering using bio-based or biodegradable plastics:

- **It's still plastic.**  
Some alternatives are incorrectly marketed as “plastic-free”.
- **Select biodegradable plastic only if this feature is needed for the product**  
The best option for resource efficiency is material that is collected and recycled.
- **Industrial composting is not available in Sweden.**  
Biodegradable plastics often need industrial composting to be broken down. This needs to be reflected in the information about the product.
- **Biodegradable bags cause problems in biogas digesters.**  
When designing packaging to handle food waste, paper-based alternatives are preferable.
- **Bio-based drop-in plastic works well in recycling processes, but biodegradable plastic does not.**  
Biodegradable plastics destroy the quality of other plastics in recycling flows. Bio-based drop-in plastic is a good alternative to fossil plastic.
- **Always report the proportion of bio-based or biodegradable plastic in a product.**  
It is frequently less than 100%, which means that marketing can be misleading for the consumer.

Here is a good course on bio-based materials: [Biolyftet: company training on sustainable materials](#)

## Definition of recycling

Chapter 15, Section 6 of the Environmental Code defines recycling waste as reprocessing waste into new substances or articles that will not be used as fuel or filler material. The Swedish definition is based on Article 3 (17) of the Waste Directive.

Recycled plastics can be divided into different types. According to ISO 14021, recycled materials are divided into pre-consumer and post-consumer categories.

- **Pre-consumer** is defined as material that is separated from the waste during a manufacturing process.
- **Post-consumer** is defined as materials generated by households or commercial, industrial or institutional facilities in their role as final consumers and which are discarded or can no longer be used in the intended manner. This includes material from the distribution chain.

## General guides, tools and frameworks for designers

- [The Circular Design Guide](#) from the Ellen Mc Arthur Foundation  
There's a lot of material here: presentations, exercises, guides and workshops to help designers think circularly when developing a new product.
- [Cradle to cradle](#)  
A certification for sustainable products that covers most areas linked to sustainability performance, such as water and land management and social justice. Specific requirements are imposed on single-use plastic products.
- [Materialsmart](#) from Polykemi and Rondo  
Support for choosing materials. The site includes a calculator for calculating the climate impact of various types of plastic and some metals. By entering the weight and plastic type, you are shown the climate impact of a change from one material to another.
- [Centre of expertise](#) via Polymercentrum  
Polymercentrum Sverige AB offers courses for anyone who comes into contact with plastic in their work.
- [The Substitution Guide](#) from the Swedish Centre for Chemical Substitution  
The Swedish Centre for Chemical Substitution has developed a substitution guide for companies and organisations that want to work with chemicals in a more structured way.
- [Circular economy: an introduction](#) online course from the Technical University of Delft  
The course explores the concept of the circular economy, including examining the designer's ability to contribute to many smart and important solutions.
- [Plastic Progress Tools](#) from Axfoundation  
Includes a methodology and a digital tool for responsible plastic work in Swedish companies that can be read and downloaded.
- [Circularity Calculator](#) from Ideal&CO  
Tool to measure, communicate and improve product circularity.
- [Circularity check](#) from Ecopreneur  
Online tool to measure product circularity based on a survey.



- **GreenScreen®**  
American tool to identify hazardous chemicals and safer alternatives based on GHS (Globally Harmonized System of Classification and Labelling of Chemicals) and the US Environmental Protection Agency (EPA) design for recycling methods. Provides a benchmark.
- **Plastic Scorecard Version 1.0** from BizNGO  
Grades polymeric materials by evaluating individual chemicals and aggregating their GreenScreen benchmark values.
- **Circular design strategies from the Circular Economy Delegation**  
The delegation has presented an idea for a framework for circular design strategies aimed at products, services and business models.
- **ChemSec Market Place**  
A global business-to-business platform where both buyers and suppliers can work to replace hazardous chemicals with safer alternatives in many different product categories.

## Single-use items

The EU has introduced a directive to reduce the use of single-use plastic products. Under the Directive, single-use plastic products:

*“...are typically intended to be used just once or for a short period of time before being disposed of ... ‘single-use plastic product’ means a product that is made wholly or partly from plastic and that is not conceived, designed or placed on the market to accomplish, within its life span, multiple trips or rotations by being returned to a producer for refill or reused for the same purpose for which it was conceived.”*

In 2021, several Swedish regulations were adopted that are linked to the EU’s Single-use Plastics Directive.

Several single-use products were completely prohibited:

- Cotton bud sticks, except those used as medical devices
- Cutlery (forks, knives, spoons and chopsticks)
- Plates
- Drinking straws, except those used as medical devices
- Beverage stirrers
- Balloon sticks
- Products made from oxo-degradable plastic<sup>4</sup>
- Food containers made from expanded polystyrene with or without lids for immediate consumption without further preparation
- Beverage containers and cups made from expanded polystyrene including caps and lids
- Extended producer responsibility will be introduced for other single-use plastic products, including take-away packaging for food, wet wipes, tobacco products and tobacco filters, balloons, cups and thin carrier bags.

New requirements for labelling, collection, information and targets for reduced use have been introduced for several products. Read more about the Single-use Plastics Directive on the [Swedish Environmental Protection Agency’s website](#).

## Design advice

Ask yourself these three questions if you are going to design a single-use plastic product:

### **1. Is the single-use product needed?**

If you are designing a single-use plastic product, you need to ensure that there are no other solutions that meet the same needs or requirements. For example, single-use plastic products may be justified in the healthcare sector for hygiene purposes. However, single-use products of all materials should be avoided as a basic rule, because they involve increased waste volumes, short-term use of resources and contribute to littering. Reusable solutions could possibly replace the single-use product, sometimes supported by new collection and circulation infrastructures (see example below). Or maybe the product is not needed at all.

The annual [litter report from the Keep Sweden Tidy Foundation](#), it is clear that single-use plastic products are a major source of litter (see Figure 7).

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<sup>4</sup> Oxo-degradable plastics are traditional plastics with metallic salt added to speed up degradation. How degradation takes place in the environment is unclear, and there is a risk that oxo-plastics are a source of microplastic in the environment.



Figure 7. Illustration of how much litter is found in Swedish parks in an area corresponding to a football pitch.

(Source: Litter Report 2021, Keep Sweden Tidy Foundation)

## 2. Can the plastic be replaced with better options?

Can the product be made from bio-based or recycled material instead?

Can the product be replaced with reusable options?

## 3. Can the product be recycled?

Since single-use products quickly become waste, it is important that they are designed for recycling, regardless of the type of material. However, there is not always collection or source sorting for non-packaging products, which can make recycling something of a challenging.

## Examples of working with single-use items

- The City of Gothenburg reduced single-use items in schools, preschools, senior-living homes and offices.  
The project, which submitted its final report in 2019, included inventories of which single-use items were purchased and their estimated climate impact to better understand which ones to focus on. The single-use products that had the greatest impact on climate (based on volumes and carbon footprint per item) were, in order of magnitude (see Figure 8 on the next page):
- New invention recreated plastic gloves seven times  
Using the only machine of its kind in the world at Blekinge Institute of Technology, the plastic in the glove is dissolved in hot water. The solution is then sterilised and formed into a new glove.

Climate impact of single-use items purchased by the City of Gothenburg in 2017  
(Tonnes of carbon dioxide)

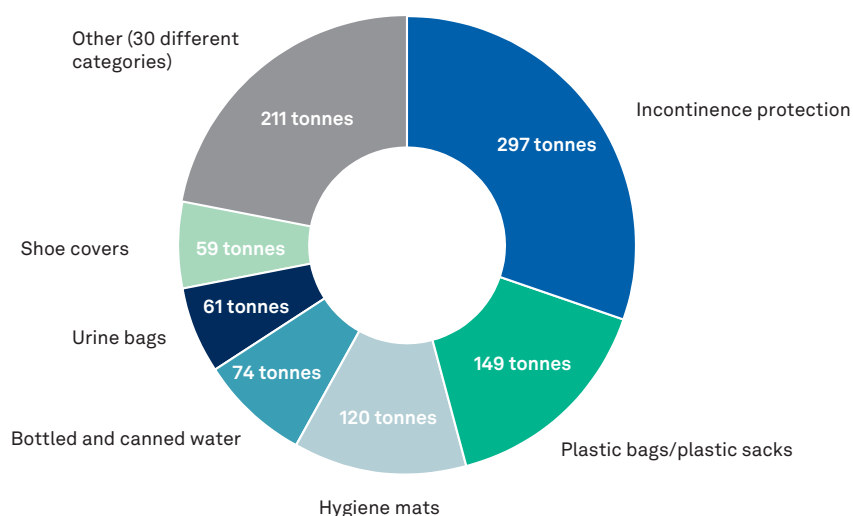


Figure 7. Climate impact from the purchase of single-use items in Gothenburg.

- Events free of single-use plastics (in Gothenburg) used several tools:
  - Deposit system for reusable plates (collaboration with Bower and Light my Fire)
  - Washing up containers
  - China from second-hand suppliers
  - 10% off for visitors with their own food box or reusable cup
  - Reusable glasses
  - Second hand clothes for staff
- Think outside the box (Light my Fire)  
Bring your own food box when you pick up food at a take-away restaurant.
- Loop-it is a reusable coffee cup service that replaces single-use cups.
- Bower is a packaging deposit solution where the customers get points for everything they return.
- &repeat is another deposit solution for single-use items that can be used in several restaurants in the scheme.
- Haloop offers rental of food boxes, coffee cups and beverage containers for restaurants and cafés to replace single-use packaging.
- Hejdå engångsmugg [Goodbye single-use cups] is a recurring campaign from Keep Sweden Tidy involving many large food-service chains. As part of the campaign, customers bringing reusable cups are given a discount.
- GreenCup was an initiative with thermal cups at KTH, where those who bought and used thermal cups received a discount on coffee and tea at cafés on campus.
- S.M.A.K. is a restaurant on Chalmers campus that offers the option of buying food in a stainless-steel food box covered by a deposit system that intends to reduce the consumption of single-use materials.



## Healthcare articles and medical devices

Plastic is increasingly used in all kinds of healthcare applications. Much of it is in single-use items like gloves, masks, aprons, tubes and syringes. An attempt to survey single-use items in the Swedish healthcare sector was made by SMED in 2019 (see Chapter 4). An updated survey will be presented at the beginning of 2022.

In a European case study<sup>4</sup> from Healthcare Without Harm Europe (HCWH), the following six types of articles accounted for over 60% of the annual plastic consumption in a hospital (Figure 9):<sup>5</sup>

Six healthcare articles that accounted for more than 60 per cent of plastic consumption in hospitals (Per cent)

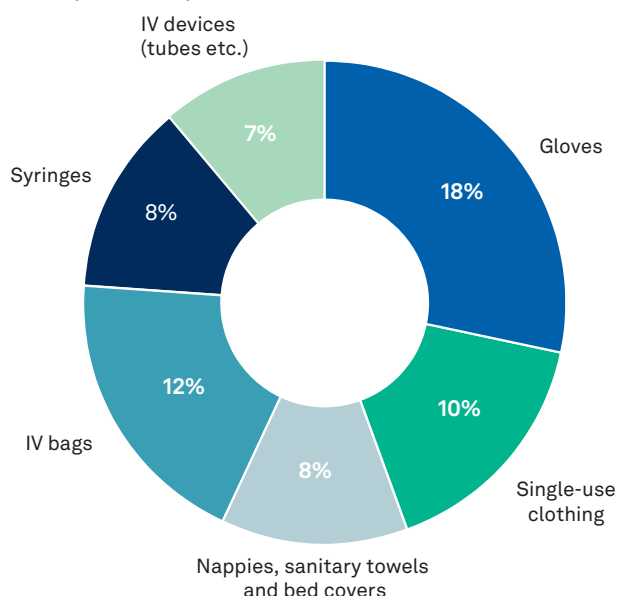


Figure 9. The six most common plastic products in a hospital in a case study from HCWH.

## Design advice

Some general advice for designers developing care products is listed below. For further advice related to procurement, see Part 2 of the report.

- Base design on function.
- Think about the next life of the product and design for it if possible.
- Use recycled materials where possible.
- Prioritise PP and PE.
- Avoid PVC.
- Reduce complexity at both material and product levels.
- Avoid endocrine disruptors, like DEHP and BPA, where possible.<sup>67</sup>
- Maintain a good dialogue between design and procurement.

<sup>5</sup> DEHP, di(2-hexyl)phthalate, is used as plasticiser. BPA, bisphenol A, is used as hardener and antioxidant.

<sup>6</sup> <https://noharm-europe.org/sites/default/files/documents-files/6886/2021-09-23-measuring-and-reducing-plastics-in-the-healthcare-sector.pdf>

<sup>7</sup> The data is from 2019 and does not include the effect of the COVID-19 pandemic.

The Healthcare Plastics Recycling Council (HPRC) has developed more detailed design advice and advice for the design of packaging and single-use products in the healthcare sector:

**Table 2: Recommendations and what to avoid for plastic design in healthcare (HPRC).**

Recommendations	Avoid
Maximise the use of mono-materials.	Rubber seals on a PP bottle.
Use PP and/or PE seals or gaskets when making PP bottles.	Plastic film and paper in the same packaging.
Combine chemically compatible or commonly processed plastics, if manufacture requires multiple types of material.	Metallised plastic, metal screws or grommets.
Use materials that can easily be separated during automated recycling processes, if multiple types of material are required.	Use of lead in plastics.
Use plastic labels as an alternative to paper (to avoid mixing materials).	Use of PVC plastic.
Minimise the number of paper labels and components.	The combination of incompatible bio-based plastics and oil-based plastics in the same product.
Use water-based adhesive.	Welding, gluing or moulding two components made of different plastic materials.
Design bottles and bags to easily drain completely before disposal.	
Use lists of contents that allow easy identification of residual liquids in the packaging.	
Minimise the number of pigments.	

## Tools and aids

- [Hospicycle](#): The Healthcare Plastics Recycling Council, HPRC, guide to hospitals that want to increase their plastic recycling.
- [Aarhus University Hospital](#) has produced a paper on plastics in hospitals containing experience and advice based on a major material stream project.
- Tools to reduce unnecessary plastic use in healthcare are presented in this [report from HCWH Europe](#) (pages 32–43).

## Networks

- [Swedish Medtech](#) is actively working with regional authorities to improve the procurement process, including through increased focus on the needs of patients/users and on introducing more innovations in the Swedish health and care sector.
- [Healthcare without Harm](#): sustainable procurement network.
- [Swedish Association of Local Authorities and Regions \(SALAR\)](#)
- [Swedish regions' national secretariat for sustainable public procurement](#)
- [Practice Greenhealth](#) is an American organisation that helps healthcare systems become more sustainable. They have helped with new [procurement strategies](#) for reducing environmental impact, improving the economy and reducing racism in healthcare.

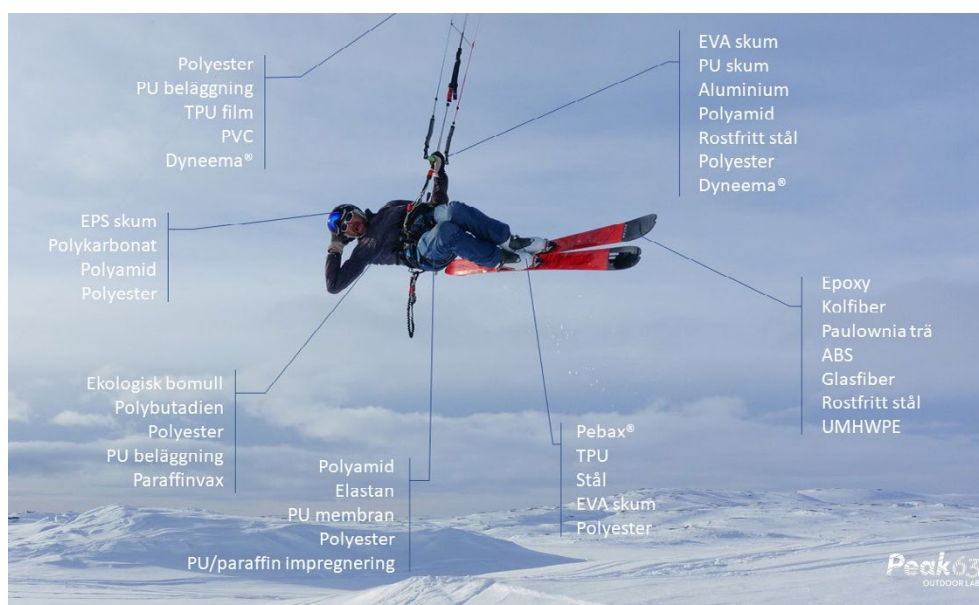


Figure 10. Examples of complex material combinations in outdoor products.  
(Source: Peak 63)

## Outdoor articles

The product area outdoor articles is wide-ranging and covers everything from cutlery, compasses and headlamps to clothes, backpacks and tents, skis, bicycles and climbing gear. Complex materials like composites, laminates and sandwich constructions are often used to achieve the desired properties (see Figure 10).

### Design advice

- Select materials based on function and usage patterns.
- Design for upgrade and repair if possible (to ensure long life of products and potential inclusion in rental businesses).
- Design modular products.
- Select bio-based materials if material recycling solutions are not available for the product.

### Guides and tools

- Sustainability in hard goods from the European Outdoor Group.  
The guide highlights such things as potential major differences in the use of hazardous chemicals in the production of certain plastics. Where possible, these materials should be avoided and replaced by other options with the same function. Specifically, these plastics are ABS, PC, PVC, PS and PU.  
Epoxy, polyamides (PA) and polycarbonate (PC) also have a very high climate impact in production and require a lot of energy for manufacturing (embodied energy). Using recycled material will drastically reduce both energy and climate footprints.

- Little school of plastic from Light My Fire  
Light My Fire manufactures food boxes, cutlery and firesteel lighters and has replaced large parts of its fossil-based plastic with bio-based plastic. Based on their experience, they produced a brief and simple brochure describing various raw materials and additives for plastics and how plastic is handled when it becomes waste. It explains the difference between bio-based and biodegradable plastics and shows examples of certifications for these.

## New (and reinvented) business models

Outdoor gear has long been available for rent. A classic example is ski rentals at mountain resorts.

But there are also exciting new initiatives emerging in the context of the “access economy” allowing you to avoid having to own your canoe, tent or camping stove.

- Outdoor buddies  
Hire of clothing and equipment for skiing and outdoor recreation.
- Fritidsbanken  
Free loan of sports and outdoor equipment available in many towns.
- Houdini Rental  
Rent outdoor clothes online or in a store.
- Lagg & hoj  
Rental of skis and bicycles. Also bicycle repair shops.
- Sarek friluftsboutik  
Rental of outdoor equipment in Umeå.
- Naturkompaniet  
Rental of tents, backpacks, baby carriers and baby tow sledges (pulks). Home delivery can be arranged.
- Municipal operations, such as ice rinks  
Most municipal ice rinks offer rental or loan of skates and helmets. Here is an example from the City of Gothenburg.



## Construction products

In 2019, the construction industry accounted for about 20 per cent of the total demand for plastics in the EU. The most common plastics used are PVC, HDPE, MDPE and EPS. Other plastics used in the industry include PP, PS, LDPE, LLDPE.<sup>8</sup> Very little plastic is currently recycled from construction and demolition, but that may change. In August 2020, requirements were introduced for sorting out construction and demolition waste in different material fractions, where plastic is a fraction. See [the guide](#) on the new regulations from the Swedish Environmental Protection Agency.

A [survey from the Swedish EPA](#) shows bio-based and recycled alternatives to plastics in some of the most common construction products:<sup>9</sup>

- Pipes
- Insulation
- Floor and wall mats
- Moisture and weather protection
- Windows and doors
- Electric installations

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<sup>8</sup> Plastics – the Facts 2020 • Plastics Europe

<sup>9</sup> Plastics in the construction sector – a survey of bio-based and recycled alternatives. Swedish EPA 2021.

## Reuse of construction products

There is untapped potential for increased reuse of construction products discarded at recycling collection points, for example. Construction materials that are reused instead of recycled can contribute to more circular flows and a lower environmental impact.<sup>10</sup> There are several initiatives both to increase and facilitate reuse in the construction industry:

- [The Centre for Circular Construction Solutions](#), CCBuild, an arena for collaboration between different stakeholders in the construction industry on industrial-scale reuse and circularity. Offers training, guides, product bank and marketplace.
- [Brattöns Återbruk](#) – used construction materials
- Reuse at collection points, including: [Kretsloppsparken Alelyckan](#), recycling centre, City of Gothenburg, [Sola byggåterbruk](#), collection points, Municipality of Karlstad
- [Madaster](#), EU project (2017–2019) that developed a [platform](#) for reuse of construction materials.
- [Hus till hus](#), Alingsås
- [Kompanjonen](#) – reuse of construction products and surplus lots
- [Action plan for circular construction](#), City of Stockholm

## General design principles

- Explore potential use of reusable products.
- Examine potential use of recycled material.
- Check for bio-based options.
- Designs should allow the products or materials to be sorted out during demolition.

## Tools and Guides

- [SIN list](#) from ChemSec  
Intended to inform manufacturers of chemicals in their products that should be phased out immediately as they have an impact on human health and the environment.
- [Level\(s\)](#) from the European Commission  
For example, courses and tools are presented that aim to increase the sustainability performance of European buildings.
- [Basta](#)  
The database contains a list of the products in the construction industry that meet the requirements for the chemical content of construction products.
- [Svanen](#)  
The Svanen eco-label has produced a label to be used for buildings that places demands on such areas as the chemical products and construction products used.
- [SundaHus](#)  
SundaHus offers construction contractors support for making informed material choices during construction.

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<sup>10</sup> Ahlm et al. (2021). Mapping of plastic flows in the construction sector. Raw materials, products, waste and litter.

- [eBVD \(Building Product Declaration\)](#)  
Provides stakeholders in the construction industry with information about different building materials.
- [Environmental calculation tool for the construction sector](#)  
The tool enables calculation of a building's total climate impact and comparisons of the impact of different material choices.
- [Madaster Circularity Indicator](#)  
Madaster and EPEA have developed this tool to estimate the circularity of buildings.
- [Friendly materials](#)  
Tools and consulting services for evaluation and ranking of the health impact of construction products, with a particular focus on indoor environments.

## Insulation

Plastic is now commonly used as insulation. Insulation is available that is made from expanded polystyrene (EPS, EPP, Styrofoam), extruded polystyrene (XPS), rigid polyurethane foam (PUR) and phenol or Bakelite foam (PF).

The majority of plastic in insulation in Sweden is made of EPS. The material is used in many applications in construction, such as under building foundation slabs, in walls and ceilings. It is estimated that approximately 40,000 tonnes of EPS insulation is used in construction in Sweden annually. Major manufacturers of EPS in Sweden are Sundolitt, Jackon and BeWiSynbra Group.

In recent years, new applications of EPS have been developed for the construction sector. These include complete construction systems, radon protection systems and as light fill in the terrain for major road and railway installations. Adding graphite increases the material's insulation property and less material can be used to achieve the same function. There are no major bio-based alternatives to EPS today, but there are several material recycling solutions. Read more about EPS at the [EPS Sverige website](#).

## Examples of more sustainable alternatives for insulation

- [Repur](#) – insulating groundwork slabs and cement made from recycled PUR insulation from refrigeration units.
- [BEWI Circular](#) – Recovery and recycling of EPS insulation and plastic film. The recycled EPS is incorporated into new products in the Green Line range that has 50 per cent post-consumer recycled content.
- [Hunton wood fibre insulation](#) – insulating panels and wind barriers made from Norwegian wood chips.
- [Isotimber](#) – prefabricated wooden wall elements with built-in insulation.
- [Reused wool from Eniva](#) – loose wool insulation made from used insulation from demolition.
- [ThermaCork](#) – cork insulation.
- [Natuwool](#) – insulation made from sheep's wool.
- More examples are available at [Friendly materials](#).



## Furniture

Furniture is traditionally a long-lived product that is replaced less often than other products. There are also many well-functioning recycling channels for furniture, both for individuals and businesses. Table 3 shows several examples.

**Table 3. Examples of solutions for reuse of furniture**

Focus on the public sector/organisations	Focus on private individuals
<u>Tagge</u> – an internal exchange site for furniture in the Västra Götaland region of Sweden	Second hand and antiques shops throughout Sweden
<u>Rekomo</u> – new and used office furniture	<u>Blocket</u> – marketplace for new and used goods
<u>BBS Möbler</u> – used office furniture	<u>Facebook Marketplace</u> – marketplace for new and used goods in both Sweden and other countries.
<u>Off-to-off</u> – ad market for municipal used furniture and gadgets (for example from Lerum)	<u>Tradera</u> – Swedish online auction site for new and used goods
<u>AllForSale</u> – used designer label furniture, office furniture, conference furniture and lounge furniture	<u>IKEA</u> – second hand for bookshelves, cupboards, tables, chairs and more
<u>Malvin</u> – an internal brokerage service for office furniture and other equipment for all of the city of Malmö's agencies	<u>Mjukhome</u> – collection, cleaning and sale of used furniture
<u>Stocket Återbruk</u> – the internal service of the City of Stockholm for the recycling of furniture and other equipment staffed by individuals on long-term unemployment	<u>ReTuna Design</u> – used refurbished/re-painted furniture



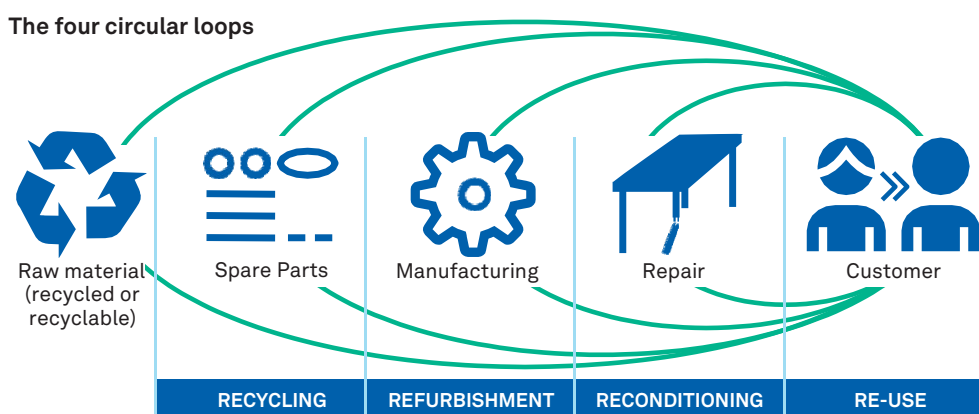


Figure 11. The four circular loops a designer needs to think about, according to IKEA's model.

IKEA has developed an illustration of how to look at the various circular solutions available for furniture, which they call the 'four circular loops', see Figure 11.

## Example: Circular design principles from IKEA

IKEA has developed a Circular Product Design Guide to act as a source of inspiration and offer useful guide for working toward more circular flows of furniture and furnishings. The design guide highlights eight principles for circular furniture design:<sup>11</sup>

- **Designing for standardisation:**  
Standardising products, materials and spare parts facilitates circular design and products can be more easily reused, reassembled and repaired.
- **Designing for adaptability:**  
A product that is designed to allow the consumer to change its style, shape and function in line with current trends and changes in way of life will extend the lifetime of the product.
- **Designing for renewable and recycled materials:**  
Choosing renewable or recycled materials is a way to choose materials that are suitable for a circular economy.
- **Designing for remanufacturing:**  
Intact and useful parts from old products that can be used in new products reduce the need for new production and reduce resource requirements.
- **Designing for care:**  
A design that considers how products are used and cared for by the consumer may extend the lifetime of furniture and furnishings.
- **Designing for repair:**  
The lifespan of furniture and furnishings can be extended by offering practical solutions for repairing specific parts and products.
- **Designing for disassembly and reassembly:**  
A product that can be disassembled and reassembled facilitates reuse and repair.

<sup>11</sup> 512088\_v2.pdf (thenewsmarket.com)

- **Designing for recyclability:**  
Designing products by choosing materials and combinations of materials that can be separated and then recycled into industrial processes lead to more circular resource flows.

## Eco-labels and labelling systems

- **Svanen**  
The Swan eco-label has produced an environmental certification for furniture and furnishings that sets requirements on raw materials, chemicals, warranties and the availability of spare parts.
- **EU Ecolabel**  
Ecolabel, also known as the EU Flower, is the official EU eco-label covering several product groups, including furniture. It sets requirements for the labelling of plastic components, hazardous substances and the content of recycled materials.
- **Möbelfakta**  
Möbelfakta is a reference and labelling system for furniture. It has, for example, produced a specification for furniture on the Swedish market that covers various materials, including plastics.

## Repair and updating

- Sveriges tapetserarmästare is an industry organisation where you will find everything about curtain makers, vehicle upholsterers and furniture upholsterers. It allows you to find your local tradespersons wherever you are in Sweden.
- Fixa Grejen – hem och möbler gives good ideas and DIY suggestions for homes and furniture through the Swedish Society for Nature Conservation.
- PTV renovates furniture and provides furniture care.
- Bemz produces custom-made covers and new furniture legs for IKEA furniture. Allowing you to keep a fully functioning piece of furniture even if the fabric is torn or the furniture feels dated.
- O.H. Sjögren reupholsters Carl Malmsten furniture following the original design. Pick up and drop off furniture available in much of Sweden.
- Prettypegs extends the life of IKEA furniture by refreshing it with new legs and fittings.

## Other initiatives

- CircularHub  
Contains a collection of examples of more circular and sustainable design for furniture and interior design in Sweden.
- Gröna listan  
Sweden's Västra Götaland region has created a list of furniture and textiles that meet the highest environmental standards for the products. This includes the Swan label and the EU Flower.



# Packaging

Packaging is a product designed to contain, protect, present, transport or otherwise handle a product during a part of its life cycle.

In 2019, plastic packaging accounted for about 40 per cent of the total demand for plastic in the EU. The most common plastic types used are LDPE, LLDPE, HDPE, MDPE, PP and PET. Other types of plastic, such as PS, EPS and PVC, are used but to a lesser extent.<sup>12</sup>

## Reusable packaging

Reusable packaging has a lower resource and climate footprint than single-use packaging and can be used in a wide range of applications.

## Requirements

- Reusable packagings should be capable of being used multiple times for the same purpose for which they were originally designed (under the [Regulation on producer responsibility for packaging 2018:1462](#))
- There is also an EN standard for reusable packaging, [EN 13429:2004](#).

## Design advice

Designing a packaging for reuse means thinking about the design and the infrastructure system and logistics that enable reuse.

It is important for packaging that:

- Each item of packaging must be made of durable material that is strong enough to be reused over several cycles of use under normal conditions.
- The packaging must be able to handle transport, use, cleaning, repair and refill several times over.
- A package should be standardised and able to be used by several brands.
- Removing old labels and attaching new ones should be easy.
- Standardised sizes and shapes help streamline logistics by maximising storage and distribution space.
- The reusable packaging should be recyclable when it can no longer be reused.
- Reusable packaging should not have a higher environmental and climatic impact than packaging that is only recyclable.

You can find [guide to designing reusable packaging](#) at the Dutch Institute for Sustainable Packaging, KDIV.

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<sup>12</sup> Plastics – the Facts 2020 • Plastics Europe

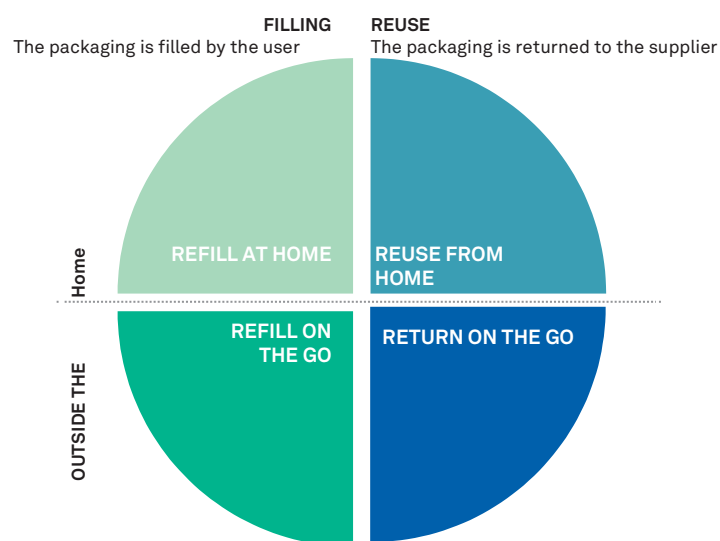


Figure 12. Various types of reusable consumer packaging.

Source: [Reuse – rethinking packaging, New Plastics Economy \(thirdlight.com\)](#)

## Consumer packaging

There are different systems for reusable consumer packaging (see Figure 12). Examples of companies offering reusable consumer packaging:

### Refill at home

- [Rituals](#) – refillable beauty product packaging.
- [Orkla](#) - refillable beauty product packaging.

### Reuse from home

- [Loopstore](#) – premium refillable glass and metal packaging.
- [Årstidene](#) – reusable boxes made from wood and Styrofoam for home-delivered food

### Refill on the go

- [Micro-matic](#) – various beverage machines in public spaces.
- [ECover](#) – refillable packaging for cleaning and hygiene products.
- [Vågen Zero Waste store](#) – organic products to fill yourself.
- Local milk dispensers – many farms in Sweden offer on-site milk refills.

### Return on the go

- [Sveriges Bryggerier](#) – washable glass bottles
- [Packoorang](#) and [RePack](#) – reusable transport cases.
- [Sodastream](#) – Reusable carbon dioxide cylinder.
- [ClubZero](#) – reusable food boxes for take-away food.

## Supplier packaging

Examples of companies offering reusable supplier packaging:

- [Svenska Retursystem](#) – washable plastic crates for grocery stores.
- [Jiangyin Lonovae Technology](#) – Washable and folding plastic crates for the grocery trade.
- Additional examples of different reuse systems have been compiled by Ellen MacArthur Foundation:
- [Reuse – rethinking packaging, New Plastics Economy](#)

## Recyclable packaging

When producing new plastic packaging, the focus should be on creating a product that fits into a circular economy. The following guide can be followed when designing recyclable packaging:

- Input material:
  - minimise the number of different materials that the product is made from.
  - avoid complex combinations (e.g., composites, laminates).
  - select transparent materials as often as possible.
  - choose the least harmful option for the environment without compromising the functionality of the packaging.
  - select materials that are included in larger recycling flows.
- Select transparent materials as often as possible.
- Additives must not interfere with recycling or break down into hazardous substances during reprocessing.
- The different materials and components should be easy to separate.
- Pigments must not interfere with sorting and recycling.
- Labels and adhesives should be easy to separate or be made of the same material as the product.
- There should be collection systems for the material.
- There should be material recycling technology for the material.
- It should be easy for consumers to distinguish between materials (to facilitate correct sorting of the packaging).
- Design the packaging for the next life of the material to contribute to more circular material flow.

## Tools and Guides

- [Bra plastförpackningar](#) [Good plastic packaging] from SPIF  
A recycling guide from SPIF (Swedish Plastic Industry Association), intended to facilitate the manufacture of recyclable plastic packaging.
- [Manual för plastförpackningar](#) [Manual for plastic packaging] from FTI  
FTI, the packaging and newspaper collection service, has developed a recycling manual for manufacturers interested in designing recyclable plastic packaging.

- Packaging Guide from ECR  
Efficient Consumer Response (ECR) has developed a packaging guide concerning packaging construction, design and durability. Aimed at the grocery trade.
- LCA Tools from KDIV  
The Dutch Institute for Sustainable Packaging (KDIV) has developed a LCA tool to highlight the differences in CO2 emissions for reusable and disposable packaging.
- Check-list for designing sustainable plastic packaging from KDIV  
KDIV (see above) has developed two guides aimed at producers wanting to develop recyclable plastic packaging, one for rigid packaging and one for flexible packaging.
- Design for Recycling Guidelines from RecyClass  
A manual that provides insight and guidance for manufacturers about the design of recyclable plastic packaging and plastic components.
- Designing for a Circular Economy from Ceflex  
This guide intends to help flexible packaging professionals develop packaging that is recyclable.
- Packaging recommendations from Cotrep  
A plastics guide to support and provide advice on the development of new consumer packaging with a focus on recyclability.
- The APR Design Guide for Plastics Recyclability from the Association of Plastic Recyclers. This manual aims at facilitating the process of designing recyclable packaging.
- A guide to investor engagement on plastic packaging: containers and packaging producers from PRI  
Principles for Responsible Investment (PRI) has developed a guide to enable good cooperation throughout the value chain for plastic packaging.
- Upstream Innovation – A guide to packaging solutions from the Ellen MacArthur Foundation  
A guide intended to support manufacturers, designers and packaging engineers in areas such as reduced use, reuse and circular flows linked to plastic packaging.

# Part 2:

## Procurement and purchasing

### General advice for sustainable procurement and purchasing of plastics

This section lists advice and examples for you to procure or purchase plastic products or services, both in the public and private sectors. This contains a great deal of information that means that your work does not have to start from scratch.

#### Sustainable plastic procurement

The Swedish National Agency for Public Procurements has a [website on sustainable plastic procurement](#).

It provides advice on the purchase and procurement of goods and services containing plastics:

- Demand recycled plastic
- Procure function or solution instead of for a product
- Set product lifespan requirements
- Demand circular products that can be reused or recycled.

Some other important questions for smart resource use in procurement are:

- Is the product really required or can it be removed completely?
- Is it possible to reduce the consumption/use of the product?
- Is it possible to purchase a product that has less packaging or reusable packaging?

#### The role and responsibility of the purchaser

Procurement is “in the middle of a product’s life cycle” (see Figure 13), which provides special conditions for setting requirements. This particularly applies to the role of the purchaser that procuring public agencies have.

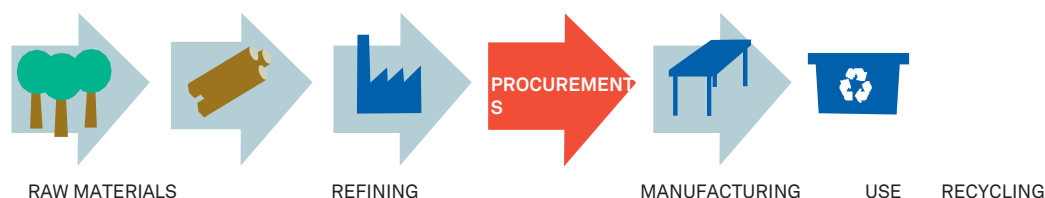


Figure 13. Illustration of procurement as an activity in the middle of a product’s life cycle.

The fact that procurement is in the middle of a product’s life cycle leads to a shared responsibility between procuring agencies and suppliers. The entire value chain, both upstream and downstream, needs to work together to find sustainable solutions.



A purchaser can drive the transition by working strategically with procurement and ensuring that there are goals in the organisation that support requirement of sustainable materials and products. The criteria in the procurement document provide information to tenderers on such aspects as the details of the environmental and climate performance that the tendered products must comply with, but it is the supplier's responsibility to ensure that these requirements are met in the tender and during the contract period for delivered products.

It is equally important that the products are used correctly. In the case of public procurement, it is the procuring agency's responsibility to inform the organisation and company of how the products are used, such as how regularly maintenance procedures should be carried out and repairs made and how they are carried out. In addition, they must provide information on how to support reuse of products, how to facilitate recycling by providing open collection systems, ensuring good waste management, etc.

More information about sustainable procurement can be found at the [National Agency for Public Procurements website](#).

It contains a [criteria service with sustainability criteria](#) at a basic level or advanced level for a wide range of product groups. One example is criteria for [medical consumables that contain a lot of plastic](#). It is important to set chemical requirements to reduce exposure of substances hazardous to the environment and health in medical treatment while maintaining medical function and safety whenever possible. Many of the criteria therefore relate to the phasing-out substances of very high concern in plastic products, see some examples below:

- Content of [bisphenoles in plastic](#) (advanced)
- Chlorine-free [plastic consumables](#)(basic)
- Content of substances of [very high concern](#) (basic, also advanced)
- [Climate impact](#) information (advanced)
- Sustainable [supply chains](#) (advanced)

## Preparation for sustainable plastic procurement

The National Agency for Public Procurements has detailed information about [sustainable plastic procurement throughout the purchasing process](#). The following steps can be used:

4. Develop a purchasing strategy, preferably with the support of a purchasing network (see below)
5. Map plastic flows in your organisation
6. Conduct a needs analysis: What plastic products are needed?
7. Prioritise products using reduction lists
8. Conduct a market analysis: Can the market meet your requirements?

## Example: This is how the municipality of Botkyrka reduced its plastic use

In 2012, the municipality of Botkyrka started a collaboration with the municipalities of Nykvarn, Södertälje, Salem, Huddinge, Haninge, Tyresö and Nynäshamn known as the Södertörn Collaboration. By joining forces with other municipalities, Botkyrka was able to reduce its range of plastic products from 2,000 to 350 articles. With the volumes of the products becoming so large, they could also set more stringent climate and environmental requirements than before and still get attractive prices.

Botkyrka municipality's tips for reducing the number of products:

- Reserve time. Reducing the assortment list takes time and involves a lot of work.
- Consider the need for and performance of each product. Can the same product be used for multiple purposes?
- Have a constant dialogue with the organisation. Dialogue is important both in selecting which products to remove and in getting the organisation to order the new range.

## Support in different purchasing areas

Sustainable procurement of plastic products has different conditions and opportunities in different product areas. The National Agency for Public Procurements provides specific advice and support in six purchasing areas:

- Packages and packaging
- Food and meal services
- Events and conferences
- Construction and properties
- Healthcare
- Other product areas

## Example: Circular procurement of signs in the city of Malmö.

The city of Malmö set three circular requirements when procuring signs for schools, libraries, residential properties and offices, etc.:

- That the supplier temporarily holds in stock signs that are not in use and repairs them if necessary. Value added: 10 per cent reduction in price if the supplier has experience in warehousing.
- That the supplier takes back any signs that are no longer in use and reuses all or part of them in its production. Value added: 10 per cent reduction in price if the supplier has experience in the procedure.
- That the supplier has well-executed recycling and waste management processes. Value added: 20 per cent price reduction if the different materials in the signs are separated before recycling, so that aluminium, plastic, glass and electronics can be recycled separately

## Example of a purchasing network

- The Swedish Association of Public Purchasers
- The Environment and Health Network in Procurement is a collaboration between 15 municipalities, the Swedish Police Service and Adda – a total of 24 individuals are involved. The collaboration mainly takes place through Microsoft Teams meetings. There is no joint website. The contact person is Marilouise Berg, Adda.
- Network for buyers and logistics officers
- Network for purchasing managers
- Network for buyers and procurement officers
- Circular municipality network



## Healthcare products

Plastic is used in a variety of healthcare applications, often in the form of single-use products such as gloves, aprons, cups, syringes and blood bags.

Some examples of regions and municipalities that have come far with sustainable procurement of plastic in the healthcare sector are Region Västra Götaland (example below), Uppsala municipality (example below) and [Region Skåne](#).

The National Agency for Public Procurements has brought together information about sustainable plastic procurement in healthcare on a separate website with a lot of advice, examples and links to more information, including from regions and municipalities. Some of the titles:

- Reducing plastic use
- Circulating plastics
- Which plastic for which product?
- Requirement for increased share of bio-based material
- Requirement for use of recycled plastic

**Table 4. Summary of advice for plastic procurement in the healthcare sector, based on National Agency of Public Procurement.**

Title	Tool	Examples (links)
Reducing plastic use	<b>Inventory</b> of plastic products and quantities	<a href="#">Road map for circular plastic flows in the Stockholm Region</a>
	<a href="#">Needs analysis</a>	<a href="#">Resource-smart operations for lower climate impact</a>
	<b>Reduction list</b> Reduce plastic use by substitution with better alternatives	<a href="#">Example from Uppsala</a>
Circulating plastics	<b>Increase material recycling by</b> <ul style="list-style-type: none"> <li>• purchasing plastic that has a value in the recycling market</li> <li>• make demands on waste contractors</li> </ul>	<a href="#">Recycling of protective aprons at Danderyd Hospital</a>
	Organise <b>sorting</b> of plastic that has a market value.	<a href="#">Pilot project in the Region Västra Götaland</a>
Think outside the box	<b>Set functional requirements in</b> , for example, Requests for Information (RFIs)	<a href="#">National Agency for Procurement's functional requirements web page</a>
	Replace single-use with reusable	
Which plastic for which product?	<b>Training</b> about plastics	<a href="#">State of knowledge Uppsala climate protocol</a> <a href="#">e-Learning Uppsala Common plastics (KEMI)</a> <a href="#">Plastics fact sheet (NV)</a>
Requirements and criteria	National Agency of Public Procurement's criteria service	<a href="#">Sustainability criteria</a> , see Healthcare
Requirements bio-based material	Fossil material can be exchanged for bio-based material where appropriate in a process of <b>collaboration with suppliers and questions in RFI</b> .	<a href="#">Biorock: Thermal coat made of wooden raw material Bio-based food boxes</a> <a href="#">Bio-composite hazardous waste container</a>
Requirements recycled raw materials	Recycled plastics cannot be used in medical devices and their primary packaging. Recycled plastics can be used in products with lower hygiene requirements, such as in dust bags, protective plastics and in packaging for non-sterile products.	<a href="#">Procurement data for resource efficient waste disposal bags</a>

## Supplier requirements

Aarhus University Hospital has prepared the following advice on purchasing plastic packaging in the healthcare sector:<sup>13</sup>

### **Reduce material consumption as much as possible:**

- Minimise weight and amount
- Include recycled materials in secondary and tertiary packaging for products requiring 3-layer packaging

### **Require recyclable plastics:**

- Packaging made from a single type of plastic (mono material)
- PP, PE or PET packaging
- Packaging labelled with a recycling symbol

<sup>13</sup> <https://www.auh.dk/siteassets/om-auh/driftsafdelinger/teknisk-afdeling/miljo/gentank-plast.pdf>

**Specify not to use the following plastic materials:**

- PVC
- Laminate
- Combinations of paper and plastic

## Example: Resource-smart operations for lower climate impact

The surgery departments at three hospitals in the Region Västra Götaland found considerable variation in consumption of consumables in all cemented hip surgery (5.0–6.6 kg/operation). The consumables were dominated by textiles, for which fossil-free alternatives produce significant environmental benefits.

A new model was created for customised operation kits through a process of consultation between the profession and the procurement organisation. This led to a significant reduction in number of packages and more streamlined work. Review of procedures for surgery and material procurement is a powerful tool for improving efficiency in the healthcare sector and reducing its impact on the climate.

## Networks

- [Nordic Centre for Sustainable Healthcare](#) is a Nordic collaboration for sustainable healthcare that includes both clients and suppliers.
- [Healthcare Without Harm](#) – a network for sustainable procurement
- Swedish Association of Local Authorities and Regions (SALAR)
- Swedish regions' national secretariat for sustainable public procurement
- [Swedish Medtech](#) actively works with regional authorities to improve the procurement process, for example, through increased focus on patients'/users' needs and on introducing more innovations in the Swedish health and care sector.
- [Practice Greenhealth](#) is an American organisation that helps healthcare systems become more sustainable. They have helped with new [procurement strategies](#) for reducing environmental impact, improving finances and reducing racism in healthcare.

## Example: Client expertise for circular furniture flows

[The Design With Care](#) project in Region Västra Götaland aims at strengthening purchasing expertise in sustainable interiors. In the first phase of the project, a methodology was developed for how to work with the interior design process in the municipality, linked to circular economy and increased reuse. Interior designers and local planners were trained in parallel.

The second phase was led by Skaraborg Municipal Association with the aim that, by 2021, each municipality in Västra Götaland would have:

- created a structure with clear procedures for purchasing furniture.
- a coordinator with responsibility for coordinating the work throughout their municipality or for multiple municipalities.

# References

The links below are divided up by the chapters in which they were used.

## **General design advice**

<https://www.remometer.com/remometer-tool/> <https://resource-sip.se/material-wheel/>  
<https://www.tuv-at.be/green-marks/>

## **Existing general guides, tools and frameworks**

<https://www.circulardesignguide.com/> <https://www.c2ccertified.org/get-certified/product-certification>  
<https://materialsmart.info/>  
<https://polymercentrum.se/>  
<https://www.ri.se/en/centre-chemical-substitution/substitution-guide>

## **Single-use articles, general**

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<https://lightmyfire.com/en/thinkoutsideofthebox>

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<https://lakartidningen.se/klinik-och-vetenskap-1/artiklar-1/temaartikel/2019/02/resurssmarta-operationer-for-lagre-klimatpaverkan/>  
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<https://sinlist.chemsec.org/>  
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[https://www.ecr.se/wp-content/uploads/2021/08/06\\_dva1815\\_katalog\\_co\\_ecr\\_a4\\_forpackningsguiden\\_sv\\_reviderad\\_webb.pdf](https://www.ecr.se/wp-content/uploads/2021/08/06_dva1815_katalog_co_ecr_a4_forpackningsguiden_sv_reviderad_webb.pdf)  
<https://recyclclass.eu/recyclability/design-for-recycling-guide/> <https://guide.ceflex.eu/resources/> <https://www.cotrep.fr/en/steps/pots-and-trays/> <https://plasticsrecycling.org/apr-design-guide>  
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The authors assume sole responsibility for the contents of this report, which therefore cannot be cited as representing the views of the Swedish EPA.

## Guide for sustainable plastics use

Plastic can be found everywhere in society. Nothing strange about that, because plastics are versatile materials that can be given almost any properties. They are also often light and inexpensive compared to other materials and last a long time. However, the diversity and variety of plastic additives can also make use of certain plastics challenging in circular flows.

This guide provides hands-on tips, advice and good examples on the sustainable and circular use of plastics.

