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Globala standarder för plastprodukter

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1. Summary

This report is the result of a government assignment that was given to the Swedish Environmental Protection Agency (SEPA) in December 2021. The aim of the assignment is to contribute with knowledge to promote the development of global standards for circular and non-toxic plastic products, in the Intergovernmental Negotiating Committee of Plastic Pollution (INC) negotiations of a future instrument to end plastic pollution.

The report is based on available literature and stakeholder dialogues. SEPA has developed a suggestion on five key principles for sustainable and circular design of plastic products that could be used as a starting point for the discussions in the INC process:

- Sustainable use of natural resources
- Design for optimal lifetime
- Design for recycling
- Design for safety of human health and the environment
- Design for transparency

To achieve sustainable design of plastic products at a global level, common eco-design criteria are not enough. Plastic products differ when it comes to use and functionality, therefore we need to develop several sets of eco-design criteria that are tailored to ensure minimal environmental impact from each product group.

Standards are collective work developed by groups of experts from various organizations including industry, consumer associations, research and testing organizations, academia, non-governmental organization, and government bodies. International standards are developed through a rigorous and transparent process characterized by a multi-stakeholder and consensus-driven dialogue.

For this assignment we have prioritized to dig deeper into potential eco-design criteria for plastic packaging, fishing gear and synthetic textiles. These product groups were selected based on national, regional, and global mappings of plastic flows and because of their special characteristics making them particularly harmful for the environment. For each product group we have suggested product specific eco-design criteria:

Plastic packaging

- Design för sustainable use of natural resources and optimal lifetime
- Design for recyclability
- Design for safety of human health and the environment

Fishing gear

- Design for optimal lifetime
- Tracking of fishing gear to minimize the loss
- Design for the safety of human health and the environment

Synthetic textiles

- Divide into subcategories
- Design for sustainable use of natural resource
- Design for a long lifetime
- Design for recyclability
- Design for safety of human health and the environment

2. Background

In March of 2022, the UN Environment Assembly (UNEA) adopted resolution 5/14 to develop an international legally binding instrument to end plastic pollution. The resolution requested the Executive Director of the United Nations Environment Programme (UNEP) to convene an intergovernmental negotiating committee (INC), to begin its work during the second half of 2022, with the aim of completing its work by the end of 2024.

The pre-ambular part of the resolution *"underline the importance of promoting sustainable design of products and materials so that they can be reused, remanufactured, or recycled and therefore retained in the economy for as long as possible."* Sustainable design is also mentioned in the operative part, stating that the future instruments should include provisions *"to promote sustainable production and consumption of plastics through, among other things, product design"*.

In December of 2022, the first meeting of the INC was organized in Punta del Este, Uruguay, where governments held a first round of discussions of the potential objective, scope, and measures of the instrument. During the meeting, many governments and stakeholders raised the need to develop criteria or rules for the sustainable design of plastic products.

The second meeting of the INC was held in May 2023 in Paris, France. As a basis for the meeting, UNEP prepared a paper on potential options for elements towards an international legally binding instrument[1]. The paper describes twelve possible core obligations that could be included in the future instrument, of which core obligation six outlines different options to foster design for circularity.

Ahead of the third meeting of the INC to be held in November 2023 in Nairobi, the chair has presented a Zero Draft text which includes two options for provisions on product design. Both options call for the establishment of design and performance criteria and include provisions to work with international organizations towards the development of standards and guidelines at the multilateral level.

In the light of UNEA resolution 5/14 and the ongoing discussions in the INC, there is now a momentum to establish a global regulatory framework that can change the way plastic products and packaging are designed to support the transition to a resource efficient and circular plastic economy.

[1] UNEP/PP/INC.2/4; https://www.unep.org/inc-plastic-pollution/session-2/documents#WorkingDocuments

2.1 The assignment

This report is the result of a government assignment that was given to the Swedish Environmental Protection Agency (SEPA) in 2022. The aim of the assignment is to contribute with knowledge to promote the development of global standards for circular and non-toxic plastic products, in the INC negotiations of a future instrument to end plastic pollution.

During the spring of 2023, a dialogue meeting was held with actors from the fishing-, packaging-, and textile industries. In-depth interviews were also conducted with selected people knowledgeable within these fields. Furthermore, there has been a continuous dialogue with the Swedish Institute for Standards (SIS). Input to the report has also been given by a reference group with experts from SEPA and the Swedish Agency for Marine and Water Management (SWAM) as well as organizations and private sector stakeholders. (See annex for a full list of participants in stakeholder dialogues and reference group.)

The knowledge and insights from the stakeholder consultation has, together with available literature, laid the ground for this report. The opinions expressed and recommendations given are those of the SEPA's.

2.2 Scope and objective

The objective of this report is to provide knowledge on sustainable and circular design of plastic products and on how eco-design criteria and product standards can be used as tools to foster sustainable and circular design. It also aims to increase the understanding of the linkages between eco-design criteria, product standards and product design. Furthermore, the report contains in depth knowledge of the development of international product standards.

Lastly, the report provides suggestions on how eco-design criteria can be included in the future instrument to end plastic pollution, with the view to promote the use of existing product standards on design of sustainable and circular plastics products, and the development of new standards were needed.

It is not within the scope of this assignment to develop detailed proposals for product-specific eco-design criteria. This requires a high level of detail and should be done in another fora. Nor does the assignment include the development of standards since this is done in separate processes by standardization bodies.

- Chapter 3 and 4 describe the basis for sustainable and circular plastics use and how this is linked to product design and eco-design criteria in the context of the future instrument to end plastic pollution.
- Chapter 5 and 6 elaborate on the link between eco-design criteria and product standards. Here, we go into detail on the development of eco-design criteria and product standards, including important aspects to consider and how it works in practice.

- Chapter 7 provides recommendations for the development of eco-design criteria for selected product groups, i.e., packaging, fishing, gear, and synthetic textiles, and how this could work in the setting of the future global instruments.

For this assignment, eco-design criteria mean *design requirements that ensure the production of safe, sustainable, and circular plastic products and enable sustainable plastic use.* Meaning that plastics are used in the right place and in resource-efficient, climate-efficient, non-toxic, and circular flows with negligible leakage[2].

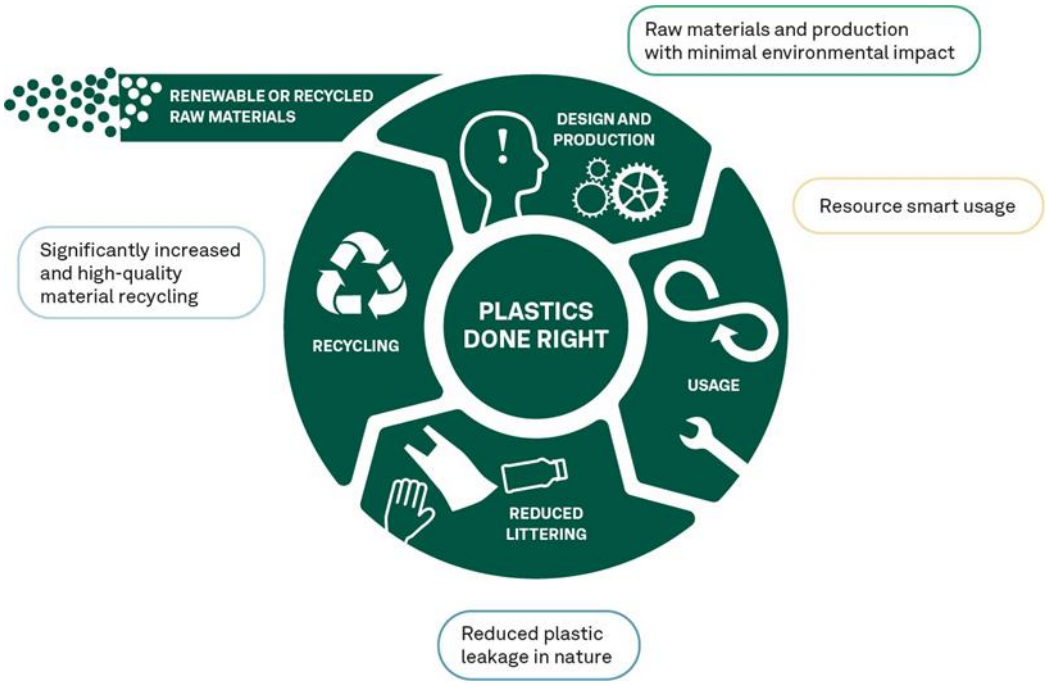
Sustainable and circular plastic products are defined as *products that are produced, used, and reused in a resource efficient way, are recycled at scale and in practice, and do not contain chemicals that are harmful to human health or the environment.*

[2] Swedish EPA (2021), The Swedish EPA's roadmap for the sustainable use of plastics

3. Sustainable and circular plastics use

To achieve the overall objective of the future instrument to end plastic pollution, we need to transition to a sustainable and circular plastic use, meaning that plastics products are used in the right place and in resource-efficient, non-toxic, and circular flows with negligible leakage.

SEPA has developed a road map to support stakeholder action towards sustainable and circular plastic use where we identify four impact areas that need to be addressed[3]. Improved product design is described as key for each of these impact areas, leaving the designers with great responsibility for the overall environmental footprint from the plastic products that are put on the market.



1. **Raw materials and production with minimal environmental impact:** To minimize the climate impact from a product, one should aim for minimal environmental impact from raw materials and production using a life cycle perspective. The choice of material or plastic type is the most important factor to keep in mind when it comes to possible environmental impacts from the whole life cycle, e.g., the risk of plastic leakage, recyclability, and fuel consumption.

[3] Swedish EPA (2021), The Swedish EPA's roadmap for the sustainable use of plastics

2. **Resource-smart usage:** Means that plastic is used in a way that provides the greatest possible benefit per amount of plastic during its life cycle. To achieve resource-smart use, one must begin with looking at desired function and examining options for making it as resource efficient as possible. Good design is crucial to reach resource-smart usage. It is in the design phase you decide the amount of material in a product and the possibilities for durability, repair, and reuse, and not least if the product is needed to fulfill the intended function.
3. **Reduce plastic leakage in nature:** Leakage of plastic includes plastic debris and microplastics that end up in nature through mismanaged waste, littering or unintentional leakage from production and wear. To overcome this problem, the sources of leakages need to be addressed, dispersal pathways need to be limited and waste that leaks into nature needs to be cleaned up. The risk of creating leakage through littering and microplastic releases is also affected by the product design, including resistance to wear and tear.
4. **Significantly increased and high-quality material recycling:** High quality recycling means that the material can be recycled many times without losing its value. It requires initiatives in several parts of the value chain, from product design to collection and sorting, and demand for recycled raw materials. The recyclability of a product is linked to design features, such as material mixes, the color of the product, labels, additives.

4. Sustainable and circular design

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. The choices made by the designers when it comes to, for example, type and composition of materials have large influence on the environmental impact during manufacture, use and final disposal of the products.

When looking at already existing guidance for sustainable design, e.g. the European Commission's Proposal for Sustainable Products[4], The Consumer Goods Forum's [5] and The Circular Design Guide from the Ellen Mc Arthur Foundation[6], as well as reports on the topic[7] [8], there are some common denominators that can be seen as key principles for sustainable and circular design of plastic products. Such principles apply regardless of the product type and are often relevant also for other types of materials. They are also in line with the 4R hierarchy (Reduce, Reuse, Repair, Recycle) and the waste hierarchy.

SEPA believes that such key principles could be included in a specific article on product design in the future global instrument to end plastic pollution, and that they should guide the development of product-specific eco-design criteria to be put in annexes of the convention text. Based on available literature and stakeholder dialogues, we have developed a suggestion on five key principles for sustainable and circular design of plastic products that could be used as a starting point for the discussions in the INC process.

1. **Design for sustainable use of natural resources:** When choosing which raw material to use in a product, the following should be considered:
   - Consider if the product is needed, or can the demand be met in another way, with less environmental impact.
   - Choose materials that fulfil the function with the lowest possible environmental impact, e.g., secondary raw materials or virgin materials with low carbon footprint that has been produced sustainably considering e.g., land use, biodiversity, and social aspects.
   - Use minimal amount of material without impairing the products quality or function.

[4] COM/2022/142, Proposal for a Regulation of the European Parliament and of the Council establishing a framework for setting eco-design criteria for sustainable products.

[5] The Consumer Goods Forum, Golder design rules (2021)

[6] https://www.circulardesignguide.com/

[7] Swedish EPA, Guide for sustainable plastics use

[8] OECD (2021), A Chemicals Perspective on Designing with Sustainable Plastics: Goals, Considerations and Trade-offs, OECD Publishing, Paris, https://doi.org/10.1787/f2ba8ff3-en.

2. **Design for optimal lifetime:** The products should be designed to be used, and re-used, for as long as possible before being recycled, taking the following aspects into consideration depending on the intended function of the product:
   - Make sure that the products are durable for their intended function and use, such as whether the product is supposed to be washed or heated.
   - Make sure that products can be upgraded, repaired and refurbished.
   - Make sure that products can be reused or refilled.
   - Strive for time-less design to achieve long life and high second-hand value of the products.
3. **Design for recycling:** The products should be designed to allow for high quality recycling, in practice and at scale, considering e.g., the following:
   - Strive for simple material compositions that can be recycled into high quality products.
   - Avoid the use of chemical additives that make recycling difficult, e.g., elastane and carbon black.
   - The product needs to fit available systems for collection, sorting and high-quality recycling.
   - Products that consist of different components should be possible to disassemble.
   - Products should include a minimum level of recycled content, to be decided depending on product type.
4. **Design for safety of human health and the environment:** Plastic products placed on the global market should not cause a risk to human health or to the environment at any stage of the life cycle:
   - The products must not contain any hazardous substances, as defined in the future new instrument to end plastic pollution.
   - The products should be designed to minimize the release of chemicals and microplastics during all stages of the life cycle.
   - The products should be designed to minimize the risk of leakage, e.g., through littering or leakage during manufacture and transport.
5. Design for transparency: Plastic products should be designed to enable information transfer throughout the value chain with the objective to facilitate environmentally sound waste management and for the consumers to make informed choices.
   - The products should be clearly labelled to inform consumers of the plastic content and how to handle the product when it becomes waste.
   - The labelling should be uniform with universal symbols to facilitate recycling.
   - There should be a mobilization of the potential for digitalization of product information on e.g., product and material type, composition, reuse/recyclability options for all product components. Including solutions such as digital passports, tagging (e.g., QR or barcode) and watermarks, and exploring digital product design tools, while taking

into consideration that digital literacy is uneven spread across the population.

5. Eco-design criteria

To reach a sustainable use of plastic at a global level we must improve the design of plastic products across all sectors and markets. To achieve this, we need a common set of binding rules, i.e., eco-design criteria, that set the bar for the design of plastic products worldwide. With the negotiations of a new global instrument to end plastic pollution, policymakers have the opportunity to take the decisions needed for the establishment of ambitious global eco-design criteria.

5.1 Development of global eco-design criteria

The stakeholder dialogue and available literature clearly shows the complexity of developing eco-design criteria and especially highlights the following issues that need to be considered:

Develop different sets of eco-design criteria for different products: The plastic economy consists of many different sectors producing a large variety of products, from packaging, textiles, cars and fishing gear to construction products etc. Since these products differ so much when it comes to use and functionality it is not possible to develop a single set of eco-design criteria that are applicable for all product types. Instead, we need to develop several sets of eco-design criteria that are tailored to ensure minimal environmental impact from each product group. Even the products within a single group may be so diverse when it comes to functional requirements that further sub-categorization is needed.

Make trade-offs between different design features to achieve minimal environmental impact: In the best of worlds, all suggested design features would improve all aspects of sustainability and circularity of a product i.e., resource efficiency, durability, reparability, recyclability, risk of leakage and safety. However, sometimes a design feature that improves one aspect can have a negative impact on another. For example, mixed materials can improve a product's functionality and durability while at the same time reducing its recyclability. In packaging, different types of plastics are often used to achieve different functions in the same packaging. Thus, when developing eco-design criteria, one must carefully consider the priority of different criteria for sustainability and circularity and make trade-offs to achieve minimal environmental impact.

Navigate in a fast-changing policy landscape: Much is happening when it comes to policy development of plastic products, especially at the EU level. Following the EU Circular Economy Action Plan, that was presented in March 2020, several policy initiatives from the European Commission have been launched that are linked to sustainable and circular design in different ways. These include but are not limited to:

- The proposal[9] for a revised Packaging and Packaging Waste Regulation (PPWR) in which packaging design will be controlled in terms of e.g. recyclability but also minimization of packaging.
- The adopted proposal[10] on Eco-design for Sustainable Products Regulation (ESPR) sets a framework for eco design and will be complemented with acts with eco-design criteria for specific product groups. The ESPR framework also includes the creation of a digital product passport to electronically register, process and share product-related information amongst supply chain businesses, authorities, and consumers.
- The EU strategy for sustainable and circular textiles[11] contains sixteen different policy initiatives to ensure that, by 2030, all textiles placed on the EU market are long-lived and recyclable, to a great extent made from recycled fibers and free from hazardous substances.
- The EU Chemicals Strategy for Sustainability (CSS)[12] aims towards a zero-pollution and toxic-free environment. A key action defined in the CSS is the development of criteria for safe and sustainable by design for chemicals.
- The single use plastics (SUP) directive (EU) 2019/904, on the reduction of the impact of certain plastic products on the environment ban certain products as well as setting targets for recycled content in drinking bottles and encouraging EPR-schemes for e.g. fishing gear.
- The proposal[13] on circularity requirements for vehicle design and on management of end-of-life vehicles contain e.g., options on circular design, mandatory targets for collection, recycling and recycled content and mandatory declaration of recycled content.
- The restriction of synthetic polymer microparticles under Reach (EC) 1907/2006 that ban intentionally added microplastics in products.
- The envisages proposal from the EU commission to tackle microplastics unintentionally released into the environment.
- The proposed regulation, Euro 7, sets limits for non-exhaust emissions such as particles from brakes and tyres.
- Regulation (EU) 2020/740 on the **labelling of tyres** with respect to fuel efficiency and other parameters.

All these ongoing processes need to be considered when developing global eco-design criteria under the INC process and the future global instrument with the aim to create a global harmonized regulatory framework that is aligned with relevant EU legislations.

[9] COM(2022) 677

[10] COM(2022) 142

[11] COM(2022) 141

[12] COM(2020) 667

[13] COM(2023) 451

6. Product standards for sustainable and circular design

Common eco-design criteria are not enough to achieve sustainable design of plastic products at the global level. To implement these criteria, we also need standards for the design of plastic products. Here, we wish to highlight existing and draft standards for design of plastic products and regional and global level (see annex 1). Principally, the uptake of available standards is recommended. For those areas that we lack standards, new ones could be developed under the international consensus-based multi-stakeholder process using global eco-design criteria as a basis but going more into detail for specific product groups. This way certification schemes could also be developed based on the standards. By doing so it will be easier for actors to comply with the provisions on product design in the future global instrument.

6.1 Development of standards – how does it work

International standards are developed through a rigorous and transparent process characterized by a multi-stakeholder and consensus-driven dialogue. Standards can function as an obligatory reference, as in the regulatory and procurement processes adopted by public authorities, e.g., CE marking of medical devices. Standards are established within a broad range of industries and business sectors, with to facilitate trade, and to, amongst others, ensure consistent function and quality, safety and accessibility, and conservation of resources and reduction of environmental impact.

Standards respond to a need in the market and may contain product-performance requirements, describe how they may be tested or define the content of services and how they should be performed. It may also contain joint terminology or describe common symbols and signs. It can also result in various other forms of deliverables, such as:

- **technical specifications (TS)** – which may often be developed at a time when the subject matter in question is still insufficiently developed for the document to gain approval as a standard.
- **technical reports (TR)** – which may include data obtained from a survey, an informative report, or information of the perceived “state of the art”.
- **publicly available specifications (PAS)** – developed to respond to an urgent market need, representing either the consensus of the experts within

a working group, or a consensus in an organization external to the International Organization for Standardization (ISO).

- **workshop agreements (IWA)** – following a mechanism outside of ISO committee structures that ensures the broadest range of relevant interested parties worldwide have the opportunity to participate and are approved by consensus amongst the individual participants in the workshops.

Normally, the development time for international standards ranges between one and four years, depending on the complexity of the subject and the range of stakeholders involved. For this reason, international standards usually take longer to develop, but ensure that such standards are quality-assured and respected. The development of standards is comprised of several stages, including:

1. **A proposal stage** – where a new work item proposal is submitted for vote by the members of the relevant technical committee to determine the inclusion in the program of work.
2. **A drafting stage** – where the standard proposal and subsequent committee drafts may be considered until consensus is reached on the technical content.
3. **An enquiry stage** – where the draft International Standard is circulated to all member bodies for voting and comment within a period of five months. It is approved in case of a two-thirds majority are in favor and not more than one-quarter of the total number of votes cast are negative. In case these criteria are not met, the text is returned to the responsible technical committee for further study, whereby a revised document is circulated for voting and comment as a draft International Standard.
4. **An approval stage** – where the final draft International Standard is circulated to all member bodies for a final approval vote. If technical comments are received during this period, they are no longer considered at this stage, but registered for consideration during a future revision of the International Standard. The text is approved as an International Standard if a two-thirds majority of the members of the technical committee are in favor and not more than one-quarter of the total number of votes cast are negative. In case these criteria are not met, the standard is referred to the responsible technical committee for reconsideration in the light of the technical reasons submitted in support of the negative votes received.
5. **A publication stage** – once a final draft International Standard has been approved, only minor editorial changes, if and where necessary, are introduced into the final text. The final text is sent to the ISO Central Secretariat which publishes the International Standard.

In special cases, where a document with a certain degree of maturity is available at the start of a standardization project, it is possible to pursue the so-called fast-track procedure. This procedure allows for an existing document from any source to be submitted for the vote as an enquiry draft, or in case of an international standardizing body recognized by the council board for a vote as a final draft International Standard.

All International Standards are reviewed systematically at least every five years to decide whether an International Standard should be confirmed, revised or withdrawn.

6.2 Roles and responsibilities in the standardization world

Standards are collective works developed by groups of experts from various organizations including industry, consumer associations, research and testing organizations, academia, non-governmental organization, and government bodies. These experts are brought together to form a technical committee to draw up the standard, with the national standardization bodies' staff facilitating the development and review.

Most standards are developed at an international level, either through organizations that work globally (i.e., ISO and IEC) or within Europe (i.e., CEN, CENELEC and ETSI). National standardization bodies occupy a key role in coordinating national consensus on subject matters, and accordingly, nominating experts to participate in the development of international standards representing the national view.

Standardization activity requires sufficient financing for national standardization bodies to operate effectively to meet the needs of customers and stakeholders over the long-term. Almost all National Standards Bodies are not-for-profit organizations that work to meet the standardization needs of their stakeholders and reinvest any surplus back into this activity. Its financing comes from the sales of standards and other technical publications and services, with other sources including project funds from industry, public funding, and membership fees. Sustainable financing is imperative for national standardization bodies to optimize their operations and to sensitize policymakers to the importance of standardization and conformity assessment for economic development and trade.

7. Product-specific eco-design criteria

When developing product-specific eco-design criteria, one should strive for a level of detail that enables the establishment of design standards for sustainable and circular plastic products. When it comes to design standards, the appropriate level of detail varies between different product groups.

Products that need to be fully compatible and have (almost) the same characteristics regardless of the manufacturer, e.g., B2B, require very precise product standards. Whereas products that don't need to be compatible and where the manufacturers compete with different designs and characteristics (e.g., toys), can have more general product standards. Also, product standards should not be too" rigid" so they prevent innovations. This way of thinking could also be applied when it comes to the development of product specific eco-design criteria.

For some products, it may be beneficial to have different levels of criteria making it possible to grade products in e.g., recyclability. The rationale behind that approach is that in some cases, such as packaging, the function of the packaging might make it necessary to compromise with e.g., recyclability. Different levels of the criteria will then enable this but at the same time set a goal to strive for.

We foresee that products specific eco-design criteria under the future instrument will need to be developed as the instrument evolves, using a start and strengthening approach. This will require a prioritization of which product groups to begin with. Such a prioritization could for instance be based on global production volumes and risk for plastic pollution.

For this assignment we have prioritized digging deeper into potential eco-design criteria for plastic packaging, fishing gear and synthetic textiles. These product groups were selected based upon national, regional, and global mappings of plastic flows and because of their special characteristics making them particularly harmful for the environment[14] . Other sectors that could be considered include construction products, electronics, and agricultural plastics.

[14] OECD Global Plastics Outlook Policy Scenarios to 2060, 2022

7.1 Plastic packaging

The biggest use of plastic globally is in packaging and the use is escalating[15]. This is not only a resource issue but also leads to problems dealing with all the waste arising. Plastic packaging, and other single use products, is one of the most common items that end up as plastic pollution in the environment.

In this assignment, we have developed a set of recommendations for the development of eco-design criteria for plastic products, in addition to the general principles described in section 4 and 5.1. The recommendations were developed based on the consultations carried out for this assignment and on the guidance for eco-design for packaging from Recyclass[16] and The Swedish Packaging Collection Service (FTI)[17].

7.1.0 Design for sustainable use of natural resources and optimal lifetime

- Reduce packaging material: The first aspect is to think about if the packaging is needed at all or if the desired function can be reached in any other way. Could e.g., improved water systems and availability reduce the need for bottled water, or could magazines be sold without plastic wrapping. The second aspect of reducing material is of course to use less material to achieve the same function. Thinner plastic, smaller packaging, less empty space etc. Linked to this there is also a possibility to rethink the product as such. For example, a switch from liquid soap to soap bars would enable another type of packaging for the same function and the volumes that we need to transport would decrease because bars contain much less water.
- Reuse of packaging: Making it possible to reuse packaging is another way of reducing the amounts of packaging material being used in society and a way of reducing packaging waste. Reusable packaging should be used for several rotations. The number of rotations is dependent on many things such as which material is used, how far the packaging needs to be transported, possibilities for washing and keeping the packaging hygienic etc. It is key that the reusable packaging is really reused in practice. Depending on the type of packaging, different approaches can be used. Large scale businesses can set up their own systems of e.g., reusable transport packaging or actors along the value chain with regular contact can be part of a common system. These are examples of business-to-businesses operations for which it is fairly easy to control and secure the number of rotations. Then there are systems involving private consumers,

[15] OECD (2022), Global Plastics Outlook: Economic Drivers, Environmental Impacts and Policy Options, OECD Publishing, Paris, https://doi.org/10.1787/de747aef-en.

[16] https://recyclass.eu/https://recyclass.eu/

[17] https://fti.se/en/company/packaging-design

for example beverage bottles. Society has the recent decades moved away from such systems mainly due to efficiency and complex value chains.

7.1.1 Design for recyclability

There are some already available standards and criteria describing recyclability, and a good example is Recyclass[18]. Within the EU there is also a standardization process ongoing. In terms of packaging this is mainly driven by the proposed new legislative act on packaging and packaging waste that is currently being negotiated. The following design for recycling criteria is often discussed:

- Polymer type: This affects the sorting process and the recycling process. In order to have a good quality output the polymers need to be of one type.
- Colours: Affects the possibility of sorting. But also, the quality of the recycled raw material. Transparent or pale colours means easier to sort and higher value for the recycled material.
- Barriers: Affects sorting but primarily the quality of the recycled material. If the barrier sticks to the polymer, it will pollute the recycled raw material.
- Lables/sleves: Affects sorting of the plastic waste. If the label “hides” the packaging, it will be wrongly sorted. It will also affect the quality of the recycled material in the same way as barriers.
- Print/ink: The color of the print will affect the quality of the recycled material since they give discoloration.
- Adhesives: Will affect the quality of the recycled material in the same way as barriers. Adhesives can also contain unwanted substances,

Other factors that are also relevant include the possibilities of emptying the packaging, because residues of the product might affect the sorting process and the quality of the recycled material. Also, the presence of small parts such as closures or other small components can create difficulties in the sorting but mainly because sorting facilities cannot take care of small parts and they will therefore end up in the rest-fraction.

7.1.2 Design for safety of human health and the environment

Packaging is a fast-moving material stream since packaging is normally used for a short period of time. This means that there are good opportunities to keep the stream clean from hazardous substances. An important driver for a more sustainable plastic use is the use of recycled content in packaging. The biggest challenge is being able to use recycled plastic in food-contact-packaging. Securing traceability is key to success.

[18] Homepage - RecyClass

7.2 Fishing gear

Plastics are used extensively in fishing and aquaculture gear. In Sweden, at least 100 tons of plastic entered the market as fishing equipment in 2020[19]. A significant proportion of the fishing gear placed on the market is lost or abandoned.

Abandoned, Lost or otherwise Discarded Fishing Gear (ALDFG) represent a large source of plastic pollution in the marine environment. In the EU, 27% of the marine litter is represented by fishing-related items[20]. In addition, because fishing gear is designed to trap aquatic organisms it is especially harmful. The gear, including nets and lines, can lead to ghost fishing, meaning that it remains in the oceans for many years, continuously trapping, entangling and potentially killing marine wildlife.

In this assignment, we have developed a set of recommendations for the development of eco-design criteria for fishing and aquaculture gear, in addition to the general principles described in section 4 and 5.1. The recommendations were developed based on the consultations carried out for this assignment and on available reports on eco-design for fishing gear[21] [22]. In addition to the design aspects, it is also very important that there are simple and easy ways to leave waste gear, or parts, that the fishermen have collected at sea for collection, and environmentally sound waste management.

While durable fishing gear is advantageous for fishing purposes, it also means that when gear is lost or abandoned, it persists for a long time, leading to prolonged damage to the marine environment. Except the risk of ghost fishing, lost fishing gear contributes to micro- and nanoplastic pollution of the oceans due to plastic degradation. This also includes leaching of different kinds of plastic additives and associated chemicals from the plastic during its degradation. Large masses of ghost gear floating near the surface can pose a risk to navigation. Entanglement with propellers can lead to damage and accidents.

7.2.0 Design for optimal lifetime

Fishing gear should be designed to be durable and withstand harsh marine environments. The importance of durable fishing gear lies in its ability to withstand the extreme conditions of fishing, including exposure to water, salt, sand and rough handling. This ensures that the gear can endure the pressure exerted by large and powerful fish, as well as the wear and tear caused by constant, casting, reeling and retrieving.

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[19] Naturvårdsverket (2022) Plastic in Sweden – facts and practical advice

[20] Directive (EU) 2019/904 of the European Parliament and of the Council of 5 June 2019

[21] OSPAR Commission (2020), OSPAR scoping study on best practices for the design and recycling of fishing gear as a means to reduce quantities of fishing gear found as marine litter in the North-East Atlantic

[22] Havs- och Vattenmyndigheten (2023), SPIRAL - Smart policyutveckling för producentansvaret för fiskeredskap av plast

Durable gear reduces the likelihood of accidents caused by gear failure and is also important for the environment. Broken or lost gear, such as fishing lines, traps, baits, lures and nets can become marine debris and contribute to pollution or ghost fishing. Durable gear lasts longer, making it less likely to end up as litter and reduces the need for frequent replacement, minimizing waste generation. Durable materials also reduce the risk for fragmentation and microplastics. Fragile or poorly constructed gear can pose safety risks.

By designing the fishing gear in several modules that can be separated and replaced, the amount of material per new gear can be reduced, and the gear can easily be repaired or upgraded. Parts from fishing gear can be reused, either as a whole product or parts of the product. Parts/modules could also be modified or repurposed. This makes it easier to recycle and reuse the materials.

7.2.1 Tracking of fishing gear to minimize the loss

Tracking lost fishing gear is an important aspect of marine conservation. Lost gear causes the most damage when just lost. It is therefore important that fishing gear is clearly marked and that reporting, retrieval actions and exchange of information between actors and states take place quickly and efficiently.

Today various methods are used to track and monitor lost fishing gear. These include satellite tracking, GPR-enabled buoys, and underwater drones. These technologies help researchers and organizations to locate and assess the movement of ghost gear.

It should be required that fishing gear is marked with unique identifiers to ensure traceability of fishing gear components throughout their life cycle, that losses are reported, and that fishing gear can be tracked in order to prevent the fishing gear from polluting the oceans as well as making it easier to find if lost.

There should be a standardized approach to gear/polymer labelling and marking (e.g. colour coding, electronic marking) to ensure traceability of fishing gear and enable material identification by recyclers.

7.2.2 Design for the safety of human health and the environment

Design to minimize the risk of ghost fishing should be promoted. One example is lobster traps equipped with escape holes that are kept closed with a single untreated cotton thread (without core and not more than 3 mm in diameter). The cotton thread dissolves after some time in the water and the escape hole opens. This design does not lead to a reduced amount of lost fishing gear but it reduces the risk of so-called ghost fishing.

The design of fishing gear can affect losses. For example, traps and pots have lines connected to the buoy which should always be made from a material that sinks or can be weighted down, this to decrease the risk that the line is struck by a boat and breaks. The weight of the cages is also important to minimize the distance it could drift due to underwater currents, mainly to prevent it from ending up in deeper

waters where it would sink with the marking buoy. There are also alternative ways to mark the equipment enabling it to be relocated, one example of this could be digital solutions with a tracker being tied to the equipment.

7.3 Synthetic textiles

Synthetic textiles are one of the major applications of plastics. In 2022, synthetic fibers accounted for 72.2% of total textile fiber production globally of over 113 million tons of fibers, and synthetic textiles accounts for 11% of global plastic waste[23]. Textile is also a sector that uses a lot of chemicals and is one of the largest sources of microplastics in the environment. The UNEP report, Sustainability and Circularity in the Textile Value Chain, identifies optimizing design as a key priority to reach sustainable and circular textiles[24].

It is mainly during the design phase that the textile's environmental impact and quality are determined through the selection of materials and production methods. Different fibers and materials impact the environment in various ways, but the production method is more critical than the specific fiber used[25].

In this assignment, we have developed a set of recommendations for the development of eco-design criteria for synthetic textiles, in addition to the general principles described in section 4 and 5.1. The recommendations were developed based on the consultations carried out for this assignment and available reports on eco-design for textiles[26] [27].

7.3.0 Divide into subcategories

Different types of textiles have different functional requirements. For example, a t-shirt must be able to be washed repeatedly without losing its shape, curtains need to be resistant to sun exposure and carpets need to withstand years of heavy abrasion. Therefore, textiles need to be divided into sub-categories to allow for developing eco-design criteria that are tailored to the intended function of each category. The following subcategories have previously been suggested and can be used as a starting point for discussion; clothing, protective clothing, home textiles, curtains, upholstery fabrics, mattresses and floor coverings[28]. Such subcategories

[23] Textile Exchange (2022) Preferred Fiber & Materials Market Report

[24] UNEP (2023) Sustainability and Circularity in the Textile Value Chain: A Global Roadmap

[25] Mistra Future Fashion (2019), The outlook report 2011-2019

[26] TemaNord (2018), Potential Ecoeco-design criteria for Textiles and Furniture

[27] ECOS (2021), Durable, repairable and mainstream, How ecodesign can make our textiles circular

[28] OVAM (2021), Ecodesign criteria for consumer textiles

may need to be prioritized to begin developing eco-design criteria for the most prioritized categories.

7.3.1 Design for sustainable use of natural resources

To minimize the environmental impact from the use of raw materials, requirements can be set to incentives the use of recycled materials and non-fossil virgin materials that are sustainably sourced considering e.g., land use, biodiversity, and social aspects. However, care must be taken so that the selection of raw materials does not affect other aspects of sustainability in a negative way. At the moment one of the most accessible recycled materials for textiles is polyethylene terephthalate from PET bottles. A negative consequence from using recycled PET for textile production is that the material is lost from the closed loop bottle recycling system creating a potential shortfall of raw material in that system. It also means that the PET loses its value since textiles cannot be recycled to bottles. A design criteria to ban the use of recycled PET in textile production would keep the PET in the closed loop bottle recycling system and incentives fibre-to-fibre recycling.

7.3.2 Design for long lifetime

High quality (durability) and time-less design are important design features to improve the possibility for textiles to be used for a long time, reused on the second-hand market or re-manufactured into new products. Other requirements that could ensure longevity, promote reuse and remake include that the product should be possible to upgrade and disassemble without compromising the quality.

Producers should guarantee repairability by ensuring that essential parts of the products are easily replaceable and repairable. For example, stitching rather than gluing can help disassembly. Require access to spare parts, e.g., zippers and buttons, including instructions, to enable easy repairs can encourage consumers to repair rather than discard.

To ensure long-lasting textiles we need technical requirements on for example color fastness, fabric resistance to pilling and abrasion, shape retention, and fastness of zippers and buttons. Such requirements can be combined with a definition of the desired lifespan of products and garments.

7.3.3 Design for recyclability

Setting requirements for recyclability is complicated since many of the technologies for recycling of synthetic textiles are emerging and not yet operational at industrial scale. SEPA believes that an eco-design criteria for recyclability needs to be developed for the available current technologies. However, since the technical development is fast the criteria should be updated as the recycling technologies and capacities evolve and be flexible enough to avoid technological lock-in effects.

Examples on recyclability requirements could include to limit the combination of material mixes, possibility to disassemble the product and information

requirements or restrictions of chemicals that hinder recycling e.g., elastane and certain pigments as well as hazardous chemicals to keep them out of the loop.

7.3.4 Design for safety of human health and the environment

The use of chemicals of concern in textile production needs to be restricted to ensure that the production and the products themselves are safe. Such requirements could be included as part of eco-design criteria for textiles and should consider the health of both workers and consumers.

Textiles are one of the major sources of microplastic pollution and it is crucial to improve design and production methods to minimize the releases during production and use. Examples of factors that can impact the release of microplastics and that should be considered when developing eco-design criteria include choice of yarn, spinning methods, and how the fabrics are cut and brushed in the production process. SEPA also recommends the introduction of limit values of the release of microplastics from production and products that are put on the market.

8. Concluding remarks

The ongoing negotiations of a legally binding global instrument to end plastic pollution has opened up the opportunity to create global design rules, i.e., eco-design criteria. By complying to such criteria, the producers must make sure that the plastic products they put on the market are designed to be produced, used, and reused in a resource efficient way before they are being recycled to high-quality products. They must ensure that the products are safe, and they are designed in a way that prevents plastic and microplastic leakage into the environment.

To create an effective legislation that can adapt to technical and scientific advancements, we believe that the future instrument should include an article on product design with key principles, or general design criteria, that are applicable to all types of plastic products. This means that all plastic products should be designed keeping in mind - resource use, product lifetime, possibilities for recycling, safety for human health and the environment and transparency along the value chain. The general design criteria should guide the development of product-specific eco-design to be placed in an annex to the instrument.

The product specific eco-design criteria will need to be developed over time, starting with high priority product groups, such as plastic packaging, fishing gear and synthetic textiles, and be possible to update to strengthen the instrument over time. The level of detail of the products specific eco-design criteria must be carefully considered to be well adapted for the specific product group and to create conditions that enable market surveillance and a level playing field at the global market.

Furthermore, the eco-design criteria must be constructed to enable the use of existing design standards for sustainable and circular plastic products (see annex 1) and to foster the development of new ones as needed. Design standards are developed by external standardization bodies and will be critical to support implementation of the eco-design criteria under the future instrument.

The development of product-specific eco-design criteria requires knowledge of sustainable design and technical knowledge of the product group in question as well as an in-depth understanding of how the sector works. For these reasons we find that product specific eco-design criteria under the future instrument need to be developed by a subsidiary body to the governing body, e.g., a Technical Review Committee for adoption by governing body.

However, as sustainable design is key to reach a sustainable and circular plastics use and minimize leakage, we support that the work on developing eco-design criteria is prioritized already for the intersessional work under the INC negotiations.

Annex 1: List of relevant regional (EN) and international (ISO) standards

For a list of common international standards, and leverage existing international standards, to address the full life cycle of plastic in order to eliminate plastic pollution, please see the written provided by ISO to the Second session of the Intergovernmental Negotiating Committee (INC-2) for the development of an international legally binding instrument on plastic pollution, including in the marine environment.

Below, further regional standard references within the scope of plastic products, including textiles, fishing gear and plastic packaging, are provided.

Table 1 - List of relevant regional (EN) and international (ISO) standards for plastic products

Standard reference	Title of standard
Terminologies and definitions	
These standards provide general terms and definitions used in the value chain of plastics, textiles and fishing gear and packaging related to environmental and circular economy aspects including design, production, retail, use and reuse, recycling processes, repair, and disposal.	
ISO 472:2013	**Plastics – Vocabulary**
EN 17615:2022	Plastics - Environmental Aspects - Vocabulary
ISO 5157:2023	Textiles — Environmental aspects — Vocabulary
CEN/TS *(under development)*	Circular Design of Fishing Gear - Terms and Definitions
ISO 18601:2013	General requirements for the use of ISO standards in the field of packaging and the environment

Energy-related products

The standard series EN 4555X aims to support the introduction of eco-design requirements on material efficiency aspects for energy-related products by providing horizontal methods to ensure repair, reuse and recycle of products.

EN 45552:2020	**General method for the assessment of the durability of energy-related products**
EN 45553:2020	General method for the assessment of the ability to remanufacture energy-related products
EN 45554:2020	General methods for the assessment of the ability to repair, reuse and upgrade energy-related products’;
EN 45555:2019	General methods for assessing the recyclability and recoverability of energy-related products
EN 45556:2019	General method for assessing the proportion of reused components in energy-related products
EN 45557:2020	General method for assessing the proportion of recycled material content in energy-related products
EN 45558:2019	General method to declare the use of critical raw materials in energy-related products
EN 45559:2019	Methods for providing information relating to material efficiency aspects of energy-related products

Fishing gear (under development)

The standard series EN 17988 **aims to support the introduction of** circular design of fishing gear and aquaculture equipment, with the aim of encouraging preparation for re-use and facilitating material recycling of end-of-life gear.

prEN 17988-1	**Circular design of fishing gear and aquaculture equipment - Part 1: General requirements and guidance**
prEN 17988-2	Circular design of fishing gear and aquaculture equipment - Part 2: User manual and labelling
prEN 17988-3	Circular design of fishing gear and aquaculture equipment - Part 3: Technical requirements
prEN 17988-4	Circular design of fishing gear and aquaculture equipment - Part 4: Environmental and circularity requirements and guidelines

prEN 17988-5	Circular design of fishing gear and aquaculture equipment - Part 5: Circular business model
prEN 17988-6	Circular design of fishing gear and aquaculture equipment - Part 6 - Requirements and guidance for digitalization of information on gear and components

Textiles and textile products

The standard series **ISO 4484 aims to address the impacts of fiber fragmentation, support the minimization of material loss during laundering and thus ensure extension of the lifetime of textile products.**

ISO 4484-1:2023	**Textiles and textile products — Microplastics from textile sources — Part 1: Determination of material loss from fabrics during washing**
ISO 4484-2:2023	Textiles and textile products — Microplastics from textile sources — Part 2: Qualitative and quantitative analysis of microplastics
ISO 4484-3:2023	Textiles and textile products — Microplastics from textile sources — Part 3: Measurement of collected material mass released from textile end products by domestic washing method

Plastics polymers and plastic packaging

European standard(s) requested as regards plastics recycling and recycled plastics in support of the European Strategy for Plastics in a Circular **Economy aim to ensure quality grades for sorted plastics wastes and quality assessment of plastic recyclates for use in products, as well as design-for-recycling and recyclability assessment of plastic packaging.**

European standardisation deliverable(s) on plastic wastes and recylcates	**Quality grades for sorted plastics wastes: HDPE, LDPE, PP, PET, PVC, PS, EPS**
	Characterisation of Acrylonitrite butadienestyrene (ABS) recyclates
	Quality assessment of plastic recyclates for use in products: rHDPE, rLDPE, rPP, rPET,rPVC, rPS, rEPS , rABS
European standardisation	Process and criteria to evaluate the recyclability of plastic packaging

deliverable(s) on plastic packaging	
	Definitions and principles for design-for recycling of plastic packaging
	Design-for-recycling guidelines for plastic packaging products: polyolefins flexibles; polystyrene (PS) cups, trays and dairy packaging; polyolefins rigids; polyethylene terephthalate (PET) beverage bottles; PET trays expanded polystyrene (EPS) packaging

Annex 2: Participants in stakeholder dialogues and reference group

IKEA

SVID Stiftelsen Svensk Industridesign

Chalmers Industriteknik

Lindex

Svensk handel

Blekinge Tekniska högskola

Karlstad Universitet

Bona

Högskolan I Borås

RISE

Cloetta

IVL

Hav och vattenmyndigheten

Keep Sweden Tidy

Swedish Institute for Standards

WK Konsult / Eventsee