Appendix C:
Detailed summary of questionnaire responses

Introduction

1. The Co-Chairs of Expert Group 2 addressed an online questionnaire to the nominated experts, inviting them to provide input on criteria and non criteria based approaches to plastic products, chemicals of concern in plastic products, and plastic product design, focusing on reusability and recyclability, considering their uses and applications. A total of 54 responses were received from nominated experts, by the extended deadline of 29 July 2024.

2. This document contains a detailed summary of the questionnaire responses from the nominated experts. In the preparation of this document, expert responses have in some cases been edited for brevity, with care to maintain the original meaning. A compilation of responses containing the full text of all responses is available at the webpage for the intersessional work.[1]

3. All references in this document are references provided by experts in their questionnaire responses, and have not been formatted. Any rationales and qualitative descriptions of approaches provided in the tables are taken from the questionnaire responses, and should be read as expert opinions, and not necessarily as statements of fact.

4. The document is structured according to the three main sections of the questionnaire: Part B relates to plastic products, Part C to chemicals of concern in plastic products and Part D to the design of plastic products, focusing on reusability and recyclability. Part A addresses cross-cutting considerations identified across the responses to the three sections of the questionnaire.

Part A. General considerations

5. Across all three areas (plastic products, chemicals of concern in plastic products, and plastic product design), a large majority of respondents support an evidence- and science-based approach.

6. Some experts suggested that a criteria based approach is recommended as the preferred path forward; others favoured non criteria based approaches; while a number of experts stated that integrating both criteria based and non criteria based approaches within the instrument would be the most effective approach.

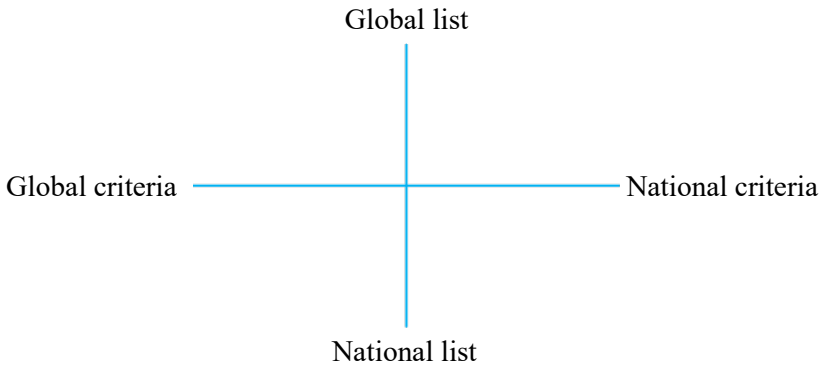
7. Some respondents emphasised that criteria based approaches could be developed at the global level (with some overarching approaches and some for specific uses and applications) to provide confidence to industry to make long-term investments into more circular manufacturing and recycling systems. Other experts stressed that in identifying approaches for plastic products, chemicals of concern in plastic products and product design it is necessary to maintain flexibility and take into consideration national circumstances and capabilities, stressing that approaches should not be imposed globally but included in national plans, which could then result in global or national approaches (**Figure 1**). Similarly, there were various views on the extent to which criteria and non criteria based approaches should be mandatory or voluntary. Experts also proposed standards and targets at different levels, ranging from national to global.

8. Several experts noted that any provision included in the instrument should adhere to WTO principles to avoid unjustified restrictions on international trade, emphasizing that global harmonized rules can help bring clarity and transparency, also recognizing the globalized nature of the plastic value chain.

Figure 1. Conceptual representation of different possible levels of intervention and obligation relating to criteria and listings for plastic products, chemicals of concern in plastic products, and product design.

[1] See https://www.unep.org/inc-plastic-pollution/ioeeg.

9. A number of experts emphasized the importance of a shared understanding of terms and concepts, and some proposed specific definitions of key terms. These are presented in **Box 1**.



Box 1. Possible working definitions of key terms identified by experts

Working definitions suggested by experts for Part B and C:

Non criteria based approach to the classification/identification of plastic products and chemicals of concern: one that does not requiring explicit criteria in the treaty text indicating how the listed chemicals of concern in plastic products were identified for control measures in the treaty.

Working definitions suggested by experts for Part D:

Criteria based approaches focus on specific measurable outcomes. For instance criteria based approaches focus on specific design and operational principles that directly impact recyclability and recycled product quality. These are grounded in practical considerations such as material compatibility, sorting efficiency, and regulatory compliance.

Non criteria based approaches emphasize broader concepts and systemic changes, including education, policy advocacy, technological innovation and cultural shifts which can collectively enhance the sustainability of plastic product design and recycling efforts.

Reuse refers to the process of using a plastic product again for a purpose identical to its original purpose,

Repurposing refers to using a plastic product for a different purpose from its original one.

PART B. Plastic products

Part B. 4. What criteria, types of criteria or non criteria based approaches could be reflected in the ILBI for the identification/ classification of plastic products?

10. Experts proposed criteria and non criteria based approaches with reference to problematic and avoidable plastics. One expert proposed alternative language such as "plastic products of concern", and some expressed concern that terms such as 'problematic', 'unnecessary' and 'avoidable' were unclear and subjective. A number of experts identified criteria and non criteria approaches relating to the identification/classification of plastic products without specifying what the criteria or non criteria based approaches would ultimately identify.

4.a. Criteria or types of criteria based approaches

11. A number of criteria based approaches were identified by experts through their responses. **Table 1** summarizes these responses.

Table A.1. Criteria based approaches to the classification and/or identification of plastic products and potential criteria identified in questionnaire responses

Approaches	Groups of criteria	Specific criteria identified
Problematic plastic products / plastic products of concern defined by criteria	Adverse impacts on human health or environment	- Adverse environmental impact / the product is harmful or poses a risk/threat to the environment, including the marine environment, living organisms or biological diversity (fragmentation into microplastics, animal entanglement, high likelihood for being littered or ending up in the environment through direct or indirect application, ecotoxicity, emissions of harmful by-products, likelihood to be ingested) - Adverse impact/the product is harmful or poses a risk/threat to human health - Potential risk or hazard on human health and environment linked to the intrinsic properties by presence of chemicals of concern, as well as its use or substances or hazardous emissions and releases on stages of life cycle - Manufacturing requires chemicals that pose a hazard to human health, animal health or the environment, including the marine environment. - The product lacks data to determine safety to the environment and human health across the full life cycle - Prevalence in the environment / Their existence in the open and public area (sea, coasts, streams, parks and city streets), based on local or regional analysis - Has likelihood to break down rapidly into micro and/or nano plastics
	Durability/utility	- Unnecessary single-use and short-lived plastic products - Low utility
	Circularity	- Disruption of circularity (not reusable, remanufacturable, or recyclable in practice and at scale, hinders the recyclability or reusability of other items) - The product is not reusable, recyclable, renewable, or compostable in practice, or there is potential to redesign its life cycle in a more circular manner. - Products cannot be reused or recyclable due to scientifically proven damage to health or the environment, and block or affect the ability to recycle other products or the capacity and quality of the final product of the recycling process
	Material composition	- The product is falsely promoted to be biodegradable - The product is made of/contains microplastics that were generated and/or added during production - The product is made of EPS, PS, PVC, PVDC, PETG, oxo-degradable products - Presence of additives such as plasticizers, stabilizers, and flame retardants, which can affect the recyclability and toxicity of plastics

Approaches	Groups of criteria	Specific criteria identified
	End-of-Life Pathways	- Classifying plastics based on their end-of-life management options (e.g., recyclable, compostable, landfill, incineration). - Availability of Adequate national collection and recycling infrastructure
Avoidable plastic products defined by criteria	Essentiality	- The product's use is not essential. - The product or its components are not essential considering the product's functionality and performance. - It is necessary for the health, safety or functioning of society; - Excessive Packaging / excessive headspace
	Available design alternatives	- Options for improved resource efficiency exist or can be developed, including extending the longevity of the product. - The product or its components can be improved by increasing durability, reusability, refillability, refurbishability, remanufacturability, recyclability, and compostability without significantly degrading functionality
	Available alternatives	- Whether alternate practices or designs (e.g. reuse system, refill system, remanufacture, alternative materials or service) are available for a product. - Carbon footprint of alternatives - A single-use plastic for which there is availability, accessibility and affordability to alternatives; it is feasible and possible to change the consumption pattern of the product in society, there is availability of practices and technologies to increase reuse, recycling and remanufacturing. - The product or its components can be replaced with other products or alternative materials that provide the same functionality and performance - The product can be replaced with a product with a reduced potential for reaching the open public space. - There are no available technically and economically feasible alternatives or substitutes that are acceptable from the standpoint of the environment and human health.
Decision tree approach	- Essentiality - Societal value, e.g., enabling energy transition or climate goals. - Availability of better alternatives, alternative practices and designs, and the availability of	

Approaches	Groups of criteria	Specific criteria identified
	non-plastic substitutes.	
Decision hierarchy approach	- Hazards - Emission generation - Impediments to circularity - Transparency	
Criteria to identify the level of action required		- Management action options are insufficient to protect the global environment. - Provided the importing or producing country implements appropriate management action, the risks can be managed down to acceptable levels.

12. Several respondents differentiated between problematic and avoidable plastic products. Some suggested an initial list of problematic products, with a supplementary list of avoidable plastic products, based on two sets of criteria.[2] The intention would be that products that are problematic *and* avoidable could be subject to regulation, restriction or reduction measures, whereas products that are problematic *but not* avoidable could be subject to redesign to address and limit properties considered problematic. Products that do not fall under either category would not be subject to measures under the provision. Some experts proposed merging the criteria for problematic and avoidable products to a single category to identify/classify products.

13. An alternative approach raised in some responses is a decision-tree approach. Respondents emphasised that such an approach should cover the whole life cycle of plastics. It could consist of a ranked flow of questions based on the waste hierarchy (i.e. prevention, resource efficiency, reuse, recycling, recovery, including energy recovery, landfill, and controlled disposal)[3].

14. Experts generally noted that any criteria based approaches would need to avoid driving regrettable substitution or use of alternatives with worse performance in terms of impacts on human health and the environment. One expert emphasised that any criteria based approaches should apply equally to plastics, plastic alternatives and non-plastic substitutes.

15. The questionnaire responses centred largely around potential criteria to identify products for regulation, reduction or elimination. Several dimensions were identified in the responses as relevant for the selection of criteria and the development of any potential control measures. These include:

Criteria design

a. Inclusion or exclusion criteria
b. Cumulative or non-cumulative criteria (i.e., meeting one or all identified criteria to qualify for inclusion or exclusion)
c. The number and complexity of criteria
d. Quantitative or qualitative assessments

Process and level of intervention

e. Voluntary or mandatory measures
f. Global or national level
g. Stepwise approach to listings (candidate list – final list) or one-step approach (final list)

[2] Proposal ("CRP") by the United Kingdom and Thailand, on problematic and avoidable plastic products
[3] https://plasticseurope.org/wp-content/uploads/2024/04/2110353_DecisionTreeInfographics_041524.pdf

h. Fixed criteria or scope to update criteria with new knowledge and information
i. Role of subsidiary bodies / process for listings.

Instrument design

j. Placement: Criteria in main text of instrument or in annexes
k. Timing: Decision on criteria in initial text or at a later meeting of the governing body

16. As mentioned above, some experts identified criteria for the identification/classification of plastic products, without specifying what the criteria would result in or their intended use. These are listed in **Table A.2** below, without prejudice to whether the respondents intended for the criteria to be used to form lists or be used as part of other criteria based approaches. Some also identified potential indicators for criteria. These are available in the online compilation of responses.

Table A.2. Criteria for the identification/classification of plastic products, identified in questionnaire responses

Broad category	Criteria identified
Chemical composition / material composition	- Based on primary polymer type (e.g., PE, PP, PET, PVC) - Plastics or Synthetic Plastics; Recycled Plastics; Bioplastics, encompassing bio-based and biodegradable plastics
Chemical structure	- Thermoplastics, thermosets, thermostable and elastomers - Structure [linear (or one-dimensional) and three-dimensional polymers]
Physical properties	- Density, color, transparency, and size can aid in identification and classification of plastic products - Flexible plastics, rigid plastics, elastic plastics - The modification of the molecular mechanical properties of polymers - The cohesion of the polymers - Temperature - Their processing conditions
Environmental impact[4]	- Whether the product is commonly littered (according to litter data) - Whether the product has a high likelihood of being littered or ending up in the natural environment (especially marine environment) - Carbon footprint - Emissions criteria – focused on the release of plastic products into the environment, taking into account micro plastics, nano plastics, hazardous plastic chemicals / potential of a plastic product to be released into the environment as well as to generate micro- and nanoplastics and release hazardous plastic chemicals throughout the full life cycle. - Whether the plastic products contain or could rapidly break down into microplastics / microplastic release potential - Propensity to be ingested by animals and microorganisms - Propensity to create entanglement - Ecotoxicity - Environmental Impact Assessment
Usage duration / durability	- Single-use, short-term use, durable goods - Long lasting/multi use versus single use[5] - Whether the product is single-use, considering the setting in which it is used

[4] ECHA, Chapter R.7a Endpoint specific guidance, no. 4. 2017; M. Mudersbach et al., "Life Cycle Assessment in a Nutshell—Best Practices and Status Quo for the Plastic Sector," Macromol. Rapid Commun., Nov. 2023, doi: 10.1002/marc.202300466.
[5] United Nations Environment Programme, Single-use Plastic: A Roadmap for Sustainability. UNEP. 2018

Broad category	Criteria identified
	- Whether there is a system in place to reuse the product, how the product is marketed and dishwasher/reusability standards. - Product life span[6]
Material efficiency	- Excessive uses of plastics - Reliance on plastics from primary sources
Recyclability	- Widely recyclable, limited recyclability, not recyclable - Easily recyclable vs complex materials - Whether the product is made from hard to recycle plastic types, for example PVC, polystyrene and multi-layer composite materials. - Whether the product is recyclable (in local/national settings/existing systems). - Contains recyclable additives - It hinders or disrupts the recyclability or compostability of other items. - Classify based on the recyclability of the plastic product, including existing recycling processes and infrastructure. The recyclability rank of plastic products and the recycling capability rank of country should be developed. This approach is necessary to develop a fair instrument for countries with different recycling capabilities.
Biodegradability	- Non-biodegradable, industrial biodegradable, home compostable, marine biodegradable - Classify plastics based on their biodegradability or compostability under specific conditions[7]
Hazard-based / hazard properties / Risk management[8]	- Non-hazardous, potentially hazardous, hazardous - Hazard criteria on chemicals of concern – ensuring a clear set of criteria addresses chemicals of concern, what needs to be banned, phased out and phased down - Whether or not a product contains chemicals or polymers of concern - It contains, or its manufacturing requires, hazardous chemicals that pose a significant risk to human health or the environment (applying the precautionary principle). - Develop criteria for managing identified risks, including mitigation measures and safe disposal methods - It is known to cause physical and indirect harms (e.g., entanglement, damage to infrastructure).
Human health impact[9]	- Toxicity, persistence and bioaccumulation - Exposure risk - It should not enter the human food chain for both food and drinks. It has no health effects on humans in other ways, such as contact, inhalation, or others. - Carcinogenic, mutagenic or reprotoxic (CMRs category 1A or 1B) - Persistent, bioaccumulative and toxic (PBTs) - Very persistent and very bioaccumulative (vPvBs) - Persistent, mobile and toxic (PMTs) - Very persistent and very mobile (vPvMs) - Endocrine disrupting chemicals (EDCs) - Immunotoxicants - Neurotoxicants

[6] United Nations Environment Programme, Single-use Plastic: A Roadmap for Sustainability.UNEP. 2018
[7] U. Salahuddin, J. Sun, C. Zhu, M. Wu, B. Zhao, and P. Gao, "Plastic Recycling: A Review on Life Cycle, Methods, Misconceptions, and Techno-Economic Analysis," Adv. Sustain. Syst., vol. 7, no. 7, Jul. 2023, doi: 10.1002/adsu.202200471; G. Faraca and T. Astrup, "Plastic waste from recycling centres: Characterisation and evaluation of plastic recyclability," Waste Manag., vol. 95, pp. 388–398, Jul. 2019, doi: 10.1016/j.wasman.2019.06.038.
[8] ECHA, Chapter R.7a Endpoint specific guidance, no. 4. 2017; M. Mudersbach et al., "Life Cycle Assessment in a Nutshell—Best Practices and Status Quo for the Plastic Sector," Macromol. Rapid Commun., Nov. 2023, doi: 10.1002/marc.202300466.
[9] ECHA, Chapter R.7a Endpoint specific guidance, no. 4. 2017; M. Mudersbach et al., "Life Cycle Assessment in a Nutshell—Best Practices and Status Quo for the Plastic Sector," Macromol. Rapid Commun., Nov. 2023, doi: 10.1002/marc.202300466.

Broad category	Criteria identified
	- Respiratory sensitisers - Specific organ toxicity with chronic effects
Potential for redesign	- Ability to prevent, reduce or reuse the item. - It can be avoided (or replaced by a reuse model) while maintaining utility.
Availability of alternatives and alternative materials	- Life cycle assessment of alternatives (to understand impacts of alternative products and the need to avoid any regrettable substitutions). - Availability of alternative practices and designs, and the availability of non-plastic substitutes
Socioeconomic impacts[10]	- Socio-economic impact of bans (including any socio-economic impacts bans could have regionally). - Employment generation: Classify plastics based on their role in job creation, particularly in manufacturing, recycling, and waste management sectors. - Market value: Identify plastics that contribute significantly to the economy through their market value and demand. - Added value chain: Identity the added value chain created from plastic products to other industries
Local Industry Support[11]	- SMEs: Highlight plastics essential for small and medium enterprises, which are crucial for economic growth and employment in developing countries. - Local production vs. import (national/region level criteria): Differentiate between locally produced plastics and imported ones to encourage domestic production and reduce dependency on imports.
Sustainability criteria	- Sustainability criteria on plastic products – taking into account regenerative circularity, reusability, repairability, recyclability, and interlinkage with financial incentive mechanisms - Sustainability criteria to assess the ability of plastic products to be reused, repaired, and recycled, especially single-use items. To keep materials in economic circulation for as long as possible and promote efficient waste management. - Compatibility of a plastic product with regenerative and restorative circularity. Lack of reusability, repairability and recyclability, in particular single-use products.
End of use management	- Whether the plastic products have properties that may hinder their safe and environmentally sound management - It is not reusable, recyclable or compostable in practice and at scale (as per the Global Commitment definitions). - Suitability and availability of technology for end of life solutions such as alternate use, use in bitumen road, use in cement-kiln, energy recovery etc - Collectability - Applications which are identified by the country to be contributing to its waste issue, difficult to be managed, and containing chemicals of concern based on risk assessment.
Lifecycle assessment	- LCA assessment for the classification of plastics based on their sustainability and environmental footprint.
By application / Product functionality	- According to sector of use, e.g., packaging, building/construction, automotive/transportation, consumer goods and products, textiles, tires, etc.

[10] Gambarin, A., 2024. *Mapping the plastics value chain: a framework to understand the socio-economic impacts of a production cap*. Oxford Economics, April.
[11] Gambarin, A., 2024. *Mapping the plastics value chain: a framework to understand the socio-economic impacts of a production cap*. Oxford Economics, April; Cordier, M., Uehara, T., Jorgensen, B., and Baztan, J., 2024. Reducing plastic production: Economic loss or environmental gain? *Cambridge Prism: Plastics*, 2, p. e2. Available at: http://doi.org/10.1017/plc.2024.3.

Broad category	Criteria identified
Utility	- Hygiene - Product safety - Essentiality - Social impact - Economic Impact
Regulatory compliance	- Classifying plastics according to compliance with existing regulations and standards (e.g., food safety regulations for packaging).
Microplastic content	- Criteria for identifying products that contain microplastics. This could be regulated through microscopic and spectroscopic techniques of raw materials used and finished plastic products
Impacts on specific groups/populations	- Whether the plastic products are particularly prevalent among and/or harmful to Indigenous Peoples, local communities, and their traditional terrestrial and maritime territories.

17. A number of respondents also highlighted existing criteria or sets of criteria proposed or currently utilised:

Existing international instruments and approaches referred to**:**

- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal
- Global Framework on Chemicals – For a Planet Free of Harm from Chemicals and Waste (GFC)
- Inter-Organization Programme for the Sound Management of Chemicals (IOMC)
- International Conference on Chemicals Management (ICCM)
- Minamata Convention, as Annex A, Part 1, identifies a list of products that Parties agree should not be allowed to be produced, imported, or exported after a certain date and Annex 2, Part 2, provides a list of measures that can be taken by a Party to address a product for which production, import, and export is allowed to be continued.
- Montreal Protocol on on Substances That Deplete the Ozone Layer
    - The essential use criteria, as defined in the Montreal Protocol.
- Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade
- Stockholm Convention on Persistent Organic Pollutants
    - Article 3 which sets expectations for how national systems will regulate unlisted chemicals with the characteristics of POPs
    - Annex F [Information on socio-economic considerations] of the Stockholm Convention provides best practice in considering control measures, for instance, by extending consideration of alternatives to include socio-economic factors taking into account the capability and conditions of parties.
- Strategic Approach to International Chemicals Management (SAICM)

Other proposed approaches referred to include:

- The criteria based approach of the Ellen MacArthur Foundation's Global Commitment, adopted by many governments and businesses[12], incorporates health and environmental hazards; the inability of problematic plastic products to be reused, recycled, or composted in practice and at scale; hindrances or disruption posed by plastic products to recycling; products that can be "avoided" or replaced by a reuse model; and having a high likelihood of ending up in the natural environment.

[12] Business Coalition for a Global Plastics Treaty, 2023. *Identification of chemicals and polymers of concern as well as problematic and avoidable plastic products: Policy briefing to inform the INC discussions on a Global Plastics Treaty*. January 17.

- The criteria based approach proposed by the Nordic Council of Ministers[13] takes into consideration hazards (whether or not a product contains chemicals or polymers of concern), emission generation (including the generation of micro- and nano-plastic pollution), impediments to circularity, and lack of transparency, in addition to the availability of alternative practices and designs, and the availability of non-plastic substitutes. A simple decision hierarchy is also proposed, with the goals of reducing plastic production and sustainable and safe management of plastics. A life-cycle approach guided the selection of criteria, recognition of variations across countries, and the range of plastic products already banned or restricted by 141 countries, plus 33 countries that have banned or restricted one or more plastic polymers or monomers for particular applications.

- The Norwegian Research Council report[14] proposes a conceptual framework that combines hazards with sustainability and circularity criteria, including leachate toxicity, the release of micro- and nano-plastics, climate and resource use impacts, chemical and material complexity, the potential for reuse/repair/repurposing, etc., life span (durability and inertness), capacity for safe recycling, beneficial degradability in certain applications, waste generation, and emissions to nature.

- A criteria based conceptual approach to identify polymers of concern involves evaluating a spectrum of plastic impacts on health and the environment across their life cycle, while considering feasibility, costs, environmental, social, and economic implications of alternative materials.[15]

4.b. Non criteria based approaches

18. A number of respondents expressed uncertainty as to the meaning of "non criteria based approaches" and requested the proponents of the language in the decision from INC-4 to elaborate and provide examples of such approaches.

19. Some respondents did provide examples, though a number emphasized that especially the identification of lists not based on criteria was not desirable. The approaches identified are listed in **Table A.3** below. Furthermore, some respondents proposed various types of control measures (e.g., taxes and levies, extended producer responsibility, labelling). These are detailed in **Annex II** of this document. Some respondents proposed using a combination of approaches.

Table A.3. Non criteria based approaches identified in questionnaire responses

Approach	Description	Rationale
Lists created without the use of criteria	Lists based on the activities and initiatives already undertaken in the public and/or private sector to move away from certain plastic products, or nomination of products by Parties. An example could be the Rotterdam Convention mechanism for establishing global lists based on national regulatory action.	
Guidance	Guidance for countries to develop their own nationally determined criteria to assess whether products are "problematic and avoidable" within their national contexts	

[13] Raubenheimer, K. and Urho, N., 2024. *Global criteria to address problematic, unnecessary and avoidable plastic products*. Copenhagen: Nordic Council of Ministers. Available at: https://www.norden.org/en/publication/global-criteria-address-problematic-unnecessary-and-avoidable-plastic-products.
[14] Wagner, M., Monclús, L., Arp, H.P.H., et al., 2024. State of the science on plastic chemicals – identifying and addressing chemicals and polymers of concern. Available at: http://dx.doi.org/10.5281/zenodo.10701706.
[15] As described by Suh, S. et al., 2024. Conceptual framework for identifying polymers of concern. *Frontiers in Sustainability*, 5.

Approach	Description	Rationale
Decision hierarchy based on global lists[16]	A simple decision hierarchy that could be based on lists only (not criteria)	
Life cycle approach	Utilize life-cycle assessments to evaluate the environmental impact of each plastic product, considering substitutes and replacements.	Consider the entire lifecycle of plastic products, from production to disposal, to assess their environmental and health impacts. This enables each Party to determine which plastic products need further regulation.
Circular economy principles		
Evidence-based methods	Utilize data on the amount of waste generated or found in the environment to identify and classify problematic plastics.	
National Waste Management Context	Assess whether plastic products contribute to national waste management issues or require resources beyond their capacity	By focusing on national waste management context, the ILBI could ensure that measures are contextually appropriate, and nationally controlled
Impact assessment	Assessing the environmental and socio-economic impacts of plastic products to prioritize the management actions	Impact assessment guides decision-making by highlighting the most critical issues and areas for intervention.
Stakeholder Engagement	Involving stakeholders (e.g., industry, NGOs, local communities) in monitoring and reporting plastic pollution. Incorporating input from various stakeholders, including industry experts, environmental organizations, and policymakers, lead to a more holistic approach. This engagement ensures that the criteria reflect practical realities and challenges faced in the management of plastic products.	Collaborative efforts enhance data collection, awareness, and compliance with regulations, supporting effective implementation of policies. Involving various stakeholders such as manufacturers, consumers, and environmental organizations in the classification process. This participatory approach ensures diverse perspectives are considered, leading to more comprehensive classifications.
Risk and cost assessment approach	A risk assessment approach taking into account associated risks as well as cost of measures, national circumstances, capacities, abilities and regulatory frameworks and development priorities, consideration of restrictions on other applications, allowing flexibility in choice of approaches and prioritising of recycling and redesign over alternative materials, utilising	

[16] Raubenheimer, K. and Urho, N., 2024. *Global criteria to address problematic, unnecessary and avoidable plastic products*. Copenhagen: Nordic Council of Ministers. Available at: https://www.norden.org/en/publication/global-criteria-address-problematic-unnecessary-and-avoidable-plastic-products

Approach	Description	Rationale
	LCA analysis of switching to alternative materials	
Market Trends Analysis	Observing market dynamics and consumer behavior regarding plastic usage and disposal.	Helps identify emerging trends that could influence future classifications and regulatory needs
Innovation Tracking	Monitoring advancements in material science that lead to new types of biodegradable or alternative plastics.	Encourages adaptation of classification systems to incorporate innovative solutions that reduce reliance on traditional plastics
Socioeconomic Factors	Considering economic implications such as cost-effectiveness and accessibility when classifying plastic products	Ensures that classifications are practical for implementation across different regions with varying economic capabilities.
Cultural Contexts	Recognizing how cultural attitudes towards plastic usage influence classification systems.	Acknowledges that perceptions of sustainability vary globally; thus classifications should be adaptable to local contexts.

Part B. 5. Are there specific uses and applications for which specific criteria and non criteria based approaches for these plastic products are particularly applicable/relevant?

20. The respondents addressed a broad range of issues, with some nominated experts identifying priority uses and applications for which problematic and avoidable plastic products can be identified, whilst others highlighted uses and applications that may be subject to exemptions from the instrument as a whole, or from control measures at this stage.

21. Uses or applications for which experts identified that specific criteria or non criteria based approaches are particularly applicable/relevant are listed in **Table 4**. The final column highlights the key related considerations identified by nominated experts.

22. A number of experts also highlighted that some uses and applications of plastic products may be considered essential, such as in the medical field, in pharmaceutical, sanitary and hygienic products, transport, communications, emergency transportation, water and food security, and during emergencies and natural disasters. There was limited overlap in the expert responses between sectors identified as possible priority and sectors in which essential uses were identified. A number of experts cautioned against blanket exemptions.

23. Some experts also highlighted certain categories of products on the basis of aspects more closely aligned with attributes of products, rather than uses or applications (e.g., products that impede circularity, or products at high risk of littering or ending up in the environment). Such attributes are not addressed under this section, as they overlap with the criteria identified in **Table A.2**. Similarly, some experts indicated that intentionally added microplastics could require specific criteria or non criteria based approaches.[17] Single-use plastics, which are also referred to in **Table A.2**, describe a specific application/use of products, and are therefore included in **Table 4** below.

[17] Conference Room Paper on an Initial List of Problematic and Avoidable Plastic Products Considered for Elimination, submitted by Georgia, Peru, Rwanda, Switzerland and Thailand

Table B.1. Uses and applications for which experts identified that specific criteria or non criteria based approaches were particularly applicable or relevant

Uses or applications	Proposed criteria or types of criteria	Considerations/rationale
Food packaging and food contact plastics[18]	- Chemical composition - Biodegradability - Hazard-based classification - Additives are not dangerous - Recyclability - Food-grade safety, - Low toxicity, - High recyclability - Use patterns	Food preservation; Food safety; Environmental impacts; necessity; likelihood of human or environmental exposures to plastic chemicals. Must comply with food safety regulations (e.g., FDA, EFSA). Eco-labeling standards provide consumers with information about the environmental performance of products based on predefined criteria. These labels are especially relevant in consumer markets where sustainability is a key purchasing factor.
Packaging[19]	- Presence in the environment - Harm to the environment - Material composition (polystyrene and EPS, PVC, oxo-degradable[20]) - Recyclability[21] - Carbon footprint - Absence of hazardous chemicals - Excessive headspace[22] - Additives - Recycled content	Life Cycle Assessment (LCA) is particularly applicable in industries where understanding the full environmental footprint is crucial
Medical devices[23] and medical sector / healthcare sector[24]	- Chemical composition - Hazard-based classification - Lifecycle approach - Availability of alternatives - Availability of alternative designs for reuse - Sterility - Non-toxic - Durable under medical conditions - Compatibility, - Sterilization compatibility - Necessity - Use patterns	Medical waste; safety; necessity;

[18] European Food Safety Authority. (2016). Recent developments in the risk assessment of chemicals in food and their potential impact on the safety assessment of substances used in food contact materials; Regulatory guidelines from FDA; Food Packaging Forum. (2022). Food packaging materials; PlasticsEurope. (2020). Plastics in food packaging.
[19] European Plastics Converters (EuPC). (2020). Plastics packaging, American Chemistry Council. (2021). Plastics in packaging; UNEP (2024). Plastic Pollution Science. Microsoft Word - UNEP_PP_INC.4_INF_1_FINAL; OECD, 2022. Global Plastics Outlook. Paris.
[20] Attachment 2, Conference Room Paper on an Initial List of Problematic and Avoidable Plastic Products Considered for Elimination, submitted by Georgia, Peru, Rwanda, Switzerland and Thailand
[21] Raubenheimer, K. and Urho, N., 2024. *Global criteria to address problematic, unnecessary and avoidable plastic products*. Copenhagen: Nordic Council of Ministers.
[22] Raubenheimer, K. and Urho, N., 2024. *Global criteria to address problematic, unnecessary and avoidable plastic products*. Copenhagen: Nordic Council of Ministers; https://static.resourcetrade.earth/INC-4-informal-technical-dialogue-Final.pdf
[23] Gurram, R., et al. (2022). Plastic medical devices: Challenges and opportunities in the circular economy. Journal of Cleaner Production, 330, 129696; ISO standards (e.g., ISO 10993 for biological evaluation of medical devices).
[24] Open Letter from medical and public health professionals on the Plastics Treaty 4th Negotiation Meeting (INC-4), April 2024; https://resolutions.unep.org/incres/uploads/open_letter_inc4_hcwh.pdf; World Health Organization (WHO). (2016). Medical device regulations; Medical Plastics News. (2021). Plastics in healthcare.

Uses or applications	Proposed criteria or types of criteria	Considerations/rationale
Agricultural plastics[25]	- Biodegradability - Risk-based approach - Value chain mapping - Necessity - Environmental impact - Toxicity	Emissions to the environment; soil and water contamination risk; likelihood of human or environmental exposures to plastic chemicals; food security
Electronics[26]	- Recyclability - Hazard-based classification - Circular economy approach - Electrical insulating properties, - Flame retardancy - Durability - Recycled content - Material composition - Additives - Toxicity	Hazardous chemicals; Recyclability; Compliance with industry standards (e.g., UL, RoHS) is often required.
Automotive plastics[27]	- Recyclability - Lifecycle approach - Circular economy approach - Durability, - Heat resistance, - Crash safety standards - Mechanical strength - Thermal stability, - Resistance to chemicals - Recycled content - Material composition - Additives - Toxicity - Environmental impacts	Lifespan; material composition; Materials often need to meet industry-specific specifications (e.g., ISO, ASTM). Life Cycle Assessment (LCA) is particularly applicable in industries where understanding the full environmental footprint is crucial
Fishing gear[28]	- Risk-based approach - Value chain mapping - Biodegradability (for certain components) - Environmental impacts	Emissions to the environment
Textiles[29]	- Chemical composition (focus on microfibers) - Lifecycle approach - Circular economy approach - Microplastic emissions	Circularity; emissions to the environment
Single use items[30]	- Presence in the environment - Harm to the environment - Negative impacts on recycling of conventional plastics - Utility	

[25] Briassoulis, D., et al. (2019). Review, mapping and analysis of the agricultural plastic waste generation and consolidation in Europe. Waste Management & Research, 37(1), 30-51.
[26] Parajuly, K., et al. (2020). Future e-waste scenarios. StEP Initiative, UNU ViE-SCYCLE, and UNEP IETC.
[27] Plastics Europe. (2021). Plastics - the Facts 2021; Industry standards and specifications from automotive manufacturers (e.g., SAE standards).
[28] FAO. (2021). Abandoned, lost or otherwise discarded fishing gear.
[29] Sandin, G., & Peters, G. M. (2018). Environmental impact of textile reuse and recycling – A review. Journal of Cleaner Production, 184, 353-365
[30] UNEP (2024). Plastic Pollution Science. Microsoft Word - UNEP_PP_INC.4_INF_1_FINAL

Uses or applications	Proposed criteria or types of criteria	Considerations/rationale
	- Recyclability - Probability of ending up in the environment - Headspace - Use patterns	
Construction materials	- Toxicity - Additives - Material composition - Usage patterns - Environmental impacts - Recycled content - Excessive use of plastics - Recyclability	Must meet building codes and standards for strength, thermal insulation, and fire resistance (e.g., ASTM, ISO).
Food and beverage sector	- Largest proportion of plastic littered; - Contamination of recycling systems; - Hard to recycle - Single use - Chemicals of concern - Food-grade safety - Low toxicity - High recyclability	Market readiness, availability of alternatives; exemptions for health and disability requirements; extensions for industry to adapt; compliance with food safety regulations. Many regions have regulations governing plastic use (e.g., restrictions on single-use plastics). Criteria based approaches ensure compliance with these regulations by providing clear benchmarks that manufacturers must meet.
Toys and childcare products	- Additives	likelihood of human or environmental exposures to plastic chemicals
Personal care products[31]	- Non-toxic, - Safe for skin contact, - Recyclable - Microplastic emissions	
Retail industry[32]	- High recyclability, - Low environmental impact, - Durable for intended use - Reusability	Many regions have regulations governing plastic use (e.g., restrictions on single-use plastics). Criteria based approaches ensure compliance with these regulations by providing clear benchmarks that manufacturers must meet.
Hospitality industry[33]	- Biodegradable, - Non-toxic, - Durable for short-term use	
Consumer goods	- Excessive use of plastics - Recyclability	Life Cycle Assessment (LCA) is particularly applicable in industries where understanding the full environmental footprint is crucial
Household items		Eco-labeling Standards provide consumers with information about the environmental performance of products based on predefined

[31] Cosmetics Europe. (2020). Plastics in personal care; International Journal of Cosmetic Science. (2018). Sustainable packaging in cosmetics.
[32] National Retail Federation. (2021). Plastic packaging in retail; Retail Industry Leaders Association (RILA). (2020). Sustainability in retail.
[33] Hospitality Net. (2020). Sustainable practices in hospitality; National Restaurant Association. (2021). Plastic use in hospitality.

Uses or applications	Proposed criteria or types of criteria	Considerations/rationale
		criteria. Especially relevant in consumer markets where sustainability is a key purchasing factor.

Part B. 6. Are there any important interrelations to other draft provisions of the instrument?

24. **Table B.2** list the draft provisions identified in expert responses as having important interrelations with draft provision II.3.

25. As reflected in **Table B.2**, nominated experts identified most provisions of the draft instrument as having important interrelations with draft provision II.3. One expert expressed that the draft provision is linked to the entire text. Of particular emphasis amongst the expert responses were the interrelationships with draft provision II.5 on product design, composition and performance. Further, experts highlighted that provisions under Part III would be important to consider, to provide financing, capacity building and technology transfer to Parties to aid in the implementation of the provision.

Table B.2. Draft provisions of the draft instrument for which experts identified important interrelations with draft provision II.3

Part I	Part II	Part III	Part IV	Part V	Part VI	Possible annexes
I.1 on Preamble I.3 on Definitions I.4 on Principles I.5 on Scope	II.1 on Primary plastic polymers II.2 on Chemicals of concern II.4 on Exemptions available to a party upon request II.4bis on Dedicated programmes of work II.5 on Product design, composition and performance II.6 on Non-plastic substitutes II.7 on Extended Producer Responsibility II.8 on Emissions and Releases II.9 on Waste management	III.1 on Financing III.2 on Capacity building, technical assistance and technology transfer III.3 on Technology	IV.1 on National plans; IV.2 on Implementation compliance and cooperation IV.5 on International cooperation. IV.6 on Information exchange IV.7 on Awareness-raising, education and research IV.8 on Stakeholder engagement	V.2 on Subsidiary bodies	VI.2 on Amendments to the instrument VI.3 on Adoption and amendments of annexes	Annex A, B, C, E and [X]

	II.XX on Fishing gear[34] II.10 on Trade II.11 on Existing plastic pollution II.12 on Just transition II.13 on Transparency, tracking, monitoring and labelling.					

26. Additionally, some overarching issues were identified by respondents without reference to specific draft provisions.

Issues identified across draft provisions of the instrument

- Area-based management tools
- Availability, accessibility, affordability and environmental sustainability of alternatives
- Circular economy provisions
- Conservation measures
- Corporate disclosure and reporting of plastic-related metrics to enable tracking of progress and monitoring of implementation
- Different sources of microplastic pollution
- Environmental and human health considerations
- Environmental impact assessments
- Fiscal incentives
- Implementation timelines
- Means of implementation including cost of transition and setting up of dedicated financial mechanism for meeting compliance obligation by developing countries based upon CBDR.
- Monitoring and assessment
- Recyclability and usability
- Restrictions and phase-outs
- Safeguards in the instrument pertaining to traditional knowledge, knowledge of Indigenous Peoples, and local knowledge systems, including the free, prior, and informed consent and other internationally recognized rights of such holders.
- Special circumstances of SIDS and that the Agreement provides for adequate for SIDS to implement the future instrument.
- Stakeholder engagement
- Waste management and recycling targets.

PART C. Chemicals of concern in plastic products

Part C.7. What criteria, types of criteria or non criteria based approaches could be reflected in the ILBI for the identification/classification of chemicals of concern in plastic products?

7.a. Criteria or types of criteria

27. Most respondents proposed potential approaches and/or criteria for the identification/classification for chemicals of concern in plastic products. Some respondents further emphasised that any control measures under the future instrument should only apply to chemicals of concern in plastic products, and not impact the use of chemicals for other applications. One expert proposed that in relation to plastics, the scope of relevant chemicals

[34] The placement of the draft text on fishing gear is yet to be determined. It is listed here with the indication "XX" under Part II, as reflected in the compilation of draft text, without prejudice to any future decision by the committee with respect to its inclusion or placement in the instrument.

can be narrowed down to additives used in polymer production. Two respondents objected to the terminology 'chemicals of concern'.

28. Many experts emphasised the importance of avoiding duplication of existing efforts. Some experts highlighted existing instruments as examples for the development of criteria based approaches under the future instrument, whereas others referred to existing instruments as examples of existing instruments addressing chemicals of concern in plastic products. Particularly the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) and the Stockholm Convention (especially Annex D and Annex E) were cited as examples of classifying and communicating hazardous properties of chemicals, and of approaches to listings respectively. The variations of REACH (EU REACH, China REACH, UK REACH, K-REACH) regulations were also cited as examples of criteria based approached. Existing instruments referred to in the responses are listed below.

Existing multilateral instruments identified by experts in their responses:

- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel Convention)
- Global Framework on Chemicals – For a Planet Free of Harm from Chemicals and Waste (GFC)
- Globally Harmonized System of Classification and Labelling of Chemicals (GHS)
- Inter-Organization Programme for the Sound Management of Chemicals (IOMC)
- International Conference on Chemicals Management (ICCM)
- Minamata Convention on Mercury (Minamata Convention)
- Montreal Protocol on Substances That Deplete the Ozone Layer
- Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (Rotterdam Convention)
- Stockholm Convention on Persistent Organic Pollutants (Stockholm Convention)
- Strategic Approach to International Chemicals Management (SAICM)

29. Many experts emphasized the importance of avoiding regrettable substitutions of chemicals.

30. A number of experts also emphasized the importance of any approaches taking into account national circumstances and capabilities to ensure the effectiveness of any resulting measures.

31. Several experts elaborated on potential criteria based approaches, whereas others listed criteria for the identification and/or classification of chemicals of concern in plastic products. These are reflected in **Table C.1** and **Table C.2**. **Table C.1** provides an overview of the proposed criteria based approaches, with a description and rationale if provided by experts. **Table C.2** summarises the broad categories of criteria proposed, alongside specific criteria and their rationales if provided.

Table C.1. Criteria based approaches to the identification/classification of chemicals of concern in plastic products identified in questionnaire responses

Criteria based approaches	Description	Rationale
Lists for chemicals of concern	1. Hazard criteria – determine (i) toxicity OR (ii) persistence OR (iii) bioaccumulation OR (iv) mobility in combination with i and ii or ii and iii. 2. Circularity criteria 3. Transparency criteria for chemicals and products	

Criteria based approaches	Description	Rationale
Building on the UN GHS	The United Nations Globally Harmonised System of Classification and Labelling of Chemicals (GHS) could be used as a guide or starting point for specific criteria for classification of chemicals of concern to support requirements in the instrument. Experts identified various hazard-based screening criteria based on the GHS system. These are listed in the following table Hazard-based criteria could be used as screening criteria (similar to Annex D of the Stockholm Convention) with chemicals meeting the criteria being subject to further risk assessment and risk management evaluation.	The GHS is a framework for the classification of hazardous chemicals and is adopted by a large number of countries. It is a key element of the Global Framework on Chemicals (Target B6), it is required to be implemented by OECD members, and is increasingly being used under international chemicals programmes (Rotterdam Convention, FAO/WHO pesticides programmes, etc). It is also used to underpin the EU's Essential Use Concept.
Danger-based approach	Chemicals of concern could be identified and listed on (proven or potential) dangers to human health, animal health or environmental effects when they meet one or more criteria.	
Group-based approaches	An alternative to chemical-by-chemical evaluation is to group chemicals based on similarities of chemical structure related to hazard properties. The Norwegian Research Council's State of the Science on Plastic Chemicals presents fifteen such groupings of plastic chemicals of concern. The ILBI could adopt a grouping approach to identify and classify chemicals of concern, where chemicals with similar structures or properties are assessed and regulated as a group, rather than individually.	Evaluating chemicals for toxicity characteristics, such as carcinogenicity or specific target organ toxicity, requires significant technical and financial resources lacking in most developing countries. This approach brings added benefits of avoiding regrettable substitutions and promoting chemical simplification in innovative design. This can help address the large number of chemicals associated with plastics and streamline the identification and management process.
Hazard-based approaches[35]	Hazard-based criteria could be used as screening criteria (similar to Annex D of the Stockholm Convention) with chemicals meeting the criteria being subject to further risk assessment and risk management evaluation Hazard-based identification could be carried out using existing hazard classes, such as the EU CLP hazard classes, as a starting point.[36]	The hazard-based approach offers an efficient and pragmatic way to address chemicals of concern consistent with the precautionary principle. Given the uncertainty, lack of exposure data and dose-response relationships, the large amount of time needed, and costs associated with the risk assessment of a single chemical, the hazard-based approach is better and more feasible.

[35] UN Globally Harmonized System of Classification and Labelling of Chemicals (GHS)
[36] CRP submitted by Norway on behalf of Norway, Cook Islands, Rwanda during INC-4 (chemicals_of_concern_in_plastics_proposal_by_cook_islands_rwanda_and_norway.pdf (unep.org)

Criteria based approaches	Description	Rationale
	The ILBI could establish criteria to identify chemicals of concern based on their hazardous properties, such as carcinogenicity, mutagenicity, reproductive toxicity, and persistence in the environment. This could involve developing a separate set of criteria to determine elements of concern.	
	A hazard is the potential to cause harm, and in the case of plastic materials, products and chemicals, this includes both toxicity of the chemicals and micro- and nanoplastics, as well as physical harms such as entanglement, injury, and damage to infrastructure from larger plastic items.	
Risk-based approaches	The building of the "lists" of chemicals through a multi-step process that occurs after chemicals have undergone a robust nomination process and a global risk assessment that looks at all uses, including considerations of alternatives.	Comprehensive approach to chemicals management.
	Evaluation of the likelihood of adverse effects occurring due to exposure to a chemical, combining hazard and exposure data.	Risk assessment allows for continued safe use of chemistries in certain applications to drive innovation, especially in sustainability, while protecting health and the environment.
	Evaluating chemicals for their potential risks based on toxicity, exposure pathways, and environmental persistence.	Criteria based risk assessments guide decisions on the safe use and management of chemicals in plastics, supporting risk management strategies and regulatory decision-making.
	Criteria to identify chemicals and groups of chemicals in plastic and plastic articles, and problematic and avoidable plastic articles that pose the highest risk of: - harm to human health; and/or - harm to the environment; and/or - being unmanageable or hindering circularity at the end of life. Coupled with criteria to determine the level of action required. In particular, whether the risks and mitigation options are such that: - management action options are insufficient to protect the global environment - provided the importing or producing country implements appropriate management action, the risks can be managed down to acceptable levels.	Any resulting management obligations under the ILBI should be consistent with a risk-based approach grounded in sound scientific evidence, and consistent with existing approaches under chemicals-focused multilateral environmental agreements (MEAs).
	The maximum allowable concentration of chemicals in plastic product could be determined by research and scientific panels	Without this, it is difficult to verify the authenticity of the reports and to make proper decisions on chemicals.

Criteria based approaches	Description	Rationale
	based on strong science and risk-based evidences and assessments with due attention to technological and socio-economic needs of each country.	
BRS Convention Alignment	National plans should integrate BRS criteria into their regulatory frameworks, ensuring that identification and classification efforts are harmonized with international guidelines.	The ILBI could mandate that national plans adhere to the established criteria of the BRS Conventions for classifying hazardous waste, chemicals, and persistent organic pollutants (POPs). This ensures that national efforts are consistent with international standards and leverage existing scientific assessments.
Risk Assessment Frameworks	Risk assessment frameworks integrate both hazard and exposure information to evaluate overall risk levels associated with specific chemicals. This includes: Quantitative Risk Assessment: Utilizing mathematical models to estimate risk based on dose-response relationships. Qualitative Risk Assessment: Employing expert judgment to categorize risks when quantitative data is lacking.	
Chemicals of concern identified based on a separate set of criteria developed under the plastics instrument[37]	The product contains chemicals or polymers that are known to be hazardous, such as carcinogens, mutagens, reproductive toxicants, persistent, bioaccumulate and toxic substances (PBTs), or very persistent and very bioaccumulate substances (vPvBs)	These criteria are based on the inherent properties of chemicals that pose risks to human health and the environment. They are widely recognized in regulatory frameworks such as those of the Stockholm Convention on Persistent Organic Pollutants (POPs) and the Rotterdam Convention on Prior Informed Consent.
Three lists	1. Substances that may pose a health hazard 2. Substances that harm the reliability of the recycling 3. Materials that have been tested and proven to be harmless - to advance positive momentum for the examination of the materials (the groups can be divided according to level of damage - safe to reasonable).	
Negative lists	Global negative list based on criteria: this could also draw on existing regulatory lists of chemicals of concern.	
Sector-specific positive lists	This could comprise polymers deemed easiest to safely use, reuse, repair, refurbish, recycle and dispose of in order to facilitate recyclability and circularity.	

[37] Raubenheimer, K. and Urho, N., 2024. *Global criteria to address problematic, unnecessary and avoidable plastic products*. Copenhagen: Nordic Council of Ministers.

Criteria based approaches	Description	Rationale

Table C.2. Types of criteria and specific criteria for the classification/identification of chemicals of concern in plastic products identified in questionnaire responses

Types of criteria	Specific criteria	Rationale
Risk-based criteria[38]	Toxicity	Risk-based criteria take into account not only the inherent hazards of chemicals but also the likelihood and extent of exposure, thereby focusing regulatory efforts on chemicals that pose the greatest risk.
	Exposure level (in specific exposure scenarios)	Chemicals that are likely to be present in plastic products and to which humans or ecosystems may be exposed. Products with high potential for human exposure, such as toys and food contact plastics, should be prioritized due to the risk of chemicals migrating into the human body.
	Likelihood of Release	Chemicals that are likely to be released from plastic products during their lifecycle, leading to potential exposure. Products that release chemicals of concern during their intended use or disposal, leading to environmental exposure, should also be prioritized.
Hazard-based criteria[39]	Carcinogenicity Mutagenicity Reproductive/developmental toxicity Respiratory sensitisation Mobility in the environment (air, water, biota, etc.)/migration Respiratory and skin sensitizer Hazardous to the aquatic environment Equivalent Level of Concern to CMR, PBT,vPvB (or any wording referring to the same concept)	These criteria focus on inherent properties of chemicals that pose risks to human health and the environment.
	Persistent, Bioaccumulative and Toxic (PBT)	Phasing out PBTs reduces the long-term ecological and health impacts of these chemicals, promoting a healthier environment. Reduces environmental contamination and protects ecosystems.

[38] Raubenheimer, K. and Urho, N., 2024. *Global criteria to address problematic, unnecessary and avoidable plastic products*. Copenhagen: Nordic Council of Ministers.
[39] UN Globally Harmonized System of Classification and Labelling of Chemicals (GHS); https://unece.org/DAM/trans/danger/publi/ghs/ghs_rev04/Spanish/ST-SG-AC10-30-Rev4sp.pdf; https://www.genevaenvironmentnetwork.org/events/road-to-busan-potential-approaches-to-plastic-products-and-chemicals-of-concern-in-the-plastics-treaty/; Raubenheimer, K. and Urho, N., 2024. *Global criteria to address problematic, unnecessary and avoidable plastic products*. Copenhagen: Nordic Council of Ministers.

Types of criteria	Specific criteria	Rationale
	Very persistent and very accumulative (vPvB)	Restricting vPvBs mitigates severe, long-term environmental and health risks, ensuring a safer and more sustainable use of plastics.
	Specific target organ toxicity	Reducing the concentration of STOT RE chemicals in plastics prevents chronic health issues, ensuring safer consumer products. Prevents long-term health effects such as liver or kidney damage.
	Carcinogenic, mutagenic, or toxic for reproduction (CMR)	Limiting CMRs in plastics reduces the incidence of cancer, genetic mutations, and reproductive health issues, ensuring safer consumer products. Protects human health by reducing exposure to highly hazardous substances.
	Toxicity	Chemicals that pose significant risks to human health or the environment based on toxicity data, such as carcinogens, mutagens, reproductive toxins (CMRs), endocrine disruptors, and persistent, bioaccumulative, and toxic substances (PBTs); Chemicals that exhibit acute or chronic toxicity to humans, animals, or the environment.
	Persistence in the environment Bioaccumulation potential	Chemicals that persist in the environment and accumulate in living organisms; Chemicals that are resistant to degradation and persist in the environment for long periods; Chemicals that accumulate in the tissues of organisms and biomagnified through food chains Persistent chemicals remain in the environment for extended periods, posing ongoing risks to health and biodiversity Bioaccumulation can lead to higher concentrations of toxic chemicals in predators, including humans, leading to serious health risks.
	Endocrine disruption	Limiting EDCs in plastics safeguards hormonal health and prevents ecological disruptions caused by these chemicals in wildlife; For decades, the body of evidence has been mounting on the impacts of plastics, endocrine disruption, and health.[40]
	Terrestrial and aquatic toxicities	Consideration should also be given to the inclusion of terrestrial and aquatic toxicities in determining chemicals of concern, given the impacts of plastic chemicals on aquatic and terrestrial ecosystems. [41]
Exposure-based criteria[42]	Likelihood of leaching from plastics Presence, use, or release from specific polymer types	Considers the likelihood of chemicals coming into contact with humans or the environment.

[40] J. Flaws et al., Plastics, EDCs & Health: A Guide for Public Interest Organizations and Policy-Makers on Endocrine Disrupting Chemicals & Plastics, Endocrine Society and IPEN, December 2020; Commission Delegated Regulation (EU) 2023/707 amending Regulation (EC) No 1272/2008 (Ref: Official Journal of the European Union L 93, 31.3.2023, p. 7-39)
[41] I.E. Napper and R.C. Thompson, Plastics and the Environment, Annual Review of Environment and Resources 48:55-79, 2023; and J. Beaman and C. Bergeron, A Summary of Literature on the Chemical Toxicity of Plastic Pollution to Aquatic Life and Aquatic-Dependent Wildlife: State of the Science White Paper, EPA-822-R-16-009, United States Environmental Protection Agency, December 2016
[42] OECD. (2019). Guiding Principles and Key Elements for Establishing a Weight of Evidence for Chemical Assessment

Types of criteria	Specific criteria	Rationale
	Potential for environmental release Human exposure routes (e.g., dermal contact, ingestion) Exposure potential based on uses Usage patterns Release potential / mechanisms Total registered volumes Population vulnerability	
	Disproportionate degree of impacts of such chemicals of concern on Indigenous Peoples, local communities, and their traditional terrestrial and maritime territories.	
	Exposure Potential	Chemicals with high potential for human or environmental exposure, considering factors such as production volume, usage patterns, and environmental release.
Regulatory status/compliance criteria[43]	Chemicals already restricted or banned in certain jurisdictions	Leverages existing regulatory frameworks and assessments Regulatory compliance criteria ensure that chemicals used in plastic products meet established safety standards set by governing bodies.
	Chemicals on various "watch lists" or "substances of very high concern" lists	Inclusion on lists such as those maintained by agencies like ECHA (European Chemicals Agency) or EPA (Environmental Protection Agency), which identify substances of very high concern.
	Compliance with international agreements; Compliance with existing laws / regulations	Alignment with existing international treaties and regulations, such as the Stockholm Convention on Persistent Organic Pollutants (POPs) and the REACH regulation (Registration, Evaluation, Authorisation and Restriction of Chemicals) in the European Union.
	Adoption of national standards; Global standards	Incorporating standards and criteria from leading national regulations, such as those from the United States Environmental Protection Agency (EPA) or the European Chemicals Agency (ECHA).
Functional use criteria[44]	Plasticizers Flame retardants UV stabilizers Colorants	Focuses on chemicals with specific functions in plastics that may pose risks; Functional criteria consider the role of chemicals in plastic products and aim to identify safer alternatives or

[43] European Chemicals Agency (ECHA) Candidate List of Substances of Very High Concern
[44] Hahladakis, J. N., et al. (2018). An overview of chemical additives present in plastics: Migration, release, fate and environmental impact during their use, disposal and recycling. Journal of Hazardous Materials, 344, 179-199.

Types of criteria	Specific criteria	Rationale
		regulate the use of hazardous substances in specific applications.
	Performance requirements	Assess if the chemical is necessary for meeting product performance standards.
	Essential vs. non-essential uses	Determine whether the chemical's function, including additives and processing aids, is essential and if safer alternatives exist.
Concentration-based criteria[45]	Threshold levels for specific chemicals or chemical groups	Recognizes that risk often depends on concentration
Circularity criteria	The chemical hinders or disrupts the circularity of a plastic product or products (e.g., making the product(s) unable to be reused or recycled in practice and at scale) in ways that protect the environment and human health).	Contaminants in plastics can hinder recycling efforts and result in hazardous waste, impeding resource circulation Circularity criteria to ensure plastic chemicals do not hamper the reuse, repair, or recycling of plastic products, such as chlorinated chemicals (e.g. dioxins) which damage recycling infrastructure.
Transparency criteria for chemicals and products	Disclosure requirements: Mandate comprehensive disclosure of all monomers, additives and processing aids used in plastic products. Labelling standards: Develop labelling standards to inform consumers about the presence of chemicals of concern.	The ILBI could require increased transparency and traceability of chemicals used in plastic products, including the disclosure of chemical information and the establishment of inventories or registries. This would help identify and track chemicals of concern throughout the supply chain; Transparency criteria for chemicals to ensure adequate hazard information.
Safer Chemical Substitution Availability	Identification of safer alternatives	Promote the identification and use of safer chemicals as substitutes for harmful monomers, additives and processing aids.
	Substitution guidelines	Establish guidelines for evaluating and implementing safer chemical alternatives.
Hazardous to ozone layer / climate impacts	- Ozone depleting chemicals - Chemicals with clear global warming potential	

32. Amongst experts who addressed the process for identification of potential chemicals of concern, several expressed a preference for an approach based on an initial screening by specific criteria, followed by further risk assessments and risk management evaluations. The Stockholm Convention Annex D was identified by one expert as an example of such an approach. One expert proposed that chemicals of concern in plastic products be classified according to the GHS, as using an existing harmonised system (i.e. no new criteria/system should be created) will avoid multiple sets of rules and regulations for chemicals. One expert considered that criteria that would exclude many chemicals associated with plastics, such as long-range environmental transport, should not be used.

[45] EU Regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)

33. Experts provided differing perspectives on the merits of risk- and hazard-based approaches to the classification and identification of chemicals of concern in plastic products. Some expressed a preference for a risk-based approach which would entail the identification of acceptable exposure levels according to the likelihood and extent of exposure. Others preferred a hazard-based approach drawing on the precautionary principle, citing lack of information on dose-response relationships, mixture effects and exposure. and that some chemicals do not have acceptable levels of exposure. For both approaches, experts proposed various additional steps, such as risk assessment for specific uses and applications and consideration of socioeconomic impacts of any control measures.

31. In their responses, experts further identified several dimensions relevant to possible approaches to the identification/classification of chemicals of concern in plastic products:

a. Risk vs. hazard-based approaches
b. Cumulative or non-cumulative criteria
c. Positive vs negative lists
d. Quantitative or qualitative criteria
e. Differentiation between industrial and non-industrial uses
f. Availability of alternatives
g. Socioeconomic impacts

32. Experts further emphasised a number of additional considerations relating to the design of criteria and non criteria based approaches to chemicals of concern in plastic products:

a. Linkages to existing chemicals management frameworks
b. Need for shared understanding of terms
c. Level of obligation
d. National circumstances vs. global approaches
e. Role of any potential subsidiary bodies
f. Ensuring a transparent, balanced and inclusive processes

7.b. Non criteria based approaches

34. Some experts identified **non criteria based approaches** for the identification/classification of chemicals of concern in plastic products. A number of experts expressed the need for clarity on the definition and meaning of "non criteria based approaches".

Table C.3 – Non criteria based approaches to *the identification/classification of chemicals of concern in plastic products identified* in questionnaire responses

Non criteria based approach	Description	Rationale
Lifecycle analysis / lifecycle assessment approach[46]	Evaluates chemicals throughout the entire lifecycle of plastic products, from production to disposal. Evaluating environmental impacts throughout a product's lifecycle—from raw material extraction through production, use, and disposal—to identify harmful substances at any stage.	Provides a comprehensive view of potential impacts at different stages
Guidance	An Annex of the ILBI sets out the general elements that should be considered when making hazard assessment on chemicals of concern, based on international frameworks and classifications such as Global Framework on Chemicals (GFC) and GHS.	

[46] Potting, J., et al. (2018). Circular Economy: Measuring innovation in product chains. PBL Netherlands Environmental Assessment Agency.

Non criteria based approach	Description	Rationale
	Each Party should conduct assessment and take decisions, taking into consideration these elements and its national circumstances. Also, each Party should conduct risk assessments by developing a risk profile, taking into consideration the results of hazard assessments and information gathered through utilizing existing databases and others so that each Party will be able to identify appropriate risk management measures according to the level of the risks concerning the respective chemicals. Appropriate guidance and assistance tools could be made available by experts for Parties when making risk profile and evaluation on chemicals. On top of those, each Party should make decisions and take appropriate measures, according to its national circumstances and necessities including such as technical feasibility, availability and accessibility of alternative chemicals, and socio-economic impacts.	
Risk assessment approach	Some countries restrict the use of chemicals in products based on risk assessments, considering hazards, risks, volume of domestic distribution, alternatives, and applications (MOE KOR, Enforcement Decree of the Act on Registration and Evaluation of Chemical Substances).	
Alternative assessment approach[47]	Focuses on identifying safer alternatives to chemicals of concern rather than solely on hazard identification	Promotes substitution with safer alternatives; Evaluating the availability and feasibility of safer alternatives to chemicals of concern in plastic products; can help drive the development and adoption of less hazardous options. This approach incentivizes innovation and the substitution of hazardous chemicals with safer alternatives.
Comprehensive evaluation	Assessing the environmental and health impacts of chemicals throughout the lifecycle of plastic products, from production to disposal.	
Circular economy principles	Promoting the design of plastic products that minimize the use of hazardous chemicals and facilitate recycling and safe disposal.	
Green chemistry approach[48]	Emphasizes the design of chemical products and processes that reduce or eliminate the use and generation of hazardous substances.	Promotes prevention rather than end-of-pipe solutions

[47] https://www.genevaenvironmentnetwork.org/events/road-to-busan-potential-approaches-to-plastic-products-and-chemicals-of-concern-in-the-plastics-treaty/ https://pub.norden.org/temanord2024-508/3-potential-criteria-for-problematic-unnecessary-and-avoidable-plastic-products.html; National Research Council. (2014). A Framework to Guide Selection of Chemical Alternatives
[48] Anastas, P. T., & Warner, J. C. (1998). Green Chemistry: Theory and Practice. Oxford University Press.

Non criteria based approach	Description	Rationale
Life cycle considerations	Environmental Fate: Assessing the potential for chemicals to persist, bioaccumulate, and undergo long-range transport during the lifecycle of plastic products. Exposure Pathways: Evaluating pathways through which chemicals of concern may enter the environment or human bodies during the lifecycle of plastic products.	Non criteria based approaches consider the broader context of chemical use in plastic products, including environmental and human health impacts throughout their lifecycle, which can inform regulatory decisions beyond hazard-based assessments alone.
Listings based on existing lists and approaches at the global, regional and national levels.	Global lists of chemicals and groups of chemicals based on existing lists at the global, regional and national levels.	
	Automatically listing chemicals under the ILBI that are already regulated by other MEAs or a number of member states. Accordingly, the specific scope of existing MEAs (e.g., waste in the Basel Convention) could be extended to regulate these chemicals in plastics. Along the same line of reasoning, existing national or supra-national regulation of plastics chemicals could be extended to a global level. As for products, a mechanism would be needed to list new chemicals in the absence of criteria.	
	An initial list (Annex) could be developed based on the activities and initiatives already undertaken in the public and/or private sector to move away from certain chemicals of concern in plastic products. Building upon this list, the INC can identify the best combination of approaches to ensure the effectiveness and efficiency of the instrument. To this end, a mechanism must be defined in the instrument that enables the listing of chemicals of concern in plastic products.	There are also a number of chemicals of concern used in plastics which are already subject to restriction at the supranational or national level in a number of jurisdictions due to their toxicity and exposure potential. In addition, some private initiatives (directly by manufacturers or through ecolabels) have been developed to eliminate chemicals of concern in certain plastic products. Thus, building on what is already being done could be a good starting point. Examples are given in the CRP by NOR.
Guidelines for identification at national level	The ILBI could include a set of guidelines on how countries could classify or identify their respective lists of chemicals of concern in plastic products domestically. The guidelines could take a risk-based assessment to include not only hazards of the chemical, but also the exposure of humans and the environment to the chemical, based on its use and application in local contexts and risk management strategies in place.	

Non criteria based approach	Description	Rationale
Maximum permissible concentration levels	Ensuring that concentration of chemicals of concern in end-use plastic products does not exceed maximum permissible concentration levels. Under this approach, circulation of an end-use plastic product on the market would be restricted if chemical residue contained in this product exceeds the maximum allowable concentration level. Such level should be established quantitatively with respect to different applications based on a demonstrated risk of adverse effects on human health and the environment.	Many countries in the world already apply this approach. For instance, policy on restrictions of hazardous substances (RoHS) in certain applications (such as toys or electrical and electronic equipment) provides a ban, if concentrations of certain hazardous substances is above certain levels (e.g. 0.1 % w/w).; Resolution 5/14 indicates that future instrument should promote sustainable production and consumption of plastic products. This goal could be achieved by addressing residues of hazardous chemicals in end-use plastic products using quantitative measurements. Implementation of this approach would guarantee the safety of plastic products, on the one hand, and minimization of issues related to management of plastic waste, on the other hand.
	Under this approach, circulation of an end-use plastic product on the market would be restricted if chemical residue contained in this product exceeds the maximum allowable concentration level. Such level should be established quantitatively with respect to different applications based on a demonstrated risk of adverse effects on human health and the environment.	
National chemicals management systems	Parties should be encouraged to establish national chemicals management system (if they have yet to have one) and establish close collaboration with the industry to enhance transparency on additives usage in plastics. The International Council of Chemical Associations (ICCA) Plastic Additives Database (https://plasticscircularity.org/additives/) is a good starting point for Parties to access information related to additives in plastics and to utilise the database in the evaluation of additives in their respective country.	
Precautionary principle approach[49]	When evidence about a chemical's harm is not conclusive, err on the side of caution and treat it as potentially harmful.	Addresses uncertainty in scientific knowledge

[49] United Nations. (1992). Rio Declaration on Environment and Development.

Non criteria based approach	Description	Rationale
	Scientific Advisory Panels: Establishing panels of experts to review and assess the latest scientific evidence on chemicals in plastics.	
	In the absence of scientific consensus on the safety of a chemical, the precautionary principle can be applied to restrict or phase out its use in plastic products to protect human health and the environment.	This approach acknowledges the potential for harm and shifts the burden of proof to manufacturers to demonstrate the safety of a chemical before it can be used, rather than relying solely on pre-defined criteria. This could help address the potential for unknown or emerging chemicals of concern.
	Preventative Action: Taking action to prevent potential harm when scientific evidence about a chemical's risks is uncertain but indicates possible significant harm.	
Adaptive management approach[50]	Continuously monitor and reassess chemicals based on new scientific evidence and emerging concerns.	Allows for flexibility as new information becomes available.
Decision hierarchy based on global lists, instead of criteria		
Case-by-case Assessment	Evaluating chemicals individually based on the best available scientific data, considering both known and potential risks.	
Multistakeholder Involvement / Stakeholder and Expert Consultation / Stakeholder engagement.	Engaging a diverse range of stakeholders, including scientists, industry representatives, NGOs, and policymakers, to gather broad perspectives and expertise in identifying chemicals of concern; Incorporating stakeholder perspectives is crucial for comprehensive assessments: Public Health Advocacy Groups: Engaging with organizations focused on public health can provide insights into community concerns regarding specific chemicals. Industry Collaboration: Working with manufacturers to understand practical implications and feasibility for substituting harmful substances.	

Part C. 8. Are there specific uses and applications where criteria and non criteria based approaches for chemicals of concern in plastic products are particularly applicable/relevant?

35. Some respondents expressed that all uses and applications should be addressed, noting that if there is a need to prioritise, priority should be considered for uses and applications of plastic products that have a high likelihood in resulting in human or environmental exposures to chemicals of concern, or that are otherwise

[50] Linkov, I., et al. (2006). From comparative risk assessment to multi-criteria decision analysis and adaptive management: Recent developments and applications. Environment International, 32(8), 1072-1093.

considered sensitive. Some experts further stressed that only uses in plastic products should be addressed by the criteria and non criteria based approaches discussed. **Table C.4** below lists relevant uses and applications for which experts identified specific criteria. **Table C.5** contains identified non criteria based approaches relevant to specific uses and applications.

36. Others identified specific uses/applications that could be considered exempt from potential criteria or non criteria based approaches, such as the medical sector and military. Finally, some respondents argued that certain uses or applications might be subject to more stringent or specific criteria or non criteria based approaches. Others underscored that national regulations and international standards for certain applications and/or uses are already in place.

37. A number of experts identified existing approaches that could be either directly utilised or adapted. Some pointed to Annex E and F of the Stockholm Convention as examples of utilising risk assessments for specific uses and applications after identification of chemicals of concern using screening criteria. This approach includes a threshold for 'essential use', as well as exposure assessments and considerations of socioeconomic impacts, including assessments of alternatives, to inform possible control measures. Others pointed to REACH and the Basel Convention as relevant to consider.

38. Some experts identified specific groups of chemicals or chemicals used in specific applications that could be subject to restrictions under the instrument, or that have particular uses or applications. These can be found in the compilation of responses.

Table C.4. Uses and applications for which criteria based approaches were identified in the questionnaire responses as particularly relevant for chemicals of concern in plastic products

Uses or applications	Proposed criteria or types of criteria	Considerations / rationale
Food packaging / Food contact materials / Food and beverage packaging[51]	- Hazard-based criteria - Exposure-based criteria - Concentration-based criteria - Carcinogenic, mutagenic, or reprotoxic (CMRs Category 1A or 1B) - Endocrine disrupting chemicals - Toxicity, persistence, bioaccumulation - Environmental and human health impact	Food safety is paramount, requiring strict control over chemical migration into food. Food contact plastics are of particular concern due to high exposure to chemicals of concern Carcinogenic, mutagenic, or reprotoxic (CMR) chemicals pose severe health risks, including cancer, genetic mutations, and reproductive harm. These risks are particularly concerning in products that come into direct contact with food, children, or medical patients, where exposure can lead to serious health consequences. Endocrine disrupting chemicals (EDCs) interfere with hormonal systems, causing developmental, reproductive, neurological, and immune effects. Products that interact with food, personal care Chemicals that accumulate in the tissues of living organisms can cause harmful effects up the food chain. The overall impact of chemicals on ecosystems and human health, including potential for environmental release and exposure, is significant. Comprehensive evaluation of environmental and health impacts ensures safer use and disposal of plastic products, promoting sustainable resource management.

[51] European Food Safety Authority. (2016). Recent developments in the risk assessment of chemicals in food and their potential impact on the safety assessment of substances used in food contact materials.

Uses or applications	Proposed criteria or types of criteria	Considerations / rationale
Packaging	- Toxicity, persistence, bioaccumulation - Impact on recyclability - Environmental and human health impact	Chemicals that accumulate in the tissues of living organisms can cause harmful effects up the food chain. Chemicals that interfere with the recycling process of plastics make it difficult to recover and reuse materials safely. Ensuring that plastic products are free from problematic chemicals enhances the efficiency and safety of recycling processes, supporting a circular economy. The overall impact of chemicals on ecosystems and human health, including potential for environmental release and exposure, is significant. Comprehensive evaluation of environmental and health impacts ensures safer use and disposal of plastic products, promoting sustainable resource management.
Storage and transportation of potable water		
Children's toys and childcare articles[52]	- Hazard-based criteria (focus on reproductive toxicity and endocrine disruption) - Carcinogenic, mutagenic, or reprotoxic (CMRs Category 1A or 1B) - Regulatory status criteria - Precautionary principle approach - Toxicity, persistence, bioaccumulation - Environmental and human health impact	Children are particularly vulnerable to chemical exposures, necessitating stringent safety measures. Toys are of particular concern due to high exposure to chemicals of concern Carcinogenic, mutagenic, or reprotoxic (CMR) chemicals pose severe health risks, including cancer, genetic mutations, and reproductive harm. These risks are particularly concerning in products that come into direct contact with food, children, or medical patients, where exposure can lead to serious health consequences. Chemicals that accumulate in the tissues of living organisms can cause harmful effects up the food chain. The overall impact of chemicals on ecosystems and human health, including potential for environmental release and exposure, is significant. Comprehensive evaluation of environmental and health impacts ensures safer use and disposal of plastic products, promoting sustainable resource management.
Medical devices[53]	- Functional use criteria - Lifecycle assessment approach - Alternatives assessment approach	Balance between necessary functionality and minimizing patient exposure to harmful chemicals. Avoid regrettable substitution Availability of substitutes / alternatives

[52] Ionas, A. C., et al. (2014). Downsides of the recycling process: Harmful organic chemicals in children's toys. Environment International, 65, 54-62.
[53] Genay, S., et al. (2011). Experimental study on infusion devices containing polyvinyl chloride: To what extent are they di(2-ethylhexyl)phthalate-free? International Journal of Pharmaceutics, 412(1-2), 47-51

Uses or applications	Proposed criteria or types of criteria	Considerations / rationale
	- Carcinogenic, mutagenic, or reprotoxic (CMRs Category 1A or 1B) - Very persistent and pery bioaccumulative (vPvBs) - Environmental and human health impact	Carcinogenic, mutagenic, or reprotoxic (CMR) chemicals pose severe health risks, including cancer, genetic mutations, and reproductive harm. These risks are particularly concerning in products that come into direct contact with food, children, or medical patients, where exposure can lead to serious health consequences. vPvB chemicals present extreme longevity in the environment and high potential for accumulation in living organisms, posing long-term risks to both human health and wildlife. Products designed for long-term use, such as medical devices and construction materials, can introduce significant amounts of vPvB substances into the environment. The overall impact of chemicals on ecosystems and human health, including potential for environmental release and exposure, is significant. Comprehensive evaluation of environmental and health impacts ensures safer use and disposal of plastic products, promoting sustainable resource management.
Pharmaceuticals		
Electronics / electric and electronic components[54]	- Hazard-based criteria (focus on flame retardants) - Green chemistry approach - Regulatory status criteria - Specific organ toxicity with chronic effects - Toxicity, persistence, bioaccumulation - Impact on recyclability	Many electronics contain hazardous flame retardants; focus on safer alternatives is crucial. Chemicals causing specific organ toxicity with chronic effects can lead to long-term health issues such as liver or kidney damage. Products that are frequently handled or used in household and construction settings pose a risk of prolonged exposure, making it essential to regulate these chemicals strictly. Chemicals that accumulate in the tissues of living organisms can cause harmful effects up the food chain. Chemicals that interfere with the recycling process of plastics make it difficult to recover and reuse materials safely. Ensuring that plastic products are free from problematic chemicals enhances the efficiency and safety of recycling processes, supporting a circular economy.
Automotive plastics / parts[55]	- Functional use criteria - Lifecycle assessment approach - Adaptive management approach - Toxicity, persistence, bioaccumulation - Impact on recyclability	Long product lifespan and diverse chemical additives require comprehensive, adaptable assessment. Chemicals that accumulate in the tissues of living organisms can cause harmful effects up the food chain. Chemicals that interfere with the recycling process of plastics make it difficult to recover

[54] Pivnenko, K., et al. (2017). Waste electrical and electronic equipment (WEEE) plastics containing brominated flame retardants — from legislation to separate treatment — thermal processes. Waste Management, 58, 341-350
[55] Geuke, A. D., et al. (2019). Chemicals of concern in plastic products. Greenpeace Research Laboratories Technical Report (Review) 10-2019

Uses or applications	Proposed criteria or types of criteria	Considerations / rationale
		and reuse materials safely. Ensuring that plastic products are free from problematic chemicals enhances the efficiency and safety of recycling processes, supporting a circular economy.
Agricultural plastics[56]	- Exposure-based criteria - Persistence and bioaccumulation criteria - Precautionary principle approach - Endocrine disrupting chemicals	Direct environmental exposure necessitates focus on long-term environmental impacts. Endocrine disrupting chemicals (EDCs) interfere with hormonal systems, causing developmental, reproductive, neurological, and immune effects. Products that interact with food, personal care items, or agricultural environments can facilitate widespread exposure to EDCs, impacting both human health and ecosystems.
Textiles and clothing[57]	- Hazard-based criteria (focus on skin sensitizers) - Alternatives assessment approach - Green chemistry approach	Direct skin contact and frequent washing require focus on safe alternatives and reduced chemical use. In particular for children and infants
Recycled plastics[58]	- Concentration-based criteria - Lifecycle assessment approach - Adaptive management approach	Recycling can concentrate or introduce chemicals of concern, requiring ongoing monitoring and assessment
Hygiene and personal care products	- Endocrine disrupting chemicals	Products containing intentionally added nano- and microplastics, such as microbeads in cosmetics and personal care products, are a concern. Endocrine disrupting chemicals (EDCs) interfere with hormonal systems, causing developmental, reproductive, neurological, and immune effects. Products that interact with food, personal care items, or agricultural environments can facilitate widespread exposure to EDCs, impacting both human health and ecosystems.
Military sector		Avoid regrettable substitution Availability of substitutes / alternatives.
Construction materials	- Specific organ toxicity with chronic effects - Very persistent and very bioaccumulative (vPvBs) - Toxicity, persistence, bioaccumulation - Impact on recyclability	Chemicals causing specific organ toxicity with chronic effects can lead to long-term health issues such as liver or kidney damage. Products that are frequently handled or used in household and construction settings pose a risk of prolonged exposure, making it essential to regulate these chemicals strictly.

[56] Steinmetz, Z., et al. (2016). Plastic mulching in agriculture. Trading short-term agronomic benefits for long-term soil degradation? Science of The Total Environment, 550, 690-705.
[57] Rovira, J., & Domingo, J. L. (2019). Human health risks due to exposure to inorganic and organic chemicals from textiles: A review. Environmental Research, 168, 62-69.
[58] Leslie, H. A., et al. (2016). Propelling plastics into the circular economy — weeding out the toxics first. Environment International, 94, 230-234

Uses or applications	Proposed criteria or types of criteria	Considerations / rationale
		vPvB chemicals present extreme longevity in the environment and high potential for accumulation in living organisms, posing long-term risks to both human health and wildlife. Products designed for long-term use, such as medical devices and construction materials, can introduce significant amounts of vPvB substances into the environment. Chemicals that accumulate in the tissues of living organisms can cause harmful effects up the food chain. Chemicals that interfere with the recycling process of plastics make it difficult to recover and reuse materials safely. Ensuring that plastic products are free from problematic chemicals enhances the efficiency and safety of recycling processes, supporting a circular economy. Chemicals that interfere with the recycling process of plastics make it difficult to recover and reuse materials safely. Ensuring that plastic products are free from problematic chemicals enhances the efficiency and safety of recycling processes, supporting a circular economy.
Waste management industries	- Chemicals in plastic that may present risks to human health or the environment when used in recycling streams	
Heat resistant materials		
Tyres		Generate significant microplastics releases due to wear and tear from road.
Artificial turf		Artificial turf contains almost 200 possible carcinogenic chemicals, including Per- and Polyfluoroalkyl Substances (PFAS).
Consumer goods / household goods	- Specific organ toxicity with chronic effects - Persistent, bioaccumulative, and toxic (PBTs) - Impact on recyclability	Chemicals causing specific organ toxicity with chronic effects can lead to long-term health issues such as liver or kidney damage. Products that are frequently handled or used in household and construction settings pose a risk of prolonged exposure, making it essential to regulate these chemicals strictly. PBT chemicals remain in the environment for long periods, accumulate in living organisms, and pose significant health risks. Products used in industrial settings, consumer goods, and marine applications contribute to the persistence and bioaccumulation of these toxic substances in the environment. Chemicals that interfere with the recycling process of plastics make it difficult to recover and reuse materials safely. Ensuring that plastic

Uses or applications	Proposed criteria or types of criteria	Considerations / rationale
		products are free from problematic chemicals enhances the efficiency and safety of recycling processes, supporting a circular economy.
Industrial plastics	- Persistent, bioaccumulative, and toxic (PBTs)	PBT chemicals remain in the environment for long periods, accumulate in living organisms, and pose significant health risks. Products used in industrial settings, consumer goods, and marine applications contribute to the persistence and bioaccumulation of these toxic substances in the environment.
Marine equipment	- Persistent, bioaccumulative, and toxic (PBTs)	PBT chemicals remain in the environment for long periods, accumulate in living organisms, and pose significant health risks. Products used in industrial settings, consumer goods, and marine applications contribute to the persistence and bioaccumulation of these toxic substances in the environment.
Long-life consumer products	- Very persistent and very bioaccumulative (vPvBs)	vPvB chemicals present extreme longevity in the environment and high potential for accumulation in living organisms, posing long-term risks to both human health and wildlife. Products designed for long-term use, such as medical devices and construction materials, can introduce significant amounts of vPvB substances into the environment.
Emissions from industrial sites		
Oil refining industry		

Table C.5. Non criteria based approaches relevant to specific uses and applications of chemicals of concern in plastic products identified in questionnaire responses

Approach	Considerations / Rationale
Research and innovation:	Facilitates the exploration of new materials and chemicals that may not yet have comprehensive data but show potential benefits.
Risk assessment and management	Used when there is insufficient data to apply strict criteria, allowing for a more holistic assessment of potential risks and benefits. Can be particularly useful in emerging fields where new chemicals or applications are constantly being developed.
Industry-specific applications	Tailored approaches in sectors like aerospace, electronics, and automotive, where unique material properties are required, and standard criteria may not be applicable.
Rapid response to emerging concerns	Enables swift action when new scientific evidence suggests a chemical may pose a risk, even if it hasn't yet been formally evaluated against specific criteria

Part C. 9. Are there any important interrelations to other draft provisions of the instrument?

39. The provisions identified by experts as having important interrelations to draft provision II.2 in the draft instrument are provided in **Table C.6** below, followed by a list of other interrelations identified, without reference to a specific draft provision. Some experts considered all draft provisions to be relevant. A number of expert responses saw no important interrelations to other draft provisions of the instrument. These responses primarily came from experts of the opinion that draft provision II.2 falls outside the scope of the future instrument.

Table C.6. Draft provisions of the draft instrument for which experts identified important interrelations with draft provision II.2 of the draft instrument

Part I	Part II	Part III	Part IV	Part V	Part VI	Possible annexes
I.1 on Preamble I.3 on Definitions I.4 on Principles I.5 on Scope	II.1 on Primary plastic polymers II.3 on Problematic and avoidable plastic products II.4 on Exemptions available to a party upon request II.4bis on Dedicated programmes of work II.5 on Product design, composition and performance II.6 on Non-plastic substitutes II.7 on Extended Producer Responsibility II.8 on Emissions and Releases II.9 on Waste management II.10 on Trade II.11 on Existing plastic pollution II.12 on Just Transition II.13 on Transparency, tracking,	III.1 on Financing III.2 on Capacity building, technical assistance and technology transfer III.3 on Technology	IV.1 on National plans; IV.2 on Implementation compliance and cooperation IV.3 on Reporting on progress Part IV.4 [b][c] on Review of chemicals of concern, microplastics and problematic and avoidable products IV.5. on International cooperation IV.6. on Information exchange IV.7 on Awareness-raising, education and research IV.8 on Stakeholder engagement IV.8bis on health aspects	V.2 on Subsidiary bodies	VI.2 on Amendments to the instrument VI.3 on Adoption and amendments of annexes	Annex A, B, C, E and [X]

	monitoring and labelling.					

Other identified interlinkages not attributed to specific draft provisions:

- Alternatives assessment
- Circular economy
- Environmental health and safety
- Human health and environmental protection.
- International cooperation and support
- Precautionary principle
- Public awareness and education
- Recyclability
- Recycling and circular economy
- Reporting and transparency
- Research and innovation
- Restrictions and phase-outs
- Sustainable Development Goals
- Waste management and recycling.

PART D. Plastic product design, focusing on reusability and recyclability

Part D. 10. What criteria or non criteria based approaches for plastic product design could be reflected in the ILBI to improve (a) the recyclability of plastic products and (b) the quality of recycled products?

40. With respect to approaches to improve the recyclability of plastic products and quality of recycled products, some experts noted that criteria for recyclability should also address reusability and repairability, and that design criteria should broadly cover safety, sustainability, essentiality, and transparency aspects.

41. Some experts submitted that any approach for increasing recyclability, if included in the future instrument, should be general enough and apply "to the extent possible and feasible" to a wide variety of plastic products. Other experts support a sectoral approach prioritizing high impact sectors (cited examples include fast moving consumer goods packaging, fashion, toys, fishing gear and tyres), possibly through a dedicated programme of work bringing together stakeholder inputs.

42. Experts noted that any application of biodegradable plastics (potentially through a sectoral approach) needs to be carefully controlled throughout the full life cycle, as these require dedicated waste streams and should not be mixed.

43. Some experts support a global ban list for single-use and short-lived plastics products, which is not supported by others.

44. Some experts noted that emissions of micro- and nano-plastics and wastewater discharges from recycling facilities need further study and should be mitigated.

10.a. Design to improve recyclability of plastic products

45. **Tables D.1** and **D.2** list potential approaches to recyclability of plastic products identified by experts in their questionnaire responses.

Table D.1. Criteria based approaches to recyclability of plastic products identified in questionnaire responses

Design for improved recyclability of plastic products		
Types of criteria	**Specific criteria**	**Rationale**
Essentiality	• Promote elimination of unnecessary or avoidable plastic products where feasible and safe alternative practices are available. This could include primary, secondary, and tertiary packaging, as well as products like helium-filled balloons intended for release.	
Design for mono-material use	• Use a single material type[59] for the product as a whole or parts thereof (including caps and labels). • Minimize use of different material types in the manufacture of a product (avoid material combinations) • Use of a limited, standardized set of polymer types for specific applications[60] (e.g. do not use thermosets polymer. When thermoset polymers are necessary, use thermosets with a different density than the common recycled plastics). • Preference for easily [mechanically] recyclable materials • Use materials with high recyclability index	• Mono-material products are easier to recycle as they don't require separation. • Using limited/ standardized polymers types simplifies recycling processes and improves recycling rates.
Compatibility of materials	• Avoid use of materials that cannot be readily recycled in the country/region. • Opt for materials that are more easily and commonly accepted in recycling streams (e.g., PET, HDPE, PP) • Reduce the use of multi-layer or composite materials or family of polymers that are difficult to separate and recycle • Caps or lids materials to be compatible for relevant domestic recycling capabilities. • Ensure material used are tested for compatibility with sorting mechanisms (e.g. size, specific density thresholds, mold shrinkage, and warpage) and recycling technologies/infrastructure available • Design products that minimize contamination with non-recyclable materials (e.g., metal components, mixed plastics).	
Design for resource efficiency	• Minimize/optimize volume of materials used. • Restrain excessive packaging. • Materials to be light weight where possible. • Minimize waste in the manufacturing process. • Designing products to be compact and stackable can improve efficiency of resources and systems.	
Design to reduce leakage	• Limit micro and nanoplastic emissions also from recycling processes (e.g. from chemical recycling). • Limit introduction of non-intentionally added substances (NIAS). • Sustainable design can be guided by the waste hierarchy	

[59] Ellen MacArthur Foundation. (2016). The New Plastics Economy: Rethinking the future of plastics
[60] European Commission. (2018). A European Strategy for Plastics in a Circular Economy.

Design for improved recyclability of plastic products		
Types of criteria	**Specific criteria**	**Rationale**
	• Products are designed and produced in a manner that minimizes environmental leakages, including in the marine environment. • Design with end-of-life considerations in mind, including options like compostability or biodegradability where appropriate.	
Use of recycled plastic	• Use recycled plastic/materials • Set minimum threshold for recycled content for specific uses and applications in ILBI • Increase recycled content for limited essential uses (and preferably) reusable items (but not for food and beverage containers or baby bottles, for example). • Set global recycling targets[61]	Recycling targets, underpinned by supporting systems, they can lead to increases in plastics recycling and enable further increases in the use of recycled content in plastic products
Design for disassembly	• Technical simplification of product disassembly: - Use less parts/minimize use of individual components in the product and avoid unnecessary complexity - The parts are easily disassembled and sorted by components. (e.g. Easier removal of lithium-ion batteries from other parts of the product.) - Use common fasteners that do not require specialty tools/ utilizing mechanical fasteners instead of adhesives. - Do not use components of different density (e.g. label and caps with specific gravity less than 1) and small separable parts that are likely to be lost during collection and sorting. - The number of processes required to remove parts, etc., is minimized as much as possible. - The consumers can easily separate the components (e.g. use easily detachable labels) - Avoid using adhesives or inks and that could be challenging to remove or use alkaline water-soluble adhesives - Avoid paints and coatings on plastics - The types of materials used are indicated. - Use easily reusable parts or reuse of parts - Design products and packaging without additional external label or sleeve	Easily separable components[62] facilitates efficient sorting and recycling of individual components.
Design for longevity and circularity	• Design for longer use and longer service life, thermal stability, and UV resistance. • Design products to be easily reparable and that can withstand multiple uses • Support the remanufacturing of plastic products to extend their lifespan and reduce the need for new products.	• Modular design supports the circular economy by promoting reuse and easy maintenance. • Enabling minimum circularity design criteria contributes to the goal of ending

[61] Examples of the scheme can be found here: https://www.dcceew.gov.au/environment/protection/waste/packaging/2025-national-packaging-targets
[62] Hahladakis, J. N., & Iacovidou, E. (2018). Closing the loop on plastic packaging materials: What is quality and how does it affect their circularity? Science of The Total Environment, 630, 1394-1400

Design for improved recyclability of plastic products		
Types of criteria	**Specific criteria**	**Rationale**
	• Design products and packaging with circularity in mind, aiming to create closed-loop systems where recycled materials are reintegrated into new products. • Encourage design for reuse or remanufacturing to extend product lifecycles and reduce overall waste generation. • Design products with modular components that can be easily replaced or upgraded. • Set minimum circularity design criteria for plastic products, such as: • Remove or minimize problematic, excessive or avoidable elements (e.g., phase-out, remove or restrict use of chemicals of concern; remove excessive headspace, packaging layers or overwraps from packaging); • Increase secondary plastic content in certain plastic products • Design and composition (including chemicals and additives), are protective of the environment and human health, including through multiple uses • Access to safe, environmentally sound and viable alternatives • Minimize unnecessary waste of material and energy	plastic pollution and reducing waste by keeping plastics in the economy for as long as possible to maximize its benefit while reducing associated negative socio-economic and environmental impacts.
Chemical simplicity, safety and colours consideration	• Avoid use of chemicals of concern. • Regulate use of chemical substances that hinder the recyclability of products, without compromising decline in shelf life of food products. • Promote chemical simplification of plastic materials and products. • Minimize or eliminate the use of additives and dyes that hinder recyclability63. • Forbid legacy plastics to enter recycling streams as it may contain chemicals of high concern. • Use un-pigmented plastic polymers/Avoid using pigments that hinder recyclability • Prefer transparent or light-colored plastics over dark colors.[64] • Minimize the use of colours, or have a list of preferred colours relevant to domestic recycling capabilities. • Except essential product information, avoid printing on plastic products particularly packaging, especially on un-pigmented plastic products	• Additives may contaminate recycling streams or degrade recycled materials. • E.g., fiberglass or fillers such as talc make products hard to recycle. Products containing chlorine (like PVC) and toxic heavy metals such as lead. or cadmium are of environmental concern. The combustion of most plastic materials releases numerous pollutants and toxicants. • Certain pigments and dark colors limit recycling options and reduce the value of recycled material.
Design for easier collection and transportation	• The weight, size, shape, and structure of the product are to facilitate easier collection and transportation as much as possible.	

[63] Pivnenko, K., et al. (2016). Recycling of plastic waste: Presence of phthalates in plastics from households and industry. Waste Management, 54, 44-52.
[64] Hahladakis, J. N., et al. (2018). An overview of chemical additives present in plastics: Migration, release, fate and environmental impact during their use, disposal and recycling. Journal of Hazardous Materials, 344, 179-199.

Design for improved recyclability of plastic products		
Types of criteria	**Specific criteria**	**Rationale**
	• Improve collection and sorting to avoid contamination and enable effective recycling • Incentivize closed loop collection to increase safety	
Design for enhanced recycling process	• Incentivize closed loop recycling and/or sector specific recycling to increase safety • Avoid use of chemicals or polymers of concern and problematic elements that hinder recyclability (for example undetectable carbon black). • Consider applicability of biodegradation, thermolysis-degradation, thermal treatment (including but not limited to chemical classification). • Design should be (recycling) technology neutral, to address the lack of information about where a product will end up at its end of life. • Easier crushing and incineration for parts that are difficult to reuse or recycle. • Control measures might include flow control channels to facilitate recycling • National plans should incorporate measures for designing plastic products to improve recycling. Reference should be: Industry best practices, national recycling guidelines, national specific technology availability. • Recycling should enable cost-effective material recovery; minimum energy loss	The ILBI should support national efforts to promote product designs that facilitate recycling processes, specifically for problematic plastic products. This includes encouraging designs that increase the efficiency of recycling operations.
Labelling	Clear and standardized labelling and marking for easy identification, requiring: - Indication of polymer type (resin identification codes)/ material types used. - Size and material to be compatible with relevant domestic recycling capabilities. - Product labels and claims accurately inform consumers and end-users about disposal (Indication of recyclability/ add recycling symbols, and recycling instructions) - Detailed recycling instructions for consumers and providing lists of recycling centers for the product - Product labels and claims comply with recognized standards and/or transparency requirements	Proper labelling of plastics products helps consumers and recyclers to identify and sort recyclable plastics accurately to ease the plastics recycling process

Table D.2 - Non criteria based approaches to recyclability of plastic products identified in questionnaire responses

Non Criteria based approach	Description	Rationale
Lifecycle Assessment (LCA)	• Conduct LCAs (based on ISO 14040)[65] to inform design decisions that improve overall	Provides a holistic view of environmental impacts

[65] ISO 14040:2006 Environmental management — Life cycle assessment — Principles and framework.

	environmental performance, including recyclability • Conduct LCA to assess environmental impacts of alternative materials considered at design stage to avoid regrettable substitutions.	throughout the product lifecycle.
Stakeholder engagement	• Designers should interact with users: product design should be interactive (entailing consultations with users), adaptive, and flexible. • Fostering dialogue between designers, manufacturers, and recyclers can help identify challenges and develop solutions that enhance recyclability • Engage stakeholders from across the plastic value chain, including manufacturers, recyclers, and consumers, to develop and implement best practices. • Through public and private sector partnerships encourage innovation in plastic materials and recycling technologies • Integrate Consumer Feedback in design process	Incorporating consumer feedback into the design process allows manufacturers to understand user behaviour regarding disposal and recycling, leading to designs that align better with actual practices.
Indigenous Peoples and territory	• Plastic products design should not impose disproportionate burdens on Indigenous Peoples, local communities, and their traditional terrestrial and maritime territories, including in terms of leakages and other harmful effects on their human health and natural environments • Do not limit availability of recycling facilities to major metropolitan centers (extend facilities to non-metropolitan/traditional territories).	
Education	• Educate businesses about proper recycling practices and the importance of recyclable product design. • Educate consumers about the importance of recycling and proper disposal practices to reduce contamination and improve the quality of recycled materials. • Conduct campaigns to educate the public about the importance of recyclability and the proper disposal of plastic products • Emphasizing a circular economy approach encourages designers to think beyond single-use products and focus on creating items that can be reused or repurposed at the end of their life cycle.	Increasing awareness can lead to better practices.
Research and development	• Support/provide grants for research and development for new materials that are inherently more recyclable or biodegradable without compromising performance nor relying on traditional recycling methods. • Support research and development on improving the efficiency and accuracy of sorting plastics by type and quality, such as automated optical sorting systems involving	Utilizing digital tools such as 3D printing allows for rapid prototyping of designs that prioritize recyclability from inception while also enabling customization which may reduce waste during production.

	combination of spectroscopy and spectrophotometry or chemical-based identification methods[66]. • Encourage development of new recycling technologies that can handle a wider range of plastic types and composites. • Encourage use of digital technologies for prototyping to reduce production waste	
Guidelines	• Guidelines could include a checklist for designers to assess their products based on recyclability criteria as well as: • Guidelines should address the following aspects: - Material choice (use monomaterial, avoid chemicals which hinder recycling, simplify formulations) - Shape of the product (make different materials easily separable) - Transparency along the product life cycle (information on polymers and chemicals that are contained in the product) - Design for recycling and design from recycling (make products easily recyclable, and design products that can be made from recycled materials). - Practical steps towards sectoral/regional product standardization and harmonization, and existing and foreseeable recycling channels.	

10.b. Quality of recycled plastic products

46. Experts noted the interlinkages between the previous question and this one and suggested that criteria mentioned above for recyclability would also help improve the quality of recycled plastics. Some experts submitted that targets and standards for recycled content should be sector-specific, and that different allowable levels of recycled content should apply in different sectors for the purpose of maintaining products' physical and mechanical properties.

47. Other experts emphasized the importance of transparency, traceability and reporting in ensuring the quality of recycled plastics and safety of products. It was noted that chemical contamination and the presence of chemicals of concern render some recycled plastics unsuitable for some applications, particularly where exposure to chemicals is very likely, such as for food contact materials, childcare goods and toys, and medical equipment.

48. Several experts stated that mechanical recycling remains the most energy-efficient, economical, and least hazardous means of recycling plastics. Some experts also noted that issues such as degradation of the polymer during recycling still need to be addressed.

49. While some experts discouraged the use of chemical or advanced recycling due to the scale of toxic by-products it generates, greenhouse gas releases, high economic lock-in costs, and low technical and economic rates of success, others suggested that advanced recycling technologies can help increase the range of plastics collected and recycled.

[66] safe-and-sustainable-by-design framework https://research-and- innovation.ec.europa.eu/research-area/industrial-research-and- innovation/chemicals-and-advanced-materials/safe-and-sustainable-design_en

Table D.3 - Criteria based approaches to quality of recycled plastic products identified in questionnaire responses

Quality of recycled plastic products		
Types of Criteria	**Specific criteria**	**Rationale**
Contamination thresholds	• Set stricter limits on allowable contaminants[67] in recycled plastics (e.g. set maximum allowable levels for impurities such as residual adhesives, dirt, and mixed polymers.) • Establish a common methodology to determine quality of recyclates, and manage harmonized limits on the presence of problematic chemicals in recycled plastics. • Address bromatological aspects for packaging in direct contact with food.	Maintains quality and safety standards for recycled materials. Minimal contamination.
Upcycling potential	Design products with the potential for upcycling into higher-value applications[68].	Improves the economic viability of recycling and encourages circular use.
Material/ Polymer type	• Use of single source/application to minimize contamination of plastic polymer (e.g. for plastic beverage containers) • Use of materials that can withstand multiple heat cycles with minimal degradation of physical properties • Reduce products that contain mixed plastics that can't be easily recycled together. • Where products contain mixed plastics- encourage easy disassembly/modular design to facilitate sorting. • Restrictions on hard to recycle plastics where alternative materials exist.	Increased efficiency of process and purity of recycled plastic. Single-type polymers like PET, HDPE, and PP are widely recyclable and have established recycling streams.
Chemicals, additives and dyes	• Reduce use of any/non-recyclable additives or dyes[69] that cause barriers to the recycling of plastics (e.g. ink, adhesives, colour masterbatch, black plastics that are hard to recycle). • Allow for the use of specific additives that enhance the properties of recycled plastics[70]. • Limit the use of hazardous chemicals that can contaminate recycling streams, such as heavy metals, phthalates, and flame retardants[71]. • Use clear or natural-coloured plastics to improve recyclability • Minimize ink coverage.	Can improve the quality (purity) of and expand applications for recycled materials. Inks can restricts end markets (for recyclability) and can also decompose during recycling, creating chemicals of concern.
Consistency of quality	• Recycled plastic products shall meet same quality requirements as plastic products made of virgin materials. • Recycled products should meet same perform requirements (including durability, strength) and deliver he same functions and at the same level as	Well-controlled recycling technologies can significantly improve the efficiency of the recycling process and the quality of recycled plastics

[67] EU Regulation No 282/2008 on recycled plastic materials and articles intended to come into contact with foods.
[68] Ragaert, K., et al. (2017). Mechanical and chemical recycling of solid plastic waste. Waste Management, 69, 24-58.
[69] https://ivl.diva-portal.org/smash/get/diva2:1845203/FULLTEXT01.pdf ; https://www.bpf.co.uk/design/recyclability-by-design.aspx
[70] Vilaplana, F., & Karlsson, S. (2008). Quality concepts for the improved use of recycled polymeric materials: A review. Macromolecular Materials and Engineering, 293(4), 274-297.
[71] European Chemicals Agency (ECHA), U.S. Environmental Protection Agency (EPA).

Quality of recycled plastic products		
Types of Criteria	**Specific criteria**	**Rationale**
	those made of raw materials (including same GHG emissions) • Encourage development of closed-loop recycling systems designing products that can be easily recycled back into the same product type, maintaining material integrity and quality. • Quality criteria should include the technical functionality of recycled products and also criteria to limit potential adverse impacts on the environment and human health. • Ensures a steady supply of high-quality plastic waste for recycling, reducing contamination and improving the quality of recycled products. • Enhances the capabilities of recycling facilities to produce high-quality recycled plastics suitable for various applications.	
Avoiding leakage	• Mitigate generation and emissions of micro- and nanoplastics from production, use and mechanical recycling (facilities), i.e. wash water etc. • Set thresholds for intentionally added microplastics as well as emissions from wear and tear, such as from tires and artificial turf.	
Design for disassembly	Designing products for easy disassembly, allowing for efficient separation of different materials	Facilitates the sorting different components easier and recycling process more efficient.
Design for circularity	Design systems that support the principles of the circular economy, ensuring that materials are kept in use for as long as possible at their highest value and quality.	

Table D.4. Non criteria based approaches to quality of recycled plastic products identified in questionnaire responses

Non criteria based approach	Description	Rationale
Life Cycle Assessments	• Conduct comprehensive LCAs to evaluate the environmental impact of plastic products throughout their lifecycle, from production to disposal[72].	Identifies opportunities to improve recyclability and minimize environmental impact, guiding manufacturers in making informed design choices.
Design for reprocessing	• Consider the entire recycling process in product design, including collection, sorting, and reprocessing steps[73]. • Adopt circular design principles that prioritize durability, reparability, and	Holistic approach to improving the quality of recycled materials

[72] Environmental Protection Agency (EPA), Journal of Industrial Ecology.
[73] Huysman, S., et al. (2017). Performance indicators for a circular economy: A case study on post-industrial plastic waste. Resources, Conservation and Recycling, 120, 46-54.

Non criteria based approach	Description	Rationale
	longevity to improve the potential for recycling.	
Cost and market demand	• Cost of recycled plastic products must be lower than that of products made of virgin materials. • Create demand for high-quality recycled plastics through market incentives and consumer awareness campaigns (e.g. through policies that incentivize the use of recycled content in new products). • Performance of recycled plastics has to be acceptable by the market, especially the Brand Owners.	Increasing the demand for high-quality recycled materials can drive improvements in recycling technologies and processes.
Collaborative value chain approach	• Foster collaboration between designers, manufacturers, and recyclers to improve overall recycling outcomes[74]. • Promote public-private collaboration for closed-loop recycling and to support establishment of well-structured recycling facilities. • Establish feedback loops between recyclers and product designers/manufacturers to improve the design and quality of recycled materials. • Foster collaboration between industries (e.g., packaging, automotive, electronics) to develop shared standards and best practices for recycled materials.	• Addresses quality issues throughout the entire plastic value chain.
Education and capacity Building	• Provide training and capacity-building programs for recyclers to enhance their skills in handling and processing recycled materials • Educating consumers on the importance of recycling and proper disposal of plastic products. • Increase know-how of end-of-life waste management of plastic with minimum leakage.	
Definitions	• Harmonize definitions for recycled plastic contents	
Guidelines/framework for plastic product design to improve quality of recycled products	• Guidelines could include: - Use of single source/application to minimize contamination of plastic polymer (e.g. for plastic beverage containers) - Minimization of use of additives (e.g. ink, adhesives, colour masterbatch) • Use of materials that can withstand multiple heat cycles with minimal degradation of physical properties.	Industry-specific guidelines can provide practical advice on designing for recyclability, encouraging manufacturers to adopt sustainable practices

[74] World Economic Forum. (2016). The New Plastics Economy: Rethinking the future of plastics.

Non criteria based approach	Description	Rationale
	• Develop best practices and industry-specific guidelines on designing for recyclability. • The COP shall adopt guidelines to improve the quality of plastic products.	
Promoting recycling technologies	• National plans should encourage adoption of advanced recycling technologies, based on National innovation programs, technology assessment reports. • Encouraging investment in advanced recycling technologies • Support R&D initiatives focused on improving the mechanical, thermal, and chemical properties of recycled plastics.	The ILBI should support the adoption of all solutions in management of plastic pollution

Part D. 11. What criteria or non criteria based approaches for plastic product design could contribute to improve (a) the reusability of plastic products and (b) the quality of reuse systems?

D.11.a. Approaches contributing to reusability of plastic products

50. Several experts considered that the criteria and non criteria approaches identified for the previous question (i.e. approaches identified for recyclability of plastic products) would also contribute to reusability of plastic products. Other experts pointed out that some elements provided as responses to the questionnaire were already included in earlier submissions to the INC or in annex proposals in the draft compilation text.

51. Additionally, several experts emphasized that effective reuse/refill criteria need to encompass both the products and the systems designed to ensure that those products are reused in practice, and therefore provided a combined response to the question, without separating between (a) the reusability of plastic products and (b) the quality of reuse systems.

52. Similarly to the previous section, some experts stressed that the criteria proposed should apply "to the extent possible and feasible", because not all criteria could be applied simultaneously for all products. Other experts suggested prioritizing criteria based approaches for high impact sectors through a dedicated programme of work, in consultation with relevant stakeholders. Other experts submitted that reuse/refill systems must be tailored to specific products. It was also suggested that even nationally determined approaches should follow a minimum set of sector-specific design criteria and system requirements established in the instrument (such as for instance food, beverages, personal products). A distinction was also made in this context between products dedicated to business-to-business (B2B) or to business-to-consumer (B2C). It was also suggested that criteria should be flexible enough to accommodate technological advancements and varying national contexts and capabilities.

53. Similarly to recyclability, some respondents emphasized that the reusability of plastic products and the quality of reuse systems should be based on relevant international standards and avoid arbitrary or unjustifiable discrimination or disguised restrictions to international trade.

54. Some respondents submitted that improving the reusability of plastic products involves both design criteria and non criteria based approaches that focus on enhancing durability, compatibility, and efficiency in reuse systems.

55. Some experts considered that a non-reusable or non-recyclable plastic product should be identified as problematic and restricted, and that in addition to other design principles, Parties may consider including such products in an annex containing problematic products to be phased out and reduced. Other experts considered that

all approaches should be implemented through national plans to ensure they are context-specific and align with each country's unique circumstances and capacities, with a focus on plastic products identified as problematic.

56. Some experts support the establishment of a mechanism for approval of criteria and guidelines, to be included in an annex to the instrument, while others considered that this could be decided by the governing body, or that guidelines should be included in national plans.

Table D.5. Criteria based approaches for improving the reusability of plastic products identified in questionnaire responses

Type of Criteria	Specific Criteria	Rationale
Design for disassembly and reassembly	- Products should be easily disassembled for cleaning, repair, or part replacement[75]. - Modular and stackable design - Simplifying the product design to include only essential features. - Use of standardized fasteners - Design products that can be melted and that can be processed in a pelletizing machine	- Facilitates maintenance and extends product lifespan - Modularity allows parts replacement or upgrade, instead of discarding the entire product
Design for durability and repair	- Products should be designed for long service life and multiple uses (reuse and refill) - Design for the environment the product will be used in (e.g., waterproof if used in the bathroom, air sealed if used for food products, microwavable if product is typically heated, refillable after emptying) - Use standardized, interchangeable and easy to repair parts across product lines and brands[76]. - Use of easily reusable parts or reuse of parts - Promote use polymer types that are strong and durable (e.g. Polycarbonate reusable cups over polystyrene single use cups) - possibility of 3D printing for parts - Make collection and storage of the product easier - Design products that can be used for multiple purposes or adapted for different functions (multi-purpose design).	Simplifies repair and replacement, encouraging longer use.
Material selection	- Reduce the amount of material used[77] - Choose materials that maintain integrity over multiple use cycles (use durable and high-quality materials). - Use recycled content that meets the defined quality standards - Products should be made from a single type of plastic or compatible plastics/ polymers to facilitate the recycling process and reduce contamination (avoid combining different types of resins that are difficult to separate and recycle). - Ensure that the raw materials are sourced and processed in an environmentally and socially responsible manner. - At end of life, reusable products should be recyclable	Ensures product quality and safety over extended periods of use. E.g. Thermoplastic materials (unlike thermosets or elastomers) can be recovered, crushed and transformed for reuse

[75] Bakker, C., et al. (2014). Products that last: Product design for circular business models. TU Delft Library.
[76] Ellen MacArthur Foundation. (2013). Towards the Circular Economy Vol. 1: Economic and business rationale for an accelerated transition
[77] Hahladakis, J. N., & Iacovidou, E. (2018). Closing the loop on plastic packaging materials: What is quality and how does it affect their circularity? Science of The Total Environment, 630, 1394-1400.

Type of Criteria	Specific Criteria	Rationale
Chemicals and additives and microplastics	- Require that products do not contain chemicals of high concern, and that applications suit the material/chemical composition of the materials. - Use polymers that are chemically stable- that do not leach harmful materials (e.g. additives) or readily form microplastics over time	
User-centered design	- Design products that are convenient and appealing for repeated use[78]. - Design for the specific reuse or refill model (e.g. refill at home, refill on the go, return from home, return on the go). - Product are easy to clean (e.g., dishwasher safe, separable components, smooth surface, limit cavities) - Avoid unnecessary hurdles for reuse compared to single-use products - Use smart packaging to facilitate consumer choices and allow consumers to earn discounts for reusing the containers (QR codes, RFID tags, etc.) - Clear labels for consumers on how to return - Include features that enhance usability, such as ergonomic handles and stackable designs. - Develop manuals and provide clear instructions on disassembly, repair and reuse.	Encourages consumer adoption of reusable alternatives.
National context-specific criteria for reusability	**Criteria for reusability**: National plans should define criteria for assessing and improving the reusability of plastic products, considering national capabilities, and market conditions (e.g. use as bases: National reuse policies, sustainability assessments). **Design for multiple uses:** National plans should incorporate measures for enhancing designs for plastic products, considering product specific considerations such as meeting application requirements, robustness, longevity, durability, safety, ease of cleaning, storability, reassembly, and fitness for multiple uses. References to be used include: Industry best practices, national design standards.	The ILBI should encourage national plans apply criteria for enhancing reusability and to promote designs that facilitates reuse.

Table D.6. Non criteria based approaches for improving the reusability of plastic products identified in questionnaire responses

Broad category	Non criteria based approaches	Rationale
Targets	- Global phase-in targets for reuse systems for key packaging sectors including food and beverage take-away packaging, consumer packaged goods, business-to-business packaging, and e-commerce packaging[79]. - A minimum target for reuse established in the instrument cross-board, with a specific target per sector to follow.	

[78] Lofthouse, V., & Prendeville, S. (2018). Human-centred design of products and services for the circular economy–A Review. The Design Journal, 21(4), 451-476.
[79] Recommendations on the revised draft text of the international legally binding instrument on plastic pollution, including in the marine environment, Recommendations by PR3, the Global Alliance to Advance Reuse; https://www.pr3standards.org/global-plastic-treaty-inc-4

Broad category	Non criteria based approaches	Rationale
	- Set mandatory reuse targets for certain types of plastic products to encourage widespread adoption. - A designated application-specific entity to set minimum reuse collection/return rate targets - Nationally determined targets/timeframes for implementing reuse	
Lifecycle Assessment (LCA) and circularity approaches	- Conduct LCA to compare environmental impacts of single-use vs. reusable options[80]. - Use LCA to inform material choices for intended product use and function - Combine Circular Economy Principles & Life Cycle approach of the product from material extraction to disposal. - Encouraging designs that minimize energy consumption and waste generation throughout the lifecycle. - Ensure circularity of products designed	- Ensures reusable designs offer genuine environmental benefits. - LCA and circularity can effectively promote designing for longevity, repairability, and recyclability.
Guidelines	Guidelines on **design for reusability** should address the following aspects: - Material choice (durability, avoid chemicals which hinder reusability) - Shape of the product (durability; easy to collect, transport and clean) - Standardization (harmonized design, make products suitable for big-scale reuse systems) - Recyclability (at some point, a reusable product will still turn into waste, and then it should be recyclable. Refer to guidelines)	
Job creation	- creation of community workshops and repair centers, generating employment and reducing waste	
Consumer education and engagement	- Ensure consumer acceptance by encouraging consumers to choose reusable options over single-use items - Conduct campaigns to educate the public about the benefits of reusability and proper product care - Engaging with users to understand their needs and preferences can lead to designs that encourage reuse.	
Definitions	- Universal definition for reuse systems	
Infrastructure development	- Sector-based approaches for infrastructure and logistics requirements to match intended uses and potential specific challenges such as food safety requirements and ease of access.	

Examples of sectoral approaches proposed for the uptake of reuse systems

57. Some experts identified the packaging sector as an example of sector for which reuse systems could be more easily introduced. Without prejudice to other sectors, the experts suggested a 5-step approach, as follows:

1. Identify sector and sub-sectors to prioritize. For instance, the packaging sector, with the following subsectors: food and drink services (e.g. beverage cups or bottles, take-away food containers), Business

[80] Gallego-Schmid, A., et al. (2019). Environmental impacts of takeaway food containers. Journal of Cleaner Production, 211, 417-427.

to Business (e.g. transport packaging), E-commerce (e.g. transport packaging from business to consumer);
2. Define reuse mandates for specific sectors (easiest: hotel, restaurant and cafeteria applications, take-away food packaging) and settings (easiest: closed systems);
3. Define clear mandatory targets for the adoption of reuse schemes by industry sector and guidance on how to set them. The COP shall adopt guidance to promote the reusability of plastic products, and related channels and capacities;
4. Define mechanisms of financing to make reuse financially competitive compared to single-use alternatives;
5. Define standards and guidance on how to implement reuse systems in different settings and ensure interoperability between systems.

58. Some **examples of possible exemptions** from a sector-based approach to reuse have also been suggested by experts, including plastics used in the medical care sector, which may not be appropriate for reuse due to possible contamination.

D.11.b. Approaches contributing to the quality of reuse systems

59. Most experts agree that the quality of reuse systems is intrinsically linked to the design of the plastic products, including the selection of the suitable material to build the product, the design of replaceable parts of the product, and the standardization of shape and design of the different elements to ensure easy management and practical use of reuse systems. Criteria highlighted in relation to product design could therefore also apply to the quality of reuse systems.

60. Some experts noted that the effectiveness and quality of reuse systems varies by country due to factors such as resources, infrastructure, and consumer needs.

61. Many experts considered that reuse targets should be set, with different views as to whether these should be set in the instrument or nationally, per sector/application or by a designated entity.

Table D.7. Criteria based approaches for improving the quality of reuse systems identified in questionnaire responses

Measure	Approach	Rationale
Global harmonized standards and guidelines[81],[82]	**Cleaning and sanitization[83]** Establish protocols for cleaning and sanitizing reusable products and facilities. Including aspects such as: - Water usage is managed according to Water Environment Conservation Act, to reduce environmental impacts. - Monthly hygiene and safety training are provided for cleaning personnel, and maintenance of cleaning system equipment is documented. - Green washing product purchases are prioritized, with performance tracked in documentation (excluding cleaning agents), and specific measures are taken to prevent container loss. - Collaborative efforts are in place for transportation efficiency, and delivery vehicles receive regular safety inspections, alongside ongoing safety training to prevent accidents. **Labeling**	- Ensures safety and hygiene in reuse systems, particularly for food contact items. - Standardized and clear product data enables the identification of the sustainability breakeven point of a reusable item

[81] World Economic Forum, "The New Plastics Economy: Rethinking the future of plastics"
[82] Ellen MacArthur Foundation (2019). Reuse rethinking packaging. Available at: https://www.ellenmacarthurfoundation.org/reuse-rethinking-packaging
[83] Greenwood, S., et al. (2020). Hygiene Aspects of Reusable Food Containers. Reference Module in Food Science, Elsevier.

Measure	Approach	Rationale
	Establish clear labeling standards to support easier cleaning and collection as well as consumer choices, including - Standardized and clear product data - Products must be labelled according to their ease of repairability and reuse. **Efficiency and transparency** Minimum performance criteria for efficiency of reusable systems could include: - minimum number of rotations greater than their sustainability breakeven point* and/or minimum packaging return rates. - improved efficiency, convenience, and affordability of shared infrastructure. **Quality of reused products** Establish and enforce regulatory standards for the quality of reused and refurbished products. * Breakeven point is the point after which a reusable item's single rotation has a smaller environmental footprint than its equivalent single-use item.	
National standards	National plans to define and enforce standards for reuse systems, ensuring effectiveness for various applications, based on National quality control frameworks and industry standards.	The ILBI should encourage national plans to support best practices for reuse systems, focusing on plastic products identified as non-reusable within national waste management context
Traceability systems	- Implement systems to track individual items through multiple use cycles[84]. - Establish and implement robust data collection and reporting on reuse system performance - Track product history, maintenance records, and adherence to standards - IT integration for automation and traceability - Use RFID tags or QR codes to track product usage and facilitate efficient sorting and return processes. - Enhance transparency of information, traceability of product and accountability	- Ensures that reusable products meet safety and quality standards throughout their lifecycle. - Tracking systems and smart technologies optimize the management, monitoring, quality control and accountability of reuse systems for plastic products.
Reverse logistics infrastructure	- Design efficient systems/shared interoperable systems for return, collection, cleaning, and redistribution of reusable items, using low-emission transport and energy- and water-efficient equipment[85]. - Develop automated systems for cleaning, repairing, and refurbishing returned products	Facilitates widespread adoption of reuse systems.

[84] Coelho, P. M., et al. (2020). Sustainability of reusable packaging–Current situation and trends. Resources, Conservation & Recycling: X, 6, 100037.
[85] Coelho, P. M., et al. (2020). Sustainability of reusable packaging–Current situation and trends. Resources, Conservation & Recycling: X, 6, 100037.

Measure	Approach	Rationale
Quality assurance protocols	- Establish regular inspection and testing procedures for reusable products[86]. - Optimization of material flow - Packaging units and materials should be environmentally friendly and safe for public health throughout their lifecycle, linking to requirements for chemicals and polymers of concern. - Storage containers maintain the shelf life of products	Ensures continued safety and functionality of products over multiple use cycles.
Standardized reuse models	- Develop standardized reuse models (e.g., refill, return systems) for different product categories[87] - Ensure interoperability of systems within and among regions and nations - Packaging standardization and pooling	Simplifies implementation and scaling of reuse systems.

Table D.8. Non criteria based approaches for improving the quality of reuse systems identified in questionnaire responses

Non criteria based approach	Description	Rationale
Life Cycle Assessment	Reuse rates should meet and surpass the cost and environmental impact of the product's original production and transportation, compared to single-use equivalents via a Life Cycle Assessment.	
Circularity	Encourage and implement circular business models such as: - Product-as-a-service (PaaS) where consumers lease or rent products instead of buying them - Sharing economy platforms - Deposit-return schemes where consumers pay a deposit when purchasing a product, which is refunded upon return.	Encourages efficient resource utilization, product longevity, and quality-driven reuse practices.
Collaborative ecosystem approach	- Foster collaboration among stakeholders, including manufacturers, retailers, recyclers, consumers, and policymakers to create integrated reuse systems and establish best practices, policies and standards[88]. - Fosters collaboration and continuous improvement in product design and reuse systems. - Build and maintain shared infrastructure for reverse logistics that companies can share through public-private partnership system. - Ensure the inclusion and livelihoods of waste pickers in reuse systems	Addresses systemic challenges in implementing reuse at scale.

[86] Greenwood, S., et al. (2020). Hygiene Aspects of Reusable Food Containers. Reference Module in Food Science, Elsevier.
[87] Ellen MacArthur Foundation. (2019). Reuse: Rethinking Packaging.
[88] Lofthouse, V., & Prendeville, S. (2018). Human-centred design of products and services for the circular economy–A Review. The Design Journal, 21(4), 451-476.

Non criteria based approach	Description	Rationale
Consumer education	- Develop programs to educate consumers and provide incentives for participating in reuse systems[89]. - Consumer reward systems (loyalty points, discounts, donation to social enterprise, et.	Encourages behavior change and adoption of reusable products.
Accessibility, affordability	- Encourage measures for reusable packaging systems to be accessible, affordable, and readily available to consumers and businesses as single-use products. - Development of distributed and shared reuse hubs for hygiene treatment and replenishment models for operational and economic efficiency - Ensure transparent financing for reuse systems	
Infrastructure development	- Sector-based approaches for infrastructure and logistics requirements to match intended uses and potential specific challenges such as food safety requirements and ease of access. - Encourage the development of infrastructure for reuse systems within national plans, based on National infrastructure development programs, industry best practices.	

Part D. 12. Are there other potential attributes, apart from improved reusability and recyclability, to be considered in criteria and non criteria based approaches for plastic product design?

62. **Table D.9** below lists the potential attributes, additional to improved reusability and recyclability, identified by experts to be considered in criteria and non criteria based approaches for plastic product design. In addition to attributes, some experts also identified additional factors that they suggest are key to be considered in product design, aside from reusability and recyclability.

63. Some experts stated that no additional attributes apart from improved reusability and recyclability need be conserved, while others stressed that by adopting a holistic approach that encompasses all additional attributes, designers can create more sustainable plastic products that benefit both consumers and the environment.

64. An expert highlighted the importance of providing effective means of implementation to enable SIDS to participate in recycling and to access recycling technologies, noting that with global supply chains, the generation of recycled plastic feedstock may not be geographically co-located with the manufacture of plastic products.

Table D.9. Additional attributes for plastic product design identified in questionnaire responses

Attributes/Factors	Criteria	Rationale
Essentiality	- Design products that are essential and not problematic	

[89] Heidbreder, L. M., et al. (2019). Tackling the plastic problem: A review on perceptions, behaviors, and interventions. Science of The Total Environment, 668, 1077-1093.

Attributes/Factors	Criteria	Rationale
Safety[90] [91]	- Eliminate or minimize the use of harmful chemicals in product design. - Thermal and Chemical Resistance: The material must withstand the temperatures and chemicals it will encounter during its lifecycle, including manufacturing, use, and disposal. - Cumulative health effect (cumulative exposure) - Chemicals should not enter the human food chain for both food and drinks. - Chemicals uses have no health effects on humans in other ways, such as contact, inhalation, or others.	Protects human health and environmental safety throughout the product lifecycle.
Carbon footprint	- Design to minimize greenhouse gas (GHG) emissions throughout the product lifecycle[92].	Addresses climate change impacts of plastic products.
Water and energy efficiency and safety	- Design products to minimize water and energy use in production and use phases[93].	Addresses water scarcity and pollution issues associated with plastics.
Reduced material usage (dematerialization)	- Minimize the amount of plastic used while maintaining functionality[94]. - Designing products that are lightweight and compact - Transition to Products Service System (PSS)	Decreases resource consumption and waste generation as well as energy consumption during transportation.
Repairability/ refurbishability	- Design products to be easily repaired, with readily available spare parts[95]. - Design products with interchangeable components that can be upgraded or replaced (modularity)[96].	Extends product lifespan, adaptability and reduces waste.
Refillability	- Design products to be refilled and reused	
Impediment to circularity	- The product should not impede the circularity of other products, such as by being non-recyclable as per established recyclability criteria.	
Alternative feedstocks	- Use of renewable or recycled content in plastic production[97]. - Use of bioplastics: - Use biomass (bio-based) plastics from renewable organic resources such as plants . - Use biodegradable plastics for products that tend to unavoidably leak to natural environment, taking into account the conditions in which biodegradation occurs.	Reduces dependence on virgin fossil-based materials.

[90] Science of the Total Environment, 651, 3253-3268. https://www.nicoletplastics.com/resources/blog/factors-plastic-part-design-manufacturability/
[91] Groh, K. J., et al. (2019). Overview of known plastic packaging-associated chemicals and their hazards.
[92] Zheng, J., & Suh, S. (2019). Strategies to reduce the global carbon footprint of plastics. Nature Climate Change, 9(5), 374-378.
[93] Vince, J., & Hardesty, B. D. (2017). Plastic pollution challenges in marine and coastal environments: from local to global governance. Restoration Ecology, 25(1), 123-128.
[94] Rossi, V., et al. (2015). Life cycle assessment of end-of-life options for two biodegradable packaging materials: sound application of the European waste hierarchy. Journal of Cleaner Production, 86, 132-145.
[95] Svensson-Hoglund, S., et al. (2021). Barriers, enablers and market solutions to circular business models in the plastic packaging industry. Journal of Cleaner Production, 316, 128502.
[96] Bocken, N. M., et al. (2016). Product design and business model strategies for a circular economy. Journal of Industrial and Production Engineering, 33(5), 308-320.
[97] Nguyen, H., et al. (2020). Recycling of plastic waste: Screening for brominated flame retardants (BFRs). Chemosphere, 251, 126342.

Attributes/Factors	Criteria	Rationale
Biodegradability/ compostability	- Products designed to biodegrade or compost in specific environments[98].	Reduces long-term environmental impact, especially for items likely to be littered.
End-of-life considerations	- Design that considers how the product will be disposed of or recycled at end-of-life[99].	Facilitates proper waste management and circular economy principles.
Cultural, social and ethical considerations/Just transition	- Consider local cultural norms and ethical implications in product design[100]. - Consider social aspects such as health and safety of workers, fair labor practices, and community engagement in plastic product design to ensure ethical and socially responsible manufacturing practices	Ensures products are socially acceptable and ethically produced.
Local sourcing and production	- Promoting the use of local sourcing, manufacturing, and production processes to reduce transportation emissions, support local economies, and enhance supply chain resilience	
Aesthetics	- Design products incorporating aesthetic appeal, ergonomic design, and user-friendly features to enhance the overall user experience, usability, and desirability	Enhances consumer acceptance and satisfaction with reusable products.
Cost-effectiveness/ economic viability	- Ensure the product is affordable for consumers and cost-efficient to produce. - Reuse systems must be economically viable in order to be sustainable in the long term.	Supports widespread adoption and sustainability of reuse systems.
Waste Hierarchy	- Design respecting the 12Rs of waste management: Refuse, Rethink, Reuse, Repair, Refurbish, Remanufacture, Repurpose, Recycle, Research, Re-skill, Re-design, Re-vision and Recover. - Design respecting the 9R: Refuse, Rethink, Reduce, Repair, Refurbish, Remanufacture, Repurpose.	can be applicable to plastics products with the common goal to promote and achieve sustainable production and consumption of plastics products.
Transparency	- Design products that can be tracked and with clear labels	
Design for manufacturability (DFM)	- Designing with manufacturability in mind can streamline production processes[101].	Uniform wall thickness can prevent defects during manufacturing and ensure structural integrity

65. One expert provided **examples of applications** for which the instrument could require or encourage restrictions to be applied gradually and encourage **environmental degradability**. These include:

[98] Emadian, S. M., et al. (2017). Biodegradation of bioplastics in natural environments. Waste Management, 59, 526-536.
[99] Hahladakis, J. N., & Iacovidou, E. (2018). Closing the loop on plastic packaging materials: What is quality and how does it affect their circularity? Science of The Total Environment, 630, 1394-1400.
[100] Medkova, K., & Fifield, B. (2016). Circular design-design for circular economy. Lahti Cleantech Annual Review, 32-47.
[101] https://prototool.com/general-principles-of-plastic-part-design-for-injection-molding/

- Packaging products and bags (e.g. trays, containers, food packaging film)
- Water and juice bottles
- Shampoo bottles, milk bottles, freezer bags, ice cream containers
- Cutlery, plates, cups
- Protective packaging, hot drinks cups.

Part D. 13. Are there specific applications or uses for which criteria and non criteria based approaches for plastics product design are particularly applicable/relevant?

66. In responding to question D.13, most experts noted that product design approaches would depend on specific applications and uses. Some experts stressed the importance of addressing all uses and applications of plastics, so that all products are designed for safety, reduction in overall use of plastic polymers (primary and secondary), and reduction in GHG emissions.

67. Some experts noted that the application of the proposed approaches could focus on redesigning problematic and avoidable products, with packaging being identified as a priority sector due to the large volumes and high probability of leakage, along with other sectors/products with direct contact with humans such as textiles and products that fragment into microplastics (e.g. synthetic grass, tires, textiles, etc.).

68. Experts emphasized that many guidelines already exist for plastic packaging, and while they have some differences, they are broadly aligned across the world.

69. As in previous responses some experts argued for the identification of specific applications to be nationally determined, while others stressed the clarity that a global harmonized approach brings, leaving some level of flexibility for country specificities.

70. **Table D.10** lists specific uses and applications for which experts identified that approaches for plastic product design are particularly relevant /applicable.

Table D.10. Uses and applications for which approaches for plastic product design are particularly relevant /applicable, identified in questionnaire responses

Uses or applications	Design Features/properties	Considerations
Food packaging and food contact plastics	- Biodegradability (for certain applications) - Food safety and non-toxicity criteria - Reusability and recyclability criteria - Chemical and material simplicity - Innovation and assessment of alternatives to preserve fresh food	- Food preservation, storage and safety. - Environmental impacts - Exposure of human or environment to toxic plastic chemicals - Single-type polymers like PET and HDPE are easier to recycle, improving the efficiency and quality of the recycling process - Food transportation and industrial applications
Electronics and appliances	- Electrical properties - Flame resistance and durability - Aesthetic appeal - Mechanical strength - Chemical resistance and thermal stability - Disassembly and reparability criteria - Recycled content criteria - Non-Toxicity	- Precise functionality - Limiting the use of harmful flame retardants, heavy metals, and other toxic substances - Leaching of hazardous substances

Uses or applications	Design Features/properties	Considerations
Personal care and cosmetics packaging	- Refillable design criteria - Reduced material usage and minimize single-use plastic packaging - Alternative feedstocks - Nano and microplastics contents	
Automotive components/ Aerospace	- Heat resistance - Impact strength - Durability (including tyres wear) - Recycled content criteria - Design for disassembly - Microplastic shedding reduction	- Strict performance; durability standards; Extreme operating conditions; high safety standards
Medical devises and sanitary uses	- Durability - Non-toxicity criteria assessment - Chemical resistance and thermal stability - Single-use vs. reusable assessment - Mechanical strength - Dimensional accuracy - Biocompatibility - Design for Disassembly	- High regulatory standards - Safety requirements - Lack of alternatives - Necessity - Patient safety
Agricultural plastics	- Biodegradability criteria - Chemical Safety - Durability - UV resistance/stability (for non-biodegradable applications)	- Soil contamination - Natural decomposition - Soil health and crop safety - Promoting sustainable farming practices.
Beverage containers	- Reusable design criteria - Recyclability criteria - Lightweight design - Chemical Safety and Non-Toxicity - Elimination of problematic products criteria	
Textiles and clothing	- Dyeability - Comfort - Durability and Recyclability - Microfiber shedding reduction - Recyclability - Alternative feedstocks	- Break down into macroplastics
Children's toys	- Durability - Chemical Safety and non-toxicity assessment	- Children's health - Durable toys reduce waste and provide long-term safety for children

71. In responding to question D.13, some experts also suggested non criteria based approaches, providing examples of potential uses and application and the associated rationale (**Table D.11**).

Table D.11. Examples of non criteria based approaches for specific uses and applications for plastic product design identified in questionnaire responses

Non criteria based approach	Examples of uses and applications and rationale
Education	- Promoting the use of safer alternatives and encouraging manufacturers to adopt green chemistry principles. - Educating parents, caregivers, farmers, producers and consumers can reduce plastic pollution. For instance, educated consumers are more likely to select safe and sustainable products such as toys; educated consumers are more likely to participate in proper disposal and recycling programs, reducing (electronic) waste and environmental contamination; and informed farmers are more likely to choose sustainable and non-toxic agricultural plastics products and opt for disposal methods, promoting sustainable agriculture.
Local sourcing and production	- Can promote sustainability and reduce environmental impact in various sectors including in the construction industry.
Guidelines and best practices	- Best practices provide actionable advice for manufacturers, promoting the adoption of sustainable and safe design principles. - Industry-specific guidelines can help manufacturers minimize the use of hazardous chemicals and improve the sustainability of plastic products including of food packaging, medical devices, toys and agricultural plastics. - Best practices help farmers adopt sustainable plastic use and disposal methods, reducing environmental impact.
Resource efficiency, circular design principles and waste reduction	- Can enhance the reusability and sustainability of food packaging materials and of medical plastic products. - Can enhance the sustainability and circularity of plastic textiles and garments, in agriculture, in the automotive industry and electronics products.
Lifecycle Assessments (LCAs)	- To evaluate the environmental impacts of plastic products and alternatives for delivering specific functions and guide manufacturers in making informed decisions about materials and design features, including for medical devices, food and other packaging materials, electronic products.
Innovative product development	- Flexibility in design encourages creativity and exploration of new ideas without being constrained by predefined criteria. Conceptual consumer products, artistic installations, and experimental designs.
Rapid prototyping	- Emphasis on speed and iteration, over adherence to strict criteria, allows for quick testing and refinement of ideas. For example, prototype models for feedback and testing, proof-of-concept designs.
Design exploration of alternatives and material innovation	- Freedom from criteria enables exploration of alternative materials, forms, and functions. For example, architectural models, furniture design, and bespoke custom products. - Design, material innovation and social impact considerations can improve the usability and societal benefits of plastic household products.
Niche markets	- Unique market demands, or low-volume production runs may benefit from a more flexible, non criteria based approach. For example, custom automotive parts, personalized consumer goods, and limited-edition items.

Part D. 14. Are there any important interrelations to other draft provisions of the instrument?

72. As shown in **Table D.12** below, interrelations were identified with all draft provisions under Parts III, IV, and V, as well as all draft provisions under Part II, with the exception of 3bis, 3bis alt, 13bis, and XX (fishing gear). Definitions and scope in Part I were identified in relation to the draft provision on product design.

73. The importance of the special circumstances of SIDS and provision of adequate means for implementation of the future instrument, in particular for recyclability, was highlighted.

74. It was pointed out by some that any provision related to product design and further regulation should adhere to WTO principles and that unjustified restrictions to international trade should be avoided.

75. Linkages with availability, accessibility, affordability and environmental sustainability of alternatives, and with means of implementation, including cost of transition for meeting compliance obligations by developing countries, Common But Differentiated Responsibilities, and consideration of socio-economic and national circumstances were identified in some responses.

76. The need for alignment with other relevant international agreements and initiatives on chemicals, waste, and the environment, duplication needs to be avoided, to ensure the overall coherence and effectiveness of the instrument was also stressed.

Table D.12. Draft provisions of the draft instrument for which experts identified important interrelations with draft provision II.3 of the draft instrument

Part I	Part II	Part III	Part IV	Part V	Possible annexes
I.3 on Definitions I.5 on Scope	II.1 on Primary plastic polymers II.2 on Chemicals of concern II.3 on Problematic plastic products II.4 on Exemptions available to a party upon request II.4bis on Dedicated programmes of work II.6 on Non-plastic substitutes II.7 on Extended Producer Responsibility II.8 on Emissions and Releases II.9 on Waste management II.XX on Fishing gear[102] II.10 on Trade	III.1 on Financing III.2 on Capacity building, technical assistance and technology transfer [III.3on Technology transfer]	IV.1 on National plans IV.2 on Implementation compliance and cooperation IV. 3 on Reporting on progress IV.4 on Periodic assessment and monitoring IV.5 on International cooperation. IV.6 on Information exchange IV.7 on Awareness-raising, education and research IV.8 on Stakeholder engagement 8bis on Health aspects	V.1 on Governing body V.2 on Subsidiary bodies V.3 on Secretariat	Annex A, B, C, D, E, [X] (regarding effective measures at each stage of plastic lifecycle)

[102] The placement of the draft text on fishing gear is yet to be determined. It is listed here with the indication "XX" under Part II, as reflected in the compilation of draft text, without prejudice to any future decision by the committee with respect to its inclusion or placement in the instrument.

Part I	Part II	Part III	Part IV	Part V	Possible annexes
	II. 11 on Existing plastic pollution II. 12 on Just transition II.13 on Transparency, tracking, monitoring and labelling.				

77. **Additional overarching issues** were identified by respondents, without reference to specific draft provisions, including:

a) Life cycle management
b) Infrastructure support
c) Regulation on integrated waste management and promotion of recycling.
d) Consumer engagement
e) Market-based and economic instruments.
f) Marine litter prevention.
g) Globally harmonised statistical guidelines for plastic material flows for tracking plastics and associated chemicals from the environment into the economy, within the economy, and from the economy to the environment (pollution).
h) Decision hierarchy based on global lists, instead of criteria.
i) Consideration of traditional knowledge, knowledge of Indigenous including in terms of harmful impacts during the recycling process on Indigenous Peoples, local communities, and their traditional terrestrial and maritime territories.

Annex I – National examples

This annex includes examples of national measures implemented by countries, included in the responses to the questionnaire, respectively in Parts B, C and D.

Relating to Part B

Table I.1. Examples of national measures relating to plastic products identified in questionnaire responses

Country	Examples provided by experts in their responses to the questionnaire
Republic of Korea	Also, national circumstances, such as recycling infrastructure and policy, vary among countries. Thus, classifying problematic plastic products by their polymer types could oversimplify the issue. For example, although the overall recycling rate of PS is considered to be very low (Global Plastics Outlook, OECD 2022), the recycling rate for PS in the Republic of Korea is high due to national policies, such as Extended Producer Responsibility scheme.
Republic of Korea	In the Republic of Korea, the Ministry of Environment implements the following measures for reduction of identified single-use plastics or problematic plastics: A. Reducing Use of Single-Use Products i. Prohibit providing single-use products free of charge. ii. Replace single-use products (e.g., cups, food containers, plastic bags) with multi-use products. iii. Implement any other market- and price-based measures to support this objective (e.g. providing incentives to service providers and consumers of multi-us products, removing subsidies for single-use products etc.) B. Ensuring Products Are Less Problematic i. Ensure products can be reused, recycled, or composted. ii. Include designs that improve the capacity for recycling and safe, environmentally sound disposal. iii. Obligate manufacturers or importers to recycle their products. iv. Evaluate the reusability, recyclability, and compostability of products, and label or notify the results. v. Substitute or replace materials to those with less environmental impact in products, or improve the design to those less likely to end up in the environment.
India	India has banned identified single use plastic products with effect from 1st July 2022 which high littering potential / adverse environmental impact and low utility based upon a comprehensive study and stakeholder engagement. The approach adopted is given below: A. Utility 1. Hygiene: This aspect is connected to conditions or practices that help to maintain health and prevent disease by preventing contamination. Both rigid and flexible packaging (i.e., film) are used for packing/delivering food and non-food items. For food and pharma packaging, barrier properties and aroma retention is also important. The level of hygiene required is dependent on end-use. 2. Product safety: The packaging is designed to ensure (a) integrity of the product, (b) protection of product against adulteration, counterfeiting, pilferage and spillage (c) safe delivery till it reaches the end user (d) retention of properties as required, reduction of wastage. 3. Essentiality: Whether product is essential for the intended use and whether affordable is available. 4. Social impact: It is the effect of products on the wellbeing of the society. It is related to lifestyle and/or fraction of population using the product. 5. Economic Impact: It is related to the plastic industry and therefore the consumption of plastics for the specific application. The influence of product on the total value chain is also considered.

Country	Examples provided by experts in their responses to the questionnaire
	B. Environmental adverse impact 1. Collectability: It is related to ease of collection, and amount of waste being collected. If more waste is collected, less will be seen in litter. Scattered and contaminated waste, as well as small- size and light weight is difficult to be collected. 2. Recyclability: It is related to prevalent rate of recycling (mechanical, chemical and thermal). 3. End of Life (EoL) solutions: It is related to suitability and availability of technology for end of life solutions such as alternate use, use in bitumen road, use in cement-kiln, energy recovery etc. 4. Impact of alternative on the environment: This factor is related to availability, affordability and impact of any possible alternative on environment. Reference may be made to Life Cycle Assessment of alternatives. 5. Littering Propensity: This factor is related to litter caused by the product and found in public places, remote places, villages, tourist spots, seas, beaches, roads, rivers and water bodies, waste water streams etc.
Egypt	According to the Egyptian National Waste Management law and the National Strategy for banning single use plastic bags, there are some restrictions and measures had been taken regarding single use plastic bags considering the following criteria: 1- Adverse impact on human health and environment (micro plastic release – littering in the marine environment) 2- Sustainability of production and consumption 3- Recyclability 4- Availability of feasible alternatives 5- Social and economic assessment.
New Zealand	New Zealand has implemented bans on single-use and hard-to-recycle plastics. The plastic phase-outs in New Zealand focused on food and beverage products, as these make up the largest proportion of plastic that is littered and this type of packaging frequently contaminates recycling systems. The food and beverage sector has been transitioning to alternative plastic types and other material types over recent years. New Zealand's product bans have targeted hard-to-recycle plastic products (polymer-based), single-use plastic products or both. New Zealand ran a public consultation process to understand support and industry readiness to phase out selected products and availability of practicable alternatives to switch to. From 1 October 2022, New Zealand banned PVC food trays and containers, polystyrene and expanded polystyrene takeaway food and drink packaging, plastics with pro-degradant additives, plastic drink stirrers, and cotton buds with plastic stems. From 1 July 2023, New Zealand also banned plastic produce bags, plastic straws, and plastic plates, bowls and cutlery, and began a transition towards fully home compostable product labels. Exemptions and extensions were essential in implementing this product ban policy. For example, the banning of plastic drinking straws required: - An exemption for health and disability requirements, and - A 2.5-year extension for drinking straws that form an integral part of the packaging to enable industry to switch to a suitable alternative. Drawing from our domestic experience, we have learnt that regulations need to take a nuanced and sector-specific approach. We therefore consider that an exemptions process should be considered as part of discussions on criteria and non criteria based approaches. It is important to note that our domestic phase outs targeted one sector only, based on industry readiness, which may support the need for the plastics treaty to take a sector-specific approach to addressing problematic and avoidable plastic products.

Country	Examples provided by experts in their responses to the questionnaire
European Union	A comprehensive impact assessment, which served as a basis for the EU-Single Use Plastics Directive, identified single use plastics (such as packaging, disposable cups, straws or cutlery) and fishing gear as main sources of marine litter in Europe. Together, these constituted 84% of plastic marine litter items, among them the most environmentally harmful items in the marine environment. Furthermore, the placing on the market of products made from oxo-degradable plastic is prohibited in the EU, as that type of plastic does not properly biodegrade and thus contributes to microplastic pollution in the environment, negatively affects the recycling of conventional plastic and fails to deliver a proven environmental benefit.
United Kingdom	Different sectors require different approaches. For example, in the UK within the plastic packaging sector we have taken different approaches for different types of plastic packaging: Banned Extruded and Expanded Polystyrene food and drink containers. Introduced a tax on plastic packaging with less than 30% recycled content. Will introduce a deposit return scheme for plastic bottles and an extended producer responsibility scheme for plastic packaging. The UK Plastics Pact Roadmap for film and flexible packaging.
Suriname	The EU Regulation 2019/2024 mandates that caps must remain attached to bottles during recycling to prevent contamination and loss of materials. Excessive Packaging: Products with excessive headspace or unnecessary components can be classified as unnecessary. Proposed revisions to EU packaging regulations aim to limit such practices, thereby reducing plastic waste. The EU Fertilizing Products Regulation 2019/1009 aims to phase out plastic-coated fertilizers, promoting the use of biodegradable alternatives to enhance soil health and reduce plastic pollution.

Relating to Part C

The following national-level examples were identified with respect to chemicals of concern in plastic products.

Table I.2. Examples of national measures relating to chemicals of concern in plastic products identified in questionnaire responses

Country	Examples provided by experts in responses to questionnaire
UK	There are further examples which could be considered when taking a criteria-based approach. For example, within the UK domestic chemicals regime, criteria are used within, GB CLP, UKREACH Substances of Very High Concern (SVHC) and GB Prior Informed Consent (GB PIC).
Australia	Examples of successful Australian approaches for chemicals regulation include: - Australian Industrial Chemicals Introduction Scheme (https://www.industrialchemicals.gov.au/) - Australian Chemicals Environmental Management Standard (https://www.dcceew.gov.au/environment/protection/chemicals-management/national-standard) - Australian Poisons Standard (regulated by Therapeutic Goods Administration) https://www.tga.gov.au/how-we-regulate/ingredients-and-scheduling-medicines-and-chemicals/poisons-standard-and-scheduling-medicines-and-chemicals/poisons-standard-susmp)
Canada	Chemicals Management Plan

Country	Examples provided by experts in responses to questionnaire
Panama	Law 187 of December 2, 2020, regulates the reduction and gradual replacement of single-use plastics, establishing the following synthetic polymers as problematic or to be avoided. [lists 24 polymers]. As can be seen, all problematic polymers are synthetic polymers present in synthetic plastics. Therefore, the classification of plastic products based on composition, discussed in point III.2, should be repeated in point II.2. Similarly, the non criteria classification of plastic products based on the present additive is repeated in this point II.2. While it is true that additives can be classified according to their functionality, plastic products containing them cannot be classified this way. However, it is useful to make this classification of additives since it is much easier to substitute or eliminate these chemicals from plastic product formulations if their function is known.
Switzerland	Disseminate practical examples, including practices that are already working in other countries. For example, the recent ban on microplastics intentionally added to products in the EU (Commission Regulation (EU) 2023/2055) which will soon be followed by a similar provision in the Swiss legislation on chemicals.
Republic of Korea	Some countries restrict the use of chemicals in products based on risk assessments, considering hazards, risks, volume of domestic distribution, alternatives, and applications (MOE KOR, Enforcement Decree of the Act on Registration and Evaluation of Chemical Substances). Regarding P&B, the US TSCA, EU REACH, and K-Reach have different criteria and levels for ranking substances based on factors like half-life, bio-concentration factor (BCF), and bio-accumulation factor (BAF). Children's Products: Many countries implement control measures for children's products, such as mandating dissolution tests (Sb, As, Cd, Cr, Pb, Ba, etc.) and restricting specific chemical content in products. i. e.g. Cd ≤ 75mg/kg, total phthalates ≤ 0.1% (The Safety Standards for Children's Products Subject to Safety Verification, MOTIE Republic of Korea) Food Containers: Many countries have also established standards for food containers, especially for those with recycled plastic content. i. e.g., standards for foreign substances and adhesive content, and criteria for the removal of artificial contaminants. (Standards and Specifications concerning Apparatus, Containers and Packages, MFDS, Republic of Korea, etc.) a. For metals used in the manufacturing or repair of food contact surfaces, lead must be 0.10% or below, and antimony must be 5.0% or below. b. Lead in tin plating for food contact must also be 0.10% or lower. c. The leaching amount of artificial contaminants from PET must be 0.01 mg/L or lower, and the residual amount of artificial contaminants in PET must be 0.22 mg/kg or lower
Egypt	Egypt adopts a list of chemicals that are used in different industries and include some chemicals used in plastic production. The list includes restrictions on the consumption of these s chemicals without license. - The license demonstrates the amount of chemical used according to the factory capacity and sets conditions for factories storage capacity for the used chemicals. National regulations regarding dealing with hazardous substance According to the National Law for Regulation and Management of Waste No. 202 of 202 and Article No. 53, a technical committee was established headed by WMRA (waste Management Regulatory Authority) and the competent administrative authorities for hazardous materials and waste, and the controls and requirements for the handling and integrated management of hazardous materials and waste shall be set, and the method of reducing their generation shall be determined. The committee has a technical secretariat comprises of experienced persons, and the executive regulations of the law shall determine the formation of the committee and its jurisdiction. According to the executive regulations, the committee is responsible for the following:

Country	Examples provided by experts in responses to questionnaire
	1- Adopting a method for classifying hazardous materials according to any of the systems in force globally and applicable locally 2- Approving lists of hazardous materials 3- Reviewing the requirements and controls for licenses for trading hazardous materials issued by the ministries and relevant authorities and approving the controls and technical requirements that must be taken into consideration when issuing licenses for trading these hazardous materials by those authorities The Technical Secretariat is responsible for the following: 1- Preparing a draft of the topics to be raised and discussed 2- Communicating with the ministries and relevant authorities and following up on the implementation of the committee's decisions and publishing them on WMRA website 3- Preparing a periodic report on technical and technological developments in the field of sound management of hazardous substance and waste 4- Preparing a periodic report on Egypt's position and commitments to international environmental agreements related to hazardous materials and waste 6- Preparing reports on topics closely related to the system of sound environmental management of hazardous materials and waste Other Regulations governing Handling of Industrial Chemicals: Decree No. 151/1999 of the Ministry of Industry that covers hazardous industrial chemicals and lists chemicals which cannot be used without a license.
El Salvador	National Plan on Marine Litter of El Salvador

Relating to Part D

Table I.3. Examples of national measures relating to plastic product design, focusing on reusability and recyclability, identified in questionnaire responses

Country	Examples provided by experts in responses to questionnaire
Australia	- Examples of recycling targets and scheme: https://www.dcceew.gov.au/environment/protection/waste/packaging/2025-national-packaging-targets - recycling guidance for households: https://arl.org.au/ - Example of Australia's scheme for transparency and information disclosure requirements: - Australia's recycled content traceability
Canada	- Labelling examples: Environment and Climate Change Canada. 2023. Recycled content and labelling rules for plastics: Regulatory Framework Paper. Canada Plastics Pact. The Golden Design Rules for Plastic Packaging. (website contains Canadian guidance)
Philippines	**Single-use displaced traditional return and refill systems worsening plastic pollution:** In the country there are 164 million pieces of sachet plastic waste discarded daily. Sachets are cheap, single-use, disposable packaging of small quantities of consumer products ranging from shampoo, and soap, to coffee and condiments. These sachets were introduced in the late 1960s by multinational companies for sale in about a million neighbourhood stores catering to low-income families. In doing so, they displaced traditional dispensing and refill systems using reusable containers, a sustainable practice dating back to the 16th century.

Country	Examples provided by experts in responses to questionnaire
Republic of Korea	- Evaluation of Quality and Structure of Packaging Materials - Standard for recycled raw material used for food containers - Standard for Labelling of percentage of use of recycled raw materials - Standards for certification of Eco-Label: Reusable Containers Rental Service - Act on the promotion of saving and recycling of resources, Republic of Korea - Assessment of Circular Usability of Products - Material and Structural Improvement System for Electrical and Electronic Products - Material and Structural Improvement System for Packaging
UK	**Plastic Product design** The UK's Environment Act Schedule 7 provides some examples of what could be considered in a criteria based approach or non criteria approach for plastic product design: aspects of the product's design which affect its expected life; the availability or cost of component parts, tools, or anything else required to repair or maintain the product; whether the product can be upgraded, and the availability or cost of upgrades;any other matter relevant to repairing, maintaining, remanufacturing or otherwise prolo ging the expected life of, the product; the ways in which the product can be disposed of at the end of its life (including whether and to what extent it can be recycled, and whether materials used in it can be extracted and reused or recycled). https://www.legislation.gov.uk/ukpga/2021/30/schedule/7 **Reuse:** UK examples of life cycle assessments and material selection for reuse can be found here: - Cadbury Dairy Milk packaging using certified recycled plastic - UK Government guidance on plastic packaging tax

Annex II - Additional elements identified by experts in their responses to the questionnaire

This Annex includes a compilation of additional elements submitted by experts in the questionnaire responses, respectively for Part B, C and D.

Relating to Part B

Table II.1. Possible control and implementation measures for plastic products identified in questionnaire responses

Type of measure	Rationale
Data disclosure	Without data disclosure, supply chain actors cannot comply with safety and sustainability standards and cannot know which materials are technically feasible in innovation planning.
Transparency, traceability and reporting mechanisms	Ensure mechanisms are in place to report on transparency and traceability measures. Products that do not meet data disclosure standards would include, need to be regulated.
Statistical guidelines for plastic material flows	Globally harmonised statistics, indicators and methodologies for tracking plastics and associated chemicals from the environment into the economy, within the economy, and from the economy to the environment (pollution). (See UNEP/UNITAR project for the development of statistical guidelines)
Addressing issues related to microplastic	Addressing issues related to microplastics is crucial. Each Party needs to take necessary measures on microplastics, depending on the level of adverse impacts on human health and the environment. As for specific measures to prevent leakage of microplastics, it should be noted that appropriate measures could vary depending on each Party's situation, such as the level of infrastructure related to sewage system, as an example Addressing intentionally-added microplastics may be much easier using a non-criteria approach, since the objective should be elimination wherever possible, and the question of recyclability does not arise.
Eco modulation	Less sustainable products could face higher tax rates, while more essential and sustainable ones could receive tariff reductions as an incentive.
Sustainable production and consumption standards and patterns	Production and consumption standards and patterns that prevent and minimize human exposure or release into the environment throughout the life cycle of the plastic product and fosters the safe and environmentally sound management, including the recyclability and disposal, of plastic products containing them (Sustainable Production and Consumption) Focusing on sustainable production and consumption through product design, environmentally sound waste management, efficient use of resources, and circular economy approaches.
National action plans	Parties develop and implement comprehensive national action plans that prioritize the management of plastic waste. These plans should include measures for plastic waste recycling, improve plastic products recyclability and the promotion of circular economy principles tailored to each country's specific context.

Type of measure	Rationale
Promoting waste management infrastructure	Investing in and improving waste management infrastructure is crucial for mitigating plastic pollution. The developed countries shall provide capacity building and technical assistance to developing countries to enhance their waste management systems.
Encouraging public awareness and education	Addressing plastic pollution requires a collective effort from all sectors of society. The treaty should include provisions for public awareness campaigns and educational initiatives that promote responsible consumption and waste disposal practices.
Facilitating technology transfer	To effectively manage plastic waste, particularly in developing countries, there is a need for access to innovative technologies and best practices. The treaty should promote cooperation and technology transfer to support developing nations in their waste management efforts
Reusable packaging	Implementing a system where groceries are delivered in reusable containers can significantly reduce single-use plastic consumption. This model has shown success in various countries and aligns with sustainability goals.[103]
Bans and restrictions	Implementing outright bans or restrictions on specific plastic products known to cause significant environmental harm (e.g., plastic bags, microbeads).
Promotion of product design	Encourage Parties to promote product design and treatment of plastic products in a more circular manner. The following elements are suggested: - Products that are reusable, recyclable, renewable, compostable or can be redesigned using cyclical methods. - Treatments that prevent leakage of plastics into the environment as much as possible, through such effective measures as handling, collection, transportation, storage, recycling, recovery and final disposal of plastic waste in an environmentally sound manner. - Use of alternative plastics, such as bio-based plastics and biodegradable plastics, which significantly reduce adverse impacts on the environment compared to before replacement.
Extended producer responsibility (EPR)	Requiring producers to take responsibility for the entire lifecycle of their products, including post-consumer waste management.
Taxes and levies	Imposing taxes or levies on certain plastic products to discourage their use and promote alternatives (e.g., plastic bag levies).
Subsidies for alternatives	Providing financial incentives for the development and use of environmentally friendly alternatives to conventional plastics.
Industry commitments	Encouraging voluntary commitments from industry stakeholders to reduce plastic production, improve recycling rates, and develop sustainable products.
Public-Private Partnerships	Fostering collaborations between governments, businesses, and NGOs to address plastic pollution through innovative solutions and shared goals.
Best practices and recommendations	Promoting general best practices for plastic product design and manufacturing without strict compliance requirements. This can include industry-led initiatives and voluntary standards.
Incentive programs	Implementing programs that provide incentives for companies to innovate and adopt sustainable practices, such as tax breaks, subsidies, or recognition schemes for environmentally friendly products.

[103] K. Raubenheimer and N. Urho, Global criteria to address problematic, unnecessary and avoidable plastic products. Nordic Council of Ministers, 2024.

Type of measure	Rationale
Non criteria based approaches	Non criteria based approaches, such as targets, have been found to be too vague or insufficient from the discrete actions required to effect change. High level targets not attributable to individual organisations can also lead to a loss of accountability; for instance, where an industry body is responsible for administering the scheme.
	Non-criteria based approaches such as incentives or education to achieve behavioural change, targeting both companies and consumers, could be useful to maximise the environmental benefits of action on problematic plastics. For instance, potentially unnecessary plastic products not otherwise considered problematic may be candidates for voluntary phase outs, contributing to objectives of reduced plastic consumption or pollution.

Table II.2. Possible processes for the listing of a problematic and avoidable product, and problematic products identified in questionnaire responses

Concept	Approach
Principles for the development of criteria and non criteria based approaches	Consider the full life cycle of products; Includes a wide range of products; Maintain flexibility to capture new products; Differentiate between the three classifications of problematic, unnecessary, and avoidable plastics; Avoid overlap with criteria for hazard/of concern and sustainable design; Not be limited by lack of information, technology, or economic feasibility; Stimulate innovation; Recognize variations in waste management and leakage rates; Act in isolation to foster focused and effective solutions[104].
	Criteria and non-criteria based approaches should be focused, specific, scientifically based, and easily implementable.
Expert bodies	As with other multilateral environmental agreements (MEAs), such as the Rotterdam and Stockholm Conventions, assessments of candidate products against the ILBI's criteria could be carried out by an expert body created as a subsidiary body to the ILBI's governing body. The expert body could then recommend the listing of assessed products to the governing body, which would make the final decision on each listing. The ILBI could also set out the process for a Party to submit a proposal to the governing or expert body to review a plastic product or category of plastic products in accordance with the established criteria and within the mandate of the treaty (e.g., building on a similar approach to that under the Stockholm Convention). The expert body could also recommend changes to the ILBI's criteria for adoption by the governing body, to ensure the criteria remain relevant and evidence and science-based over time, taking into account scientific knowledge, including Indigenous knowledge, and uses and applications
	Any list of products that are banned or to be eliminated or whose application is to be regulated must be regularly reviewed and updated. Palau suggests that this work be conducted by COP at regular intervals, starting with COP 1 for the elaboration of the first list based on the criteria with the support of the STEPs.
Process for updating lists	However, we do anticipate that consideration must be given to how additions to the list are made over time. This could take the form of a forward-looking

[104] K. Raubenheimer and N. Urho, Global criteria to address problematic, unnecessary and avoidable plastic products. Nordic Council of Ministers, 2024.

Concept	Approach
	mechanism in the text of the agreement that enables the listing of plastic products that are deemed problematic and/or avoidable. The mechanism might include: • Mechanism for introducing criteria if needed, and updating the criteria and list over time; • Ingredient disclosure requirements to assist future prioritization efforts; and • Coordination with sector-specific programs of work (fishing gear, agriculture) which may identify problematic plastic products within these sectors. • A time-limited exemption and process similar to Article 6 of the Minamata Convention on Mercury may be envisaged.
	In future COPs, the list of products could be reviewed.
	There are other more complicated approaches which could be considered: • Conduct an assessment to compare alternatives (e.g. compare environmental impact of single-use versus reuse systems). Switzerland has for ex., conducted an assessment for beverage containers to find the best packaging option for each beverage. • Systematic assessment process to evaluate applications, e.g., sector-by-sector, and find the best product/system options. o Step 1: Identify the applications where plastic products create a significant negative environmental or health impact. Example application: § "Take-away of hot beverage" -> single use plastic cups are problematic as they often end up in the environment and lead to a high use of primary material. o Step 2: For each significant application, identify alternative options for products and associated systems. Example options for the application "take-away of hot beverage": § plastic cup (single-use) § paper cup (single-use) § plastic cup (reuse system) § metal cup (reuse system) o Step 3: Assess the environmental and socio-economic impacts of available options, compare the results to find the best option. o Step 4: Define measures (e.g. phase-out, redesign and sectoral harmonization, set reuse target) in order to promote the best option.
Exemptions	As with other MEAs, the ILBI should include exemptions for certain uses or applications (e.g., to address a lack of suitable environmentally sound and viable alternatives, meet accessibility needs for people with disabilities and medical needs, and enable continued use in certain justified cases).
	Blanket exemptions should not be permitted as a clear set of criteria should identify the specific conditions of approval, and where possible, a pathway towards redesigning of the product for sustainability.
	Paints and coatings, and products made of elastomers shall not be considered as plastic products.
	Some plastic products shall be excluded from the scope of the new Treaty. In this case are applications related to medical, pharmaceutical and sanitary purposes in which alternative solutions cannot be used or are not available. Products necessary to ensure food and water security (to maintaining the safety and quality), especially in developing countries, as well as products used in cases of emergencies and natural disasters should also be excluded.

Concept	Approach
	Accordingly, products necessary to ensure humanitarian purposes including medical, pharmaceutical, sanitary and hygienic products and food and water security especially in developing countries should also be excluded from the scope of the agreement.
	Care should be taken to not allow overarching exemptions to whole sectors, such as health care, as this would prevent the development of viable alternatives for essential and non-essential items used by the sector.
	Moreover, the State of Qatar is eager to ensure food security for its citizens and residents. The sector of agriculture, in Qatar and elsewhere in the developing world, relies on the use of plastics to ensure food security. Any compromise in these sectors would entail serious setbacks and disastrous repercussions for human lives. Therefore, products in sectors such as medical and agriculture must be excluded from the scope of the ILBI.
	Applications related to medical, pharmaceutical, sanitary and hygienic purposes could be considered as specific in terms of use of plastic products. This is due to undisputable necessity of using such products, the absence of alternative solutions and potential disastrous consequences for the humanity in case of applying prohibitions and restrictions with respect to such products.
	These criteria should be applicable for all uses and applications, while allowing exemptions, for example for some specific products in the medical or military sector, where some products could be difficult to replace or avoid. A mechanism allowing specific exemptions on the request of Parties should be established.
	Exemptions and extensions were essential in implementing this product ban policy. For example, the banning of plastic drinking straws required: - An exemption for health and disability requirements, and - A 2.5-year extension for drinking straws that form an integral part of the packaging to enable industry to switch to a suitable alternative. Drawing from our domestic experience, we have learnt that regulations need to take a nuanced and sector-specific approach. We therefore consider that an exemptions process should be considered as part of discussions on criteria and non-criteria based approaches.
	It is crucial to avoid general exemptions for entire sectors, such as healthcare, to promote the development of viable alternatives for both essential and non-essential items used in that sector.
Essential uses	Montreal Protocol on substances that deplete the ozone layer, a product could qualify as "essential" only if:[105] • it is necessary for the health, safety or functioning of society; and • there are no available technically and economically feasible alternatives or substitutes that are acceptable from the standpoint of the environment and human health.
	Also, we need to pay due regards to the essential uses where there are no alternatives, in such cases as medical and welfare, food safety and hygiene, and disaster management uses

[105] Reference: Decision IV/25: Essential Uses, Meeting of the Parties to the Montreal Protocol

Concept	Approach
	Essential products are defined as such if they are necessary for the health, safety or is critical for the functioning of society (encompassing cultural and intellectual aspects); and there are no available technically and economically feasible alternatives or substitutes that are acceptable from the standpoint of environment and health, as defined in the Montreal Protocol. Sustainability assessments must be considered broadly, addressing all three of the Triple Planetary Crises including climate change, biodiversity loss and pollution, as well as human health impacts, human rights, social and economic stability.
	A product that is deemed non-essential in one country, but essential in another (e.g. plastic bags for drinking water) could trigger financial, capacity building and technical support just transition away from unsafe and unsustainable products (e.g., by improving drinking water infrastructure). There is conceptual precedent for such an approach in the Minamata Convention.4 safe and sustainable products. This approach has a conceptual precedent in the Minamata Convention.
	If a product is considered non-essential in one country but essential in another, financial support should be provided to develop capacities and facilitate a just transition.

Relating to Part C

Responses relating to the determination of control measures to be applied, and/or specific control measures to be applied

While the questionnaire primarily related to the identification/classification of chemicals of concern, under the premise that specific chemicals would be subject to control measures under the provision, some experts did raise potential non criteria based control measures. These are listed below.

Table II.3. Possible control and implementation measures for chemicals of concern in plastic products identified in questionnaire responses

Type of measure	Rationale
Regulation of problematic and avoidable plastic products	Elimination of chemicals and polymers of concern will result in less problematic products.
Emissions and releases limits	Zero tolerance of emissions and releases throughout the life cycle of chemicals, macroplastics, microplastics and nanoplastics.
Trade restrictions	Restrict import and export of known problematic products, possibly based on lists developed from final regulatory action at the national level or regional level.
Consider other lists of chemicals in other jurisdictions / conventions to avoid duplication.	Also discuss how to deal with such shortlisted chemicals in the initial list that are already listed in other chemical conventions.
Restrictive measures, exemptions	Elimination of certain chemicals in certain plastic products and definition of exemptions where necessary for certain uses. Good examples are given in the EU proposal (Webinar slides, June 2024).

Type of measure	Rationale
Adoption of national standards	Incorporating standards and criteria from leading national regulations, such as those from the United States Environmental Protection Agency (EPA) or the European Chemicals Agency (ECHA).
Financial and regulatory Incentives	Implement programs that provide financial benefits or regulatory incentives for companies reducing or eliminating hazardous chemicals in their products. This can include tax breaks, subsidies, or grants for research and development of safer materials. Rationale: Encourages innovation and adoption of safer materials, driving industry-wide improvements. Sources: Ellen MacArthur Foundation, Resource Recycling Systems.
Transparency and traceability	Harmonised producer transparency. Global databases that are publicly available to provide product risk profile, risk assessment (based on standards) and risk management information.
Sharing of information	Global database of substances, sources, exposure pathways, risk management profiles and assessments, and reduction options
Disclosure requirements	Requiring manufacturers to disclose the chemicals used in plastic products, including their identities and quantities, can help identify chemicals of concern
Traceability measures	Traceability measures, such as unique identifiers for chemicals and products, can facilitate the tracking of chemicals throughout the supply chain and product life cycle.
Reporting	Globally harmonised reporting on meaningful progress towards eliminating problematic products, based on global targets and indicators.
Labelling	Labelling the relevant chemicals of concern and plastic products based on the international harmonized requirements to allow their environmentally sound use and handling throughout their life cycle.
Statistical guidelines for plastic material flows	Globally harmonised statistics, indicators and methodologies for tracking plastics and associated chemicals from the environment into the economy, within the economy, and from the economy to the environment (pollution).
Specifying chemicals of interest in plastic products, and require manufacturers, importers and exporters to make composition information available, to be shared with the public and with other Parties.	This will help to implement the treaty, as better information on what is in plastic products will be available (see Concept Paper submitted by Switzerland at INC-4: concept_paper_on_plastic_products_and_chemicals_of_concern.pdf (unep.org).
Global knowledge hub	
Chemicals management	Hierarchy of action for chemicals management
	Parties should be encouraged to establish national chemicals management system (if they have yet to have one) and establish close collaboration with the industry to enhance transparency on additives usage in plastics.

Type of measure	Rationale
Risk management	Measures implemented to control or mitigate risks identified in the risk assessment process, including restrictions or bans on certain chemicals in plastics.
	Harmonising methodologies for hazard and risk assessment
Design for Environment	Encouraging the design of plastic products with reduced hazardous chemical content.
Identification, evaluation and promotion of safer alternatives and substitutes	Evaluating the availability and feasibility of safer alternatives to chemicals of concern in plastic products; can help drive the development and adoption of less hazardous options. This approach incentivizes innovation and the substitution of hazardous chemicals with safer alternatives.
	Promote the identification and use of safer chemicals as substitutes for harmful monomers, additives and processing aids.
	Identifying and promoting safer alternatives to chemicals of concern.
	Establish guidelines for evaluating and implementing safer chemical alternatives.
Preventative action	Taking action to prevent potential harm when scientific evidence about a chemical's risks is uncertain but indicates possible significant harm
Circular economy principles	Promoting the design of plastic products that minimize the use of hazardous chemicals and facilitate recycling and safe disposal.
Precautionary principle	In the absence of scientific consensus on the safety of a chemical, the precautionary principle can be applied to restrict or phase out its use in plastic products to protect human health and the environment.
	The ILBI could also consider non-criteria-based approaches, such as the precautionary principle, which would shift the burden of proof to manufacturers to demonstrate the safety of chemicals used in plastic products, rather than relying solely on pre-defined criteria.
Industry-specific guidelines and best practices	Develop and promote best practices tailored to different industrial sectors. These guidelines should include recommendations for safer chemical substitutes, safer production processes, and end-of-life management.
	Disseminate practical examples, including practices that are already working in other countries.
Sustainable production and consumption	Sustainable production and consumption that prevents and minimizes human exposure or release into the environment throughout the life cycle of the plastic product and fosters the safe and environmentally sound management, including the recyclability and disposal, of plastic products containing them
Measures for environmentally sound management	Relevant measures that ensure that all such chemicals, groups of chemicals, and plastic products containing them, are used in an environmentally sound manner throughout their life cycle, including for their reusability, repairability, recyclability and final disposal
Waste management	All products must be collected and appropriately sorted, particularly those destined for reuse, refill and recycling. Recycling of products containing chemicals of concern may need to be sorted into a separate waste stream

Type of measure	Rationale
	while transitioning to safe products through implementation of II.2, II.3 and II.5.

Table II.4. Possible processes for the listing of chemicals of concern in plastic products identified in questionnaire responses

Concept	Approach proposed
Procedures for the creation/update of lists	A mechanism for updating the lists, based on other MEAs, could include: 1. Proposal made by any Party based on a required set of information, e.g. risk assessment. 2. Proposal forwarded to technical review committee. 3. Proposal and recommendation made to COP. 4. Decision made by COP by two-thirds majority. 5. Decision binding on all Parties, unless a time-bound exemption has been approved by the Parties.
	Such a risk-based approach with clear steps have already been in place and applied under the Stockholm Convention, as the following: 1. Submission of a proposal for listing a chemical 2. Screening phase 3. Conducting a risk profile 4. Risk management evaluation 5. Decision-making regarding listing of chemicals based on national circumstances.
	The criteria need to be in a format so that they can evolve over time, as scientific knowledge increases. The COP should therefore have the opportunity to formalise the criteria at a later stage.
	Uses or applications where legislation is advanced could be particularly relevant for criteria or non criteria based approaches. Priority could be given to those approaches that are already working in other jurisdictions (e.g., general ban of intentionally added microplastics in every day products like detergents, cosmetics, make up etc... or in artificial football turfs, and to those plastic products that may have direct human and/or environmental contact, e.g. food packaging, children's toys.
	Any list of chemicals of concerns that are banned or to be eliminated or whose application is to be regulated must be regularly reviewed and updated. Palau suggests that this work be conducted by COP at regular intervals, starting with COP 1 for the elaboration of the first list based on the criteria with the support of the STEPs.
	As with other MEAs, such as the Rotterdam and Stockholm Conventions, assessments of candidate chemicals or groups of chemicals of concern against the ILBI's criteria could be carried out by an expert body created as a subsidiary body to the ILBI's governing body. The expert body could then recommend the listing of assessed chemicals or groups of chemicals of concern in plastic products to the governing body, which would make the final decision on each listing.

Concept	Approach proposed
	The ILBI could also set out the process for a Party to submit a proposal to the governing or expert body to review a chemical or group of chemicals in accordance with the criteria and treaty mandate (e.g., building on a similar approach to that of the Stockholm Convention). The expert body could also recommend changes to the ILBI's criteria for adoption by the governing body, to ensure the criteria remain relevant and science-based over time, taking into account scientific knowledge, including Indigenous knowledge, and uses and applications (e.g., for consideration of exemptions).
	Once chemicals are identified as of concern, the governing body would decide to list them. As such, this listing would not lead to any restrictive measure but would trigger the application of other provisions likely to be contained in the treaty (such as provisions (5) on product design, (8) on emissions and releases, (10) on trade, (13) on transparency and labelling, and monitoring requirements).
	One expert expressed that packaging and plastic products identified in the (EU) SUP Directive should be tackled as a priority.
Subsidiary bodies	The governing body of the future Instrument may consider to establish an advisory scientific, technological and economic panel (ASTEP) to study upon a risk-based approach concentration of chemicals of concern in plastic products and their possible risks and hazards for human health and environment.
	The scientific body of the instrument can develop a criteria based approaches following due process which is inclusive, transparent and balanced based upon global experience and best practices. The approaches need to be adopted by the Governing Body of the instrument.
	Scientific Advisory Panels: Establishing panels of experts to review and assess the latest scientific evidence on chemicals in plastics.
Essential use	When addressing specific uses and applications of chemicals of concern, the EU essential use concept could be considered. For example, the EU essential use concept defines 'necessary for health or safety' as: "The use and the technical function of the substance in that use are necessary in order to: - Prevent, monitor or treat illness and similar health conditions - Sustain basic conditions for human or animal life and health - Manage health crises and emergencies - Ensure personal safety - Ensure public safety" Another example in the EU Essential Use Concept is the definition of 'acceptable alternatives' which could also be considered. This is defined as "substances, materials, technologies, processes or products, which, from a societal point of view: (i) are capable of providing the function and the level of performance that society can accept as sufficiently delivering the expected service; AND (ii) are safer (their overall chemical risks to human or animal health and the environment throughout the whole life-cycle are lower in comparison to the most harmful substance)." For chemicals meeting hazard-based screening criteria, there could also be further risk assessment for specific uses and applications (similar to Annex E and Annex F of the Stockholm Convention) including to determine if the chemical meets a threshold of 'essential use.' Under this risk assessment stage, an exposure assessment could be conducted considering production data, uses, releases to the environment, including during disposal, and environmental fate, and exposures to

Concept	Approach proposed
	people (including children) across the lifecycle. Socio-economic considerations could also be evaluated to determine possible control measures for the chemicals. These considerations would include whether any uses meet the test of 'essential use' or not, and whether alternatives are available, feasible and accessible. Control measures could include complete elimination of all uses, restrictions to certain specific uses, or no use restrictions but advisory measures such as labelling or public education.
Exemptions	As with other MEAs, the ILBI should include exemptions for certain uses or applications (e.g., to address a lack of suitable environmentally sound and viable alternatives and enable continued use in certain justified cases).
	In general, these criteria should be applicable for all uses and applications, while allowing exemptions, for example in some specific products (e.g., the medical or military sector), where some chemicals could be difficult to replace or in order to avoid regrettable substitution. A mechanism allowing specific exemptions on the justified request of Parties should be established. Only application in plastics and plastic products should be targeted by the instrument, focusing on the presence of chemicals of concern

Relating to Part D

Table II.5. Control and/or implementation measures in support of design for recyclability of products and quality of recycled plastic products identified in questionnaire responses (D.10)

Concept	Approach proposed
Certifications, Labels and Standards	• Product design standards to increase the recyclability of plastic products should provide flexibility so that standards are in line with domestically recyclable materials. • Certify and label products that contain a set percentage of verified recycled material. • Globally harmonizing (purity) standards and certifications for recycled materials and products for recycled plastics that meet the specifications necessary for reuse in high-quality applications and to ensure the use of high-quality recyclable materials. • Purity standards to include limits on contaminants and additives • Establish a common methodology to develop international standards to define recycled plastics. • Establish Material Traceability Implementing systems for tracking and tracing the origin and composition of recycled plastics. • Standardize components and materials to enhance compatibility and recyclability[106]. • Implementing rigorous quality control measures throughout the recycling process. Adhering to certification standards like the Recycled Content Certification to ensure the quality and reliability of recycled plastics. • National plans should define and enforce quality standards (based on National quality control frameworks, industry standards) for recycled plastic products, ensuring that they meet the required specifications for various applications – also those to be set in an overarching global guidance or at national level. • Use international standards to avoid arbitrary or unjustifiable discrimination or disguised restriction on international trade.

[106] ISO, ASTM International

Concept	Approach proposed
Standardize product design and Packaging	• Packaging is easily identifiable according to the type of plastic used (e.g. shape, color, label) • Preference for monomaterial packaging. • Standardization of products and packaging components
Standardized testing method	• Develop and implement standardized methods for testing the quality of recycled plastics (based on ISO 15270). • Require companies to submit monthly quality results from accredited testing and analysis institutions • Laboratory tests to demonstrate that products do not contain protective chemicals, heavy metals, and other elements that generate health concerns due to their indirect use with food, or direct contact with medicines, etc . • Implement robust testing protocols to evaluate the recyclability of materials to ensure that only suitable materials are used in production. This includes assessing compatibility of different materials with recycling processes.
Incentives	• economic incentives to drive product design high up the waste hierarchy to prioritize safe and sustainable substitute materials, products, systems and services, and safe and sustainable reuse, repair, refill, repurpose, and remanufacture. • Offer subsidies or grants for research and development in sustainable plastic design and advanced recycling technologies. • Provide economic incentives for manufacturers to design products with higher recyclability and for consumers to choose recyclable products • Advocate for policies that incentivize recyclable product design and support infrastructure development for recycling • Implementing financial and regulatory incentives to encourage the design and production of recyclable plastic products[107].
Disclosure, traceability and transparency (linked to safety)	• Ensure transparency in the chemical composition of plastics, including any processing aids. • Require transparency on the safety and environmental impact of plastic products across their full life cycle, to inform decision-making. • Implement systems to track the origin and composition of recycled materials108. • Reporting to include the products source, management, and intended use of recycled products. • Require verification of self-reporting on recycled content to increase traceability • Ensure traceability of recycled materials to maintain quality standards and meet regulatory requirements.
Socio-economic considerations	Products are designed and produced in a manner that minimizes economic, social, cultural, and human health impacts, during the recycling process.
EPR	• Implementing global EPR programs that require producers to take responsibility for the end-of-life management or for the entire lifecycle of their products, including end-of-life management of their products. Or • Implementing nationally-determined EPR schemes
Ban	• Banning recycled plastics for food contact, children's toys, and medical applications because it is extremely difficult to ensure the safety of these products.

[107] Ellen MacArthur Foundation, Resource Recycling Systems.
[108] European Food Safety Authority. (2021). Safety assessment of recycled plastic materials and articles for use in food contact.

Concept	Approach proposed
Improving and standardizing waste collection and sorting processes	• Improve collection, sorting and cleaning of products to limit contamination of waste stream. • Ensure effective waste management system • Use EPR schemes, including container-deposit schemes, to reduce contamination of waste stream and secure high-quality recycled plastics. • Standardized processes and operational standards (for PET bottles) to include: removing caps and labels; primary optical sorting; crushing; density separation; cleaning and dehydrating three or more times; hot air drying; secondary optical sorting; dust removal; metal sorting. • sensor-based sorting technologies (e.g. near-infrared) can increase purity of recycled material.

Table II.6. Control and/or implementation measures in support of design for reusability of products and the quality of reuse systems identified in questionnaire responses (D.11)

Type of measure	Rationale
Standards	**Durability and Safety**[109] Establish minimum durability requirements for reusable products110: - the product is able to withstand repeated use. - The parts of the product are easily replaceable. - The product is easily repairable. - eliminate risks associated with additional leaching of potentially hazardous chemicals - Use mechanical testing to assess durability - Apply recycled content safety standards - Outdoor products should have UV stability based on the solar radiation (in kilo Langley per year) of the region where reuse is intended while promoting chemical simplification. Solar radiation is mapped per region worldwide. **Washing*** Establish washing and sanitation standards for the product and reusing services: - to maintain a high level of hygiene - to avoid chemical contamination in reused plastic products (e.g. food contact) - to ensure chemicals used to clean items for reuse do not pose human health or environmental hazard. - harmonized reuse labeling, packaging design that allows for effective washing * Standards developed through the participation of stakeholders including businesses, waste workers, the informal sector, consumer and environmental groups, and public health professionals **Size and Shape** - Standardized dimensions, shapes and features to facilitate interoperability and ease of use in various systems as well as interchange of components for reusability by multiple brands (like wine bottles, tin cans, etc.) - Design products with smooth surfaces and minimal crevices to make cleaning easier
Tests (linked to standards)	- Establish **durability and safety** test for manufacturers (for multiple uses of the product) and require products to pass.

[109] Coelho, P. M., et al. (2020). Sustainability of reusable packaging–Current situation and trends. Resources, Conservation & Recycling: X, 6, 100037.
[110] Coelho, P. M., et al. (2020). Sustainability of reusable packaging–Current situation and trends. Resources, Conservation & Recycling: X, 6, 100037.

Type of measure	Rationale

	- Requirements for the test could include:
	  - Ensure product can withstand higher temperatures and pressures in wash cycles.
	  - ensure low microplastic and nanoplastic particles emissions
	  - ensure no chemicals of concern contamination/leakage of reused plastic products (test to prevent cracking, clouding, decomposition, crazing, deformation, etc.)
	  - test under a range of conditions including heat and abrasion
	  - assess durability, including impact strength, flexural strength, scratch or abrasion resistance, elongation and tearing strength, etc.

Guidelines	Guidelines on **design for reusability** should address the following aspects: - Material choice (durability, avoid chemicals which hinder reusability) - Shape of the product (durability; easy to collect, transport and clean) - Standardization (harmonized design, make products suitable for big-scale reuse systems) - Recyclability (at some point, a reusable product will still turn into waste, and then it should be recyclable. Refer to guidelines
Incentives	- Provide financial incentives for manufacturers to design reusable products and for consumers to use them. Provide grants for academic and industrial research into new materials and designs that enhance reusability - Provide economic incentives to certified enterprises (food containers) that meet the following criteria: - The production and design of food containers must comply with the Standards and Specifications concerning Apparatus, Containers, and Packages. - The production and design of food containers must consider reusability and recyclability, including using single materials and separable components. - Enterprises must establish management standards and plans for reusing and recycling food containers. - Encouraging novel and creative design solutions that may not fit traditional criteria but offer unique benefits. - Offer subsidies or grants to support the development and maintenance of reuse systems. - Incentivize development of reuse systems that are material agnostic
EPR and policy tools	- Ecomodulated fees for EPR, levies, plastic taxes, and the financial mechanism under the future treaty to direct funds toward, or incentivize reuse/refill systems. - EPR policies that hold manufacturers accountable for the entire lifecycle of their products, including reuse and recycling. - Reuse systems should be capable of adjusting system design for unmet return rates (e.g., utilizing incentives like deposits, fees or rewards to enhance returns) - Ensure reuse system implementation and operation are unrestricted by national boundaries. - Approving regulations for the progressive replacement of synthetic plastics with recycled plastics or bioplastics through legal means specific to each country

Table II.7. Additional elements identified in responses to Part D of the questionnaire

Element	Rationale/comment
Process for updating annexes and product design criteria	High-level criteria could be reflected in different annexes or sections of annexes, as well as guidelines. A 5-steps process for updating annexes can be established, such as for other MEAs:

Element	Rationale/comment
	1. Proposal made by any Party based on a required set of information, e.g. risk assessment. 2. Proposal forwarded to technical review committee. 3. Proposal and recommendation made to COP. 4. Decision made by COP by two-thirds majority. 5. Decision binding on all Parties, unless a time-bound exemption has been approved by the Parties. 6.
	The COP shall adopt guidelines to improve the quality of reuse systems
	An **expert body** could also recommend changes to the ILBI's criteria for adoption by the governing body, to ensure the design criteria remain relevant and science and evidence-based over time
	A step-wise approach is proposed for the adoption of design criteria in the instrument: first, the establishment of overarching design criteria based on defined elements; second, the determination of sector- or product-specific criteria by future decision-making bodies, liaising with standardisation institutions.
	Criteria included in National Plans
Mechanism for identification of uses or applications	Uses or applications for design criteria may be identified as part of other provisions in the treaty or at a later date by the COP or expert group (e.g., targeted uses or applications identified for problematic and avoidable plastic products, chemicals of concern, or to reduce emissions or releases of plastics and associated pollutants into the environment).
Suggestion for staggered approach for (reusable) product design	**Short-term:** (focus of EG2) To articulate a roadmap for addressing the underlying technical issues, so that member states can consider at INC-5 the necessary level of detail of the treaty text, and what can be deferred for future work. **Medium -term**: The COP can adopt at its first meeting guidance to assist Parties in their implementation of the design paragraph. **Long-term**: Address how design criteria can simplify products and improve recyclability and thus assist Parties in reducing the quantity and toxicity of plastics produced.
Examples of uses of (safe) recycled plastics	**Children's toys:** Manufacturers of children's goods assure that their products meet international quality standards. For example, the American company Green Toys produces children's goods from recycled plastic obtained from used milk containers. In the process of processing the collected containers at the Green Toys factories in the USA, they receive purified high-density polyethylene, one of the safest and cleanest types of plastic in the world. The company has many awards from ecological associations, parenting centers and children's educational institutions. **Textiles:** the Japanese company Uniqlo turns about 20% of the donated unsuitable clothes into soundproofing materials for cars or high-calorie solid fuel. It replaces fossil fuel and is used for industrial purposes, for example, in boilers for paper production. The manufacturer notes that 22 t-shirts need to be

Element	Rationale/comment
	processed for sound insulation material in the amount sufficient for one car. https://rupec.ru/news/48328/.

Annex III – References provided by experts

This Annex includes lists of references provided by experts in the questionnaire responses, respectively in Part B, C and D, that could not be linked to specific criteria or non criteria based approaches in the above synthesis of responses.

Relating to Part B

1. A. Gambarin, Mapping the plastics value chain a framework to understand the socio- economic impacts of a production cap, no. April. Oxford Economics, 2024.
2. Canada Plastics Pact. 2024. Guidance Document: Supporting the elimination of unnecessary & problematic plastics.
3. Canadian Council of Ministers of the Environment. 2022. A Roadmap to Strengthen the Management of Single-use and Disposable Plastics.
4. Ellen MacArthur Foundation. (2017). Circular Design Guide.
5. Ellen MacArthur Foundation. (2021). Incentive Systems for Reusable Products.
6. Environmental Protection Agency (EPA). (2021). Life Cycle Assessment (LCA) Resources.
7. European Chemicals Agency (ECHA). (2020). Chemicals and Plastic Additives.
8. EU-Single Use Plastics Directive including the corresponding impact assessment
9. Fact Sheet: Plastics and the Triple Planetary Crisis - Ikhapp . Available at: https://ikhapp.org/material/fact-sheet-plastics-and-the-triple-planetary-crisis/
10. Food Packaging Forum. (2021). Design for Reuse
11. Food Packaging Forum. (2022). Sustainable Food Packaging.
12. Global Plastics Outlook, OECD 2022
13. Government of Canada. 2019. Discussion Paper: A proposed integrated management approach to plastic products to prevent waste and pollution.
14. GreenBlue. (2020). Engaging Consumers in Reuse.
15. Guidelines to government signatories on target setting and progress reporting for Global Commitment area A' (https://emf.thirdlight.com/link/3r4wjvo55x9d-94pvat/@/#id=2)
16. https://emf.thirdlight.com/link/f91ftilv95x-v9ppz/@/preview/1?o
17. Consumer Goods Forum (2021) Golden Design Rules, available at: https://www.theconsumergoodsforum.com/wp-content/uploads/2021/07/2021-Plastics-All-Golden-Design-Rules-One-Pager.pdf
18. initial_plastic_products_list_georgia_peru_rwanda_switzerland_thailand.pdf (unep.org)
19. ISO. (2019). Standards for Sustainable Development.
20. Journal of Cleaner Production. (2016). Standardization and Modularization in Product Design.
21. Journal of Industrial Ecology. (2018). LCA of Medical Devices.
22. Journal of Industrial Ecology. (2018). LCA of Reusable Plastic Products
23. M. Cordier, T. Uehara, B. Jorgensen, and J. Baztan, "Reducing plastic production: Economic loss or environmental gain?," Cambridge Prism. Plast., vol. 2, p. e2, Jan. 2024, doi: 10.1017/plc.2024.3.
24. National Geographic. (2019). Consumer Guide to Reusable Plastics.
25. National Restaurant Association. (2021). Plastic use in hospitality.
26. OECD. (2016). Extended Producer Responsibility.
27. PlasticsEurope (2020). Lightweight Packaging.
28. Resource Recycling Systems. (2019). Deposit-Refund Systems and Reuse
29. Sustainable Packaging Coalition. (2020). Modular Design in Packaging
30. technical report on Chemical Substances in Plastics (prepared by the Industry and Economy Division of the United Nations Environment Programme),
31. The Essential Use Concept for the Global Plastics Treaty - Ikhapp . Available at: https://ikhapp.org/material/the-essential-use-concept-for-the-global-plastics-treaty/
32. The 'Towards Ending Plastic Pollution by 2040' by the Nordic Council of Ministers
33. The WWF report "Regulating high-risk plastic products: global measures to eliminate, reduce, circulate and safely manage high-risk plastic products".
34. UNEP. (2021). Global Waste Management Outlook
35. EMF (2022) The Global Commitment 2022, available at: https://www.ellenmacarthurfoundation.org/global-commitment-2022/overview

36. European Commission. (2020). A European Strategy for Plastics in a Circular Economy.
37. https://pubmed.ncbi.nlm.nih.gov/34030416/
38. https://www.iris-eng.com/plastic-identification-and-classification/
39. https://www.iso.org/files/live/sites/isoorg/files/store/en/PUB100472.pdf
40. https://www.redalyc.org/journal/4263/426365043004/html/
41. https://www.researchgate.net/publication/370110359_Post-Consumer_Plastic_Waste_Management_From_Collection_and_Sortation_to_Mechanical_Recycling
42. https://www.sciencedirect.com/science/article/pii/S2405844020311464
43. International Journal of Environmental Research and Public Health. (2018). Sanitization of Reusable Plastic Items.
44. Plastics Industry Association. (2019). Best Practices in Plastic Product Design.
45. Report of the first UK-Brazil dialogue: Evaluation of potential criteria for identifying chemicals and polymers of concern and problematic plastic products | circulareconomy.earth | Chatham House
46. Report of the second UK-Brazil dialogue: Criteria classification decision trees for problematic and avoidable plastic products | circulareconomy.earth | Chatham House
47. UK Plastics Pact (2022) Eliminating Problem Plastics, available at https://wrap.org.uk/sites/default/files/2022-02/Eliminating-problem-plastics-v4.pdf
48. UNEP. (2020). Guidelines for Designing Reusable Products.
49. WRAP (2024) Film and flexible roadmap https://www.wrap.ngo/sites/default/files/2022-02/Eliminating-problem-plastics-v4.pdf

Relating to Part C

1. Blue Angel eco-label criteria.
2. Canada's Chemicals Management Plan
3. Commission Delegated Regulation (EU) 2023/707 amending Regulation (EC) No 1272/2008 (Ref: Official Journal of the European Union L 93, 31.3.2023, p. 7-39 as regards hazard classes and criteria for the classification, labelling and packaging of substances and mixtures).
4. Concept Paper submitted by Switzerland at INC-4: concept_paper_on_plastic_products_and_chemicals_of_concern.pdf (unep.org).
5. CRP submitted by Norway on behalf of Norway, Cook Islands, Rwanda during INC-4 (chemicals_of_concern_in_plastics_proposal_by_cook_islands_rwanda_and_norway.pdf (unep.org)).
6. Ellen MacArthur Foundation. (2017). Circular Design Guide.
7. Environmental Protection Agency (EPA) risk assessment frameworks.
8. European Chemicals Agency (ECHA) on REACH regulations.
9. European Chemicals Agency (ECHA). (2020). Chemicals and Plastic Additives.
10. Global governance of plastics and associated chemicals' commissioned by the Secretariat of the Basel, Rotterdam and Stockholm Conventions (https://www.basel.int/Portals/4/download.aspx?d=UNEP-FAO-CHW-RC-POPS-PUB-GlobalGovernancePlastics-2023.pdf)
11. https://chm.pops.int/TheConvention/POPsReviewCommittee/Guidance/tabid/345/Default.aspx
12. https://documents.un.org/doc/undoc/gen/k23/040/88/pdf/k2304088.pdf?fe=true&token=K6CcYXfEGbIpqV3KiY
13. https://documents.un.org/doc/undoc/gen/k23/040/88/pdf/k2304088.pdf?fe=true&token=K6CcYXfEGbIpqV3KiY
14. https://ipen.org/sites/default/files/documents/quick-views-4th-session_v2_web.pdf
15. https://enb.iisd.org/plastic-pollution-marine-environment-negotiating-committee-inc4-summary
16. https://pub.norden.org/temanord2024-508/3-potential-criteria-for-problematic-unnecessary-and-avoidable-plastic-products.html
17. https://unctad.org/system/files/non-official-document/ditc-ted-12112023-INC3-plastics-Comments-v2.pdf
18. https://unece.org/DAM/trans/danger/publi/ghs/ghs_rev04/Spanish/ST-SG-AC10-30-Rev4sp.pdf
19. https://www.pops.int/UNECE, 2023, ST/SG/AC.10/30/Rev.10
20. I.E. Napper and R.C. Thompson, Plastics and the Environment, Annual Review of Environment and Resources 48:55-79, 2023;
21. J. Beaman and C. Bergeron, A Summary of Literature on the Chemical Toxicity of Plastic Pollution to Aquatic Life and Aquatic-Dependent Wildlife: State of the Science White Paper, EPA-822-R-16-009, United States Environmental Protection Agency, December 2016).

22. J. Flaws et al., Plastics, EDCs & Health: A Guide for Public Interest Organizations and Policy-Makers on Endocrine Disrupting Chemicals & Plastics, Endocrine Society and IPEN, December 2020
23. J. Muncke et al., Impacts of food contact chemicals on human health: a consensus statement, Environmental Health 19:25, 2020
24. M. Wagner, L. Monclús, H.P.H. Arp et al. State of the science on plastic chemicals – identifying and addressing chemicals and polymers of concern, 2024; http://dx.doi.org/10.5281/zenodo.10701706
25. National Geographic. (2019). Consumer Guide to Reusable Plastics.
26. OECD. (2016). Extended Producer Responsibility.
27. P.J. Landrigan et al. The Minderoo-Monaco Commission on Plastics and Human Health. Annals of Global Health 89(1), 23, 2023; https://doi.org/10.5334/aogh.4056
28. UNEP. (2021). Global Waste Management Outlook.
29. UNEP/UNITAR project for the development of statistical guidelines
30. United Nations Environment Programme, An Assessment Report on Issues of Concern: Chemicals and Waste Issues Posing Risks to Human Health and the Environment, September 2020
31. United Nations. (2015). Sustainable Development Goals.

Relating to Part D

32. Bocken, N. M., et al. (2016). Product design and business model strategies for a circular economy. Journal of Industrial and Production Engineering, 33(5), 308-320.
33. Caldeira et al. (2022). Safe and Sustainable by Design chemicals and materials – Framework for the definition of criteria and evaluation procedure for chemicals and materials. Publications Office of the European Union, Luxembourg.
34. Coelho, P. M., et al. (2020). Sustainability of reusable packaging – Current situation and trends. Resources, Conservation & Recycling: X, 6, 100037.
35. Deloitte study commissioned by WWF-Norway. December 2023. Design for Circularity Relevant technical considerations for the International Legally Binding Instrument on Plastic Pollution, including in the Marine Environment.
36. Demystifying Reuse in the Global Plastics Treaty by the University of Portsmouth. Global Plastics Policy Centre (2023). Making reuse a reality: A systems approach to tackling single-use plastic pollution. Revolution Plastics, University of Portsmouth, UK.
37. Ellen MacArthur Foundation. (2019). Reuse: Rethinking Packaging. Available at: https://www.ellenmacarthurfoundation.org/reuse-rethinking-packaging.
38. Ellen MacArthur Foundation. (2016) (2023). The New Plastics Economy: Rethinking the future of plastics.
39. Ellen MacArthur Foundation's Circular Design Guide and related resources (strategies, briefs, product redesign worksheets, circular flow worksheets, etc.) https://www.ellenmacarthurfoundation.org/circular-design-guide/overview.
40. European Chemicals Agency (ECHA).
41. European Commission. (2018). A European Strategy for Plastics in a Circular Economy.
42. European Commission, 'A European Strategy for Plastics in a Circular Economy'.
43. European Food Safety Authority. (2021). Safety assessment of recycled plastic materials and articles for use in food contact.
44. European Union Plastics Strategy. Policy documents outlining guidelines for recyclable plastics.
45. EU Regulation No 282/2008 on recycled plastic materials and articles intended to come into contact with foods.
46. EU safe-and-sustainable-by-design framework.
47. Food Packaging Forum. (2022). Sustainable Food Packaging; European Food Safety Authority (EFSA).
48. Global Alliance on Circular Economy and Resource Efficiency (GACERE). (2024). Circular Design of Plastic Products Policy Brief.
49. Global Plastics Policy Centre and Break Free From Plastic. (2023). Accelerating the scaling of reuse systems | Global Plastics Treaty Policy Brief. Available at: https://plasticspolicy.port.ac.uk/research/reuse-policy-brief/.
50. Greenwood, S., et al. (2020). Hygiene Aspects of Reusable Food Containers. Reference Module in Food Science, Elsevier.

51. Guillard, V., et al. (2018). The Next Generation of Sustainable Food Packaging to Preserve Our Environment in a Circular Economy Context. Frontiers in Nutrition, 5, 121.
52. Hahladakis, J. N., & Iacovidou, E. (2018). Closing the loop on plastic packaging materials: What is quality and how does it affect their circularity? Science of The Total Environment, 630, 1394-1400.
53. Hahladakis, J. N., et al. (2018). An overview of chemical additives present in plastics: Migration, release, fate and environmental impact during their use, disposal and recycling. Journal of Hazardous Materials, 344, 179-199.
54. Healthy Toys. (2020). Guide to Safer Toys.
55. Heidbreder, L. M., et al. (2019). Tackling the plastic problem: A review on perceptions, behaviors, and interventions. Science of The Total Environment, 668, 1077-1093.
56. Huysman, S., et al. (2017). Performance indicators for a circular economy: A case study on post-industrial plastic waste. Resources, Conservation and Recycling, 120, 46-54.
57. International Toy Industry Association, ISO.
58. ISO 14021:2016 - Environmental labels and declarations — Self-declared environmental claims (Type II environmental labeling).
59. ISO 14040:2006 Environmental management — Life cycle assessment — Principles and framework.
60. ISO 15270:2008 Plastics — Guidelines for the recovery and recycling of plastics waste.
61. ISO, ASTM International.
62. IVL Swedish Environmental Research Institute. "Recycling technology and waste path, including market criteria in collection and sorting (local, national, global)." Available at: https://ivl.diva-portal.org/smash/get/diva2:1845203/FULLTEXT01.pdf.
63. Journal of Cleaner Production. (2016). Sustainable Electronics.
64. Journal of Industrial Ecology. (2018).
65. Kane, G. M., et al. (2018). Towards design-driven innovation for sustainability in medical devices. Procedia CIRP, 78, 100-105.
66. Kasirajan, S., & Ngouajio, M. (2012). Polyethylene and biodegradable mulches for agricultural applications: a review. Agronomy for Sustainable Development, 32(2), 501-529.
67. Lofthouse, V., & Prendeville, S. (2018). Human-centred design of products and services for the circular economy–A Review. The Design Journal, 21(4), 451-476.
68. Mayyas, A., et al. (2012). Design for sustainability in automotive industry: A comprehensive review. Renewable and Sustainable Energy Reviews, 16(4), 1845-1862.
69. Medkova, K., & Fifield, B. (2016). Circular design-design for circular economy. Lahti Cleantech Annual Review, 32-47.
70. Monnot, E., et al. (2019). Combining environmental and economic performance in circular economy: The case of refillable packaging. Journal of Cleaner Production, 223, 1122-1135.
71. National Science Foundation (NSF), Horizon 2020.
72. Northen, S., March, A., Bowyer, C., Fletcher S. (2023). Accelerating the scaling of reuse systems | Global Plastics Treaty Policy Brief. Global Plastics Policy Centre and Break Free From Plastic. Available at: https://plasticspolicy.port.ac.uk/research/reuse-policy-brief/.
73. OECD Environment Working Papers No.236. Plastic Recycled Content Requirements.
74. OECD, 'Economic Instruments for Environmental Management'.
75. OECD, 'Research and Development for Sustainable Product Design'.
76. OECD, European Union.
77. OECD. (n.d.). A chemicals perspective on designing with sustainable plastics. Available at: https://www.oecd.org/en/publications/a-chemicals-perspective-on-designing-with-sustainable-plastics_f2ba8ff3-en.html.
78. Pivnenko, K., et al. (2016). Recycling of plastic waste: Presence of phthalates in plastics from households and industry. Waste Management, 54, 44-52.
79. PlastChem – State-of-the-science of hazardous chemicals in plastic (plastchem-project.org).
80. Plastics Europe, American Chemistry Council.
81. Plastics Industry Association, Sustainable Packaging Coalition.
82. PR3, the Global Alliance to Advance Reuse. Recommendations on the revised draft text of the international legally binding instrument on plastic pollution, including in the marine environment. Available at: https://www.pr3standards.org/global-plastic-treaty-inc-4.
83. Ragaert, K., et al. (2017). Mechanical and chemical recycling of solid plastic waste. Waste Management, 69, 24-58.

84. Sandin, G., & Peters, G. M. (2018). Environmental impact of textile reuse and recycling – A review. Journal of Cleaner Production, 184, 353-365.
85. SCS Recycled Content Standard, GreenBlue Recycled Material Standard in North America.
86. Simon, B., et al. (2016). Life cycle impact assessment of beverage packaging systems: focus on the collection of post-consumer bottles. Journal of Cleaner Production, 112, 238-248.
87. Sustainability Guide developed by SVID (Stiftelsen Svensk Industridesign), Interreg Baltic Sea Region, European Regional Development Fund. (2018) within the EcoDesign Circle.
88. Swedish Environmental Research Institute. May 2024. Design for recycling of products containing plastics.
89. The Association of Plastic Recyclers (APR). APR Design Guide for Plastics Recyclability https://plasticsrecycling.org/apr-design-guide.
90. The Consumer Goods Forum. Golden Design Rules.
91. The Ellen MacArthur Foundation, 'Catalysing Action: Accelerating the Transition to a Circular Economy'.
92. The Ellen MacArthur Foundation - Reports and guidelines on circular economy practices and recycling.
93. The food packaging Forum. (2022). Hundreds of chemicals migrate from reusable plastic bottles. https://www.foodpackagingforum.org/news/hundreds-of-chemicals-migrate-from-reusable-plastic-bottles.
94. UNEP (2022). "Can I Recycle This?" A Global Mapping and Assessment of Standards, Labels, and Claims on Plastic Packaging Report.
95. UNEP. (2020). Guidelines for Sustainable Packaging.
96. UNEP. (2021). Biodegradable Plastics in Agriculture.
97. UNEP, 'Global Partnership on Marine Litter'. Public consultation documents.