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DIALOGUE ON PLASTICS POLLUTION AND ENVIRONMENTALLY SUSTAINABLE PLASTICS TRADE

FACTUAL SUMMARY OF DISCUSSIONS ON SUSTAINABLE AND EFFECTIVE ALTERNATIVES AND SUBSTITUTES

Revision

Workshop 6 December 2022

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Revision

1. In furthering the objectives of the 2021 Ministerial Statement[2], the Dialogue's Plan for 2022[3] envisaged, under the workstream "Promoting Trade to Tackle Plastic Pollution", discussions covering *inter alia* sustainable and effective substitutes and alternatives, as well as technologies for such substitutes and alternatives of interest to developing Members and least developed Members. During early discussions in the year, a proposal was made to organize a dedicated workshop on the topic to help advance technical work.[4] Coordinators agreed to do so as reflected in their Ministerial Statement adopted at the 12th Ministerial Conference.[5] The objective of the workshop was to provide a strong basis for discussions in 2023 in moving towards expanding trade in environmentally sustainable and effective substitutes and alternatives and help implement the call from the Dialogue co-sponsors Ministers to "look for concrete, pragmatic, and effective outcomes … at the latest by the 13th Ministerial Conference."[6]

2. The exploratory workshop on sustainable alternatives and substitutes to plastic (the Workshop), organized in cooperation with the United Nations Conference on Trade and Development (UNCTAD), took place on 6 December 2022 and covered four specific issues: (i) working definitions for terms relevant to trade in substitutes and alternatives; (ii) Harmonized Commodity Description and Coding System (HS) code identification exercise and trade-related measures enabling substitution of single-use plastic products (SUPP) and other "problematic" goods by sustainable materials; (iii) illustrative and extended list of material substitutes and material identification exercise; and (iv) minimum criteria for lifecycle analysis and affordability, accessibility and availability. The objective of this Factual Summary is in turn to compile and showcase the wealth of information produced by the Dialogue on these topics both before and in the wake of the Workshop.

3. In total, since the Dialogue's first 2021 meeting[7] and up to the date of the Workshop, 60 interventions (presentations and statements) were made on topics directly related to trade promotion to tackle plastic pollution by 15 different delegations, 18 stakeholders and by the WTO Secretariat (see table 1 below). Most interventions (32) took place in the last two pre-plenary meetings (September and November 2022) and at the last plenary meeting before the Workshop (October 2022).

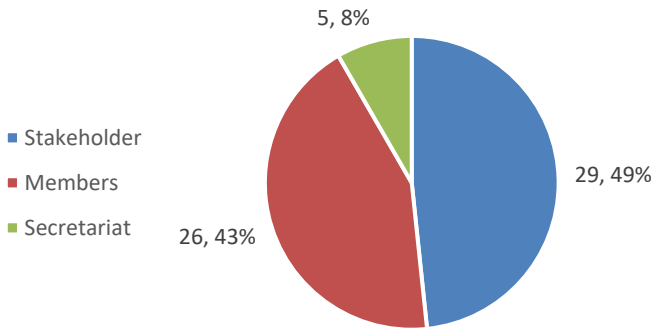
[2] See Ministerial Statement on Plastic Pollution and Environmentally Sustainable Plastics Trade (WT/MIN(21)/8/Rev.2), 10 December 2021.
[3] See Dialogue Plan 2022 (INF/TE/IDP/W/5), 21 February 2022.
[4] Aide Memoire (INF/TE/IDP/RD/41), 11 May 2022 Pre-Plenary Meeting, para. 12.
[5] See Ministerial Statement by Coordinators on Plastic Pollution and Environmentally Sustainable Plastics Trade (WT/MIN(22)/12), 13 June 2022.
[6] See Ministerial Statement on Plastic Pollution and Environmentally Sustainable Plastics Trade (WT/MIN(21)/8/Rev.2), 10 December 2021.
[7] One intervention captured by this Factual Summary was made at the Committee on Trade and Environment in 2019, specifically by Bangladesh.

Table 1: Delegations and Stakeholders who intervened on topics related to trade promotion to tackle plastic pollution

Australia	Ecuador	Maldives	Russian Federation
Bangladesh	European Union	Morocco	Switzerland
China	Guatemala	New Zealand	United Kingdom
Colombia	Jamaica	Philippines	
ALADI	IISD	Plastics Recyclers Europe	World Bank
Aptar Group	INBAR	TESS	WEF
CIEL	Nestle	UNCTAD	Yves Rocher Foundation
FAO	OECD	UNEP	Global Plastics Policy Centre (University of Portsmouth)
QUNO	Pew Charitable Trusts	WBCSD	

4. Delegations provided 26 interventions, stakeholders 29, and the WTO Secretariat 5 (see graph 1 below). Interventions covered a wide range of topics and mostly consisted of concrete suggestions (25) and actionable points (22) related to trade promotion to tackle plastic pollution, including related to the topics covered by the Workshop. These were followed by observations (15), challenges (9), and domestic policies (7).[8] Specifically on the topics covered by the Workshop, 21 interventions provided elements related to "minimum criteria for lifecycle analysis and affordability, accessibility and availability", 14 related to "working definitions", 12 related to "illustrative and extended list of material substitutes and material identification exercise", and nine to "HS code identification exercise and trade-related measures enabling substitution of SUPP and other 'problematic' goods by sustainable materials."

Graph 1: Breakdown of interventions by delegations, stakeholders and the WTO Secretariat



5. In the following sections, a summary of the interventions related to each of the topics covered by the Workshop is provided.

1 WORKING DEFINITIONS FOR TERMS RELEVANT TO TRADE IN SUBSTITUTES AND ALTERNATIVES

6. The 2021 Ministerial Statement highlights the importance of continuing to engage and support actions in other international processes, including definitions. The Dialogue's participants have noted that an important aspect of transparency is to build better understanding of the terminology commonly used in regard to plastics, plastic substitutes, and circularity in ways that are relevant to trade and trade policy discussions.[9] The need to develop certain working definitions for terms like substitutes, alternatives, reusable, compostability, recyclability, biodegradability was raised early in the discussions.[10] It was suggested that tentative working

[8] Each intervention could include simultaneously suggestions, actionable points, observations, challenges and/or domestic policies. In this sense, the total number of these add up to more than the total number of interventions.

[9] Aide Memoire (INF/TE/IDP/RD/41), 11 May 2022 Pre-Plenary, para. 11.

[10] UNCTAD presentation (INF/TE/IDP/RD/36), 11 May 2022 Pre-Plenary Meeting.

definitions could be developed for terms such as plastic; microplastic; plastic substitutes; plastic alternatives; environmentally sustainable; effective; single-use; reusable; biodegradable; erodible; recyclable; recyclable content; compostable; plastic-related emissions; waste management technologies.

7. Several Members and stakeholders highlighted that in the absence of internationally agreed definitions on plastic substitutes and alternatives, many international bodies had adopted their own definitions, for example the United Nations Environment Programme (UNEP), Basel Convention, and the International Organization for Standardization (ISO). One Member observed that the WTO also needed its own set of definitions which should have a trade facilitating function. One important consideration in this regard was that the definitions had to be identifiable or testable at the border.[11]

8. One stakeholder emphasized that while Public International Law already addressed alternatives and substitutes to other forms of pollutants or substances of concern, it did not make a clear differentiation between substitutes and alternatives. There were also several principles of international environmental law that had to be taken into consideration when identifying or liberalising trade in alternatives and substitutes to plastics: (i) the precautionary principle and the polluter-pays principle in the Rio Declaration; (ii) the principle of self-sufficiency and the principle of prevention mentioned in other international legally binding treaties; and (iii) the no harm principle of customary international law.[12] It also underscored that, in order to effectively compare substitutes or alternatives, it was first of all essential to understand the negative lifecycle impacts of plastic thoroughly. Furthermore, when searching for alternatives to plastics it could be useful to proceed with an ecological or "true cost" approach asking the following questions: (i) is there really a serious societal need for the plastic product? Does the value of the product in performing that need exceed the true costs of the product including the damage created in its lifecycle, including the extended life of the plastic once produced and becomes waste? (ii) Is there a way to fulfil the same societal need (*e.g.* without plastics), that can increase the ratio of societal worth over costs of damage done (negative externalities)?[13]

9. One stakeholder noted that it was not only single-use plastics (SUP) that were the challenge but also unnecessary and problematic plastics. This included *inter alia* recyclable plastics that in practice were uneconomic or too difficult to recycle due to their size or how they were combined or multi-layered with other plastics. Therefore, there was a need for harmonized definitions.[14] It was also observed that alternatives were usually heavier than plastic packaging which increased logistics costs, consumption of fuel, and the intensity of transport units' usage. Alternatives could increase the mass of packaging waste, reduce food shelf life, and have a potential to contribute even more to both consumption and waste due to the food spoilage and transportation losses. All these factors had to be carefully considered.[15]

10. Across the meetings, discussions and written submissions, a series of proposed definitions were put forward by delegations and stakeholders. In addition, several stakeholders responded to the guiding questions circulated along with the Workshop agenda.[16] In particular, UNEP provided a written submission[17] to the Workshop reflecting relevant definitions used in two documents prepared for the first session of the intergovernmental negotiating committee (INC-1) launched by the United Nations Environmental Assembly (UNEA) to develop an international legally binding instrument on plastic pollution, including in the marine environment.[18] The table below reflects definitions and key elements to be taken into account, as suggested by participants and stakeholders at the Dialogue's pre-plenary and plenary meetings, as well as in response to the guiding questions to the Workshop:

[11] Informal summary, 7 December 2022 Plenary Meeting. (forthcoming)
[12] CIEL submission to the Workshop (INF/TE/IDP/RD/80).
[13] CIEL presentation (INF/TE/IDP/RD/79), 17 November 2022 Pre-Plenary Meeting.
[14] University of Portsmouth statement (INF/TE/IDP/RD/68), 17 October 2022 Pre-Plenary Meeting.
[15] Informal Summary (INF/TE/IDP/R/8), 11 October 2022, Plenary Meeting.
[16] Workshop on sustainable alternatives and substitutes to plastic agenda and guiding questions (INF/TE/IDP/RD/87).
[17] UNEP submission to the Workshop (INF/TE/IDP/RD/91)
[18] The documents are: Glossary of key terms, Note by UNEP Secretariat (UNEP/PP/INC.1/6); and Plastic Science, Note by UNEP Secretariat (UNEP/PP/INC.1/7).

Table 2: Working definitions for terms relevant to substitutes and alternatives raised in the context of Dialogue discussions

CONCEPT	KEY ELEMENTS
Plastic	Usually a synthetic material, either a polymer or combination of polymers of high molecular mass modified or compounded with additives such as fillers, plasticizers, stabilizers, lubricants, pigments. According to ISO, "plastic is a material which contains as an essential ingredient a high polymer and which, at some stage in its processing into finished products, can be shaped by flow". Polymers are natural or synthetic substances composed of very large molecules, called macromolecules, that are multiples of simpler chemical units called monomers. There are a number of detailed definitions of the term "polymer", such as by the OECD.[19]
	Plastic means a solid material which contains as an essential ingredient one or more high-molecular-mass polymers and which is formed (shaped) during either manufacture of the polymer or the fabrication into a finished product by heat and/or pressure. Plastics have material properties ranging from hard and brittle to soft and elastic.[20]
Micro-plastics	Generic term for small pieces of plastic under 5 mm.[21]
	Sources, challenges are related to its "behaviour": chemical (*e.g.* POPs), physical, and biological effects.[22]
	Primary and secondary microplastics.[23]
	Microplastics refers to plastic particles less than five millimeters in diameter, including nano-sized particles. There is ongoing debate about the size limit; the definition of microplastics as particles less than 5 mm in diameter is used. Microplastics are categorized into primary and secondary. Primary microplastics are manufactured to carry out a specific function (e.g., cosmetics, abrasive cleaning beads). Secondary microplastics result from wear and tear or fragmentation of larger objects, both during use and following loss to the environment.[24]

[19] BRS submission to the Workshop (INF/TE/IDP/RD/85), referring to Draft technical guidelines on the environmentally sound management of ESM of plastic wastes (TG on ESM of plastic waste).

[20] UNEP submission to the Workshop, referring to Amendment to the annex of the Protocol of 1978 Relating to the International Convention for the Prevention of Pollution from Ships (MARPOL), resolution MEPC.201(62), annex, "Revised MARPOL annex V", regulation 1.13.

[21] "Addressing Single-use Plastic Products Pollution Using a Life Cycle Approach", UNEP 2021.

[22] BRS submission to the Workshop (INF/TE/IDP/RD/85), referring to UNEP Brochure Microplastics (https://wedocs.unep.org/bitstream/handle/20.500.11822/12079/brochure-microplastics.pdf?sequence=1&amp%3BisAllowed=).

[23] Response to Workshop guiding questions.

[24] UNEP submission to the Workshop, referring to United Nations Environment Assembly resolution 2/11, "Marine litter and microplastics", para. 1; Plastics science. Note by the secretariat, Appendix I (UNEP/PP/INC.1/7), building on UNEP, From Pollution to Solution: A Global Assessment of Marine Litter and Plastic Pollution (Nairobi, 2021); M. Cole and others, "Microplastics as contaminants in the marine environment: A review", Marine Pollution Bulletin, vol. 62, no. 12 (Dec. 2011), pp. 2588–2597; and Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection, Sources, Fate and Effects of Microplastics in the Marine Environment: A Global Assessment (London, International Maritime Organization, 2015).

Plastics substitutes	Non-polymer natural materials from mineral, marine, plant, or animal origin, that have similar properties of fossil fuel-based plastics. They should have lower environmental impact along their life cycle (e.g., natural fibers, agricultural wastes, and other forms of biomass). Depending on the case, they should be biodegradable/compostable or erodible, and should be suitable for reuse, recycling, or sound waste disposal as defined by national, regional regulations or in internationally agreed definitions. They can include by-products. Plastic substitutes should not be hazardous for human, animal, or plan life.[25]
	Similar or better quality than plastics.[26]
	International legal instruments mention that when looking at substitute materials or activities a particular consideration needs to be given to the potential environmental benefits or penalties of substitute materials or activities (i.e. negative externalities).[27]
	Substitutes should offer the same level of functionality. For instance, if substituting plastic with another material for packaging leads to product losses and waste, the environmental impact will likely be more important than that of the packaging - this trade-off should be avoided.[28]
Plastic alternatives	They can include bioplastics or biodegradable plastics. The former term usually means polymers materials produced from renewable biomass sources (e.g., vegetable fats and oils, corn starch, straw, woodchips, sawdust, and recycled food waste) and should be subject to material recycling. The latter usually refers to the end of life of plastics indicating that they biodegrade in the natural environment, or they can be composted. They can include their by-products. Plastic alternatives should not be hazardous for human, animal, or plan life. [29]
	Similar or better quality than plastics.[30]
	An alternative reduces or efficiently eliminates [pollution]: Art. 1(4) Convention for the Protection of the Ozone Layer: "Alternative substances" means substances which reduce, eliminate or avoid adverse effects on the ozone layer. International agreements emphasize that human health risks and environmental implications of alternatives need to be promoted when identifying alternatives (could also be applied to substitutes), as well as their economic and social costs.[31]
	Parties to the Basel Convention and others are invited to significantly reduce SUPP, notably through specific measures, such as the development of affordable and environmentally friendly alternatives, the use of substitutes for such products where alternatives are economically available, the reduction in their consumption. Alternative materials with less environmental impact or by reducing the size of the products.[32]

[25] UNCTAD submission to the Workshop (INF/TE/IDP/RD/83).
[26] Response to questions circulated by the WTO Secretariat.
[27] CIEL submission to the Workshop (INF/TE/IDP/RD/80).
[28] Response to Workshop guiding questions.
[29] UNCTAD submission to the Workshop (INF/TE/IDP/RD/83).
[30] Response to questions circulated by the WTO Secretariat.
[31] CIEL submission to the Workshop (INF/TE/IDP/RD/80).
[32] BRS submission to the Workshop (INF/TE/IDP/RD/85), referring to Decision BC-14/13: Further actions to address plastic waste under the Basel Convention (section II on Preventing and minimizing the generation of plastic waste, improving its environmentally sound management and controlling its transboundary movement) and TG on ESM of plastic wastes (draft).

	Alternatives providing the same service.[33]
Environmentally sustainable	Alternatives and substitutes that do not generate waste.[34]
	Substitution by multi-use products preferable to substitution of a single-use (plastic) product by another single-use (e.g. paper) product.[35]
	Substitute or alternative materials that have far less negative impactful externalities than plastics.[36]
	Truly circular alternatives and substitutes that are toxic free.[37]
	Must not contribute more than plastics to consumption and waste due to food spoilage and transportation losses.[38]
	Renewable.[39]
	Competitive price.[40]
	Holistic approach of environmental impacts, consideration of trade-offs.[41]
Effective (including cost and functionally effective)	Air and water permeability, water solubility, customer equipment and handling requirements, tensile strength, failure rate, part or total replacement costs, supply availability risk, lead time, upper and lower capacity constraints.[42]
	Need for improved access to cost-effective and environmentally friendly alternatives to plastics, in particular SUP, in developing countries.[43]
	Opportunities for displacing plastic imports in domestic marketplace in some developing countries, while also supporting livelihoods in rural communities, including by generating employment for women.[44]
	Accessible and available with a preference for indigenous and/or localized/regional supply chains; integrating the notion of industrial development.[45]
	Disposable.[46]
Single-use	Not conceived, designed, or placed on the market to accomplish, within its life span, multiple trips or rotations by being returned to a producer for refill or reused for the same purpose for which it was conceived.[47]
	Made wholly or partly from plastic and that is single-use; no threshold for a minimum level of plastic content, *i.e.* considered a single-use plastic product as soon as it contains any amount of plastic.[48]

[33] Response to Workshop guiding questions.
[34] CIEL statement (INF/TE/IDP/RD/66), 19-20 September 2022 Pre-Plenary Meeting.
[35] Aide Memoire (INF/TE/IDP/R/9), 17 November 2022 Pre-Plenary Meeting, para. 17.
[36] CIEL statement (INF/TE/IDP/RD/79), 17 November 2022 Pre-Plenary Meeting.
[37] CIEL statement (INF/TE/IDP/RD/79), 17 November 2022 Pre-Plenary Meeting.
[38] Informal Summary (INF/TE/IDP/R/8), 11 October 2022, Plenary Meeting.
[39] Response to Workshop guiding questions.
[40] Response to Workshop guiding questions.
[41] Response to Workshop guiding questions.
[42] FORTUNA COOLS submission to the Workshop (INF/TE/IDP/RD/84).
[43] 3rd co-sponsors meeting, June 2021.
[44] TESS Statement (INF/TE/IDP/RD/63/Rev.1), 11 May 2022 Pre-Plenary Meeting.
[45] Aide Memoire (INF/TE/IDP/R/9), 17 November 2022 Pre-Plenary Meeting.
[46] Response to Workshop guiding questions.
[47] Aide Memoire (INF/TE/IDP/R/9), 17 November 2022 Pre-Plenary Meeting.
[48] Aide Memoire (INF/TE/IDP/R/9), 17 November 2022 Pre-Plenary Meeting.

	UNEA-4 resolution 9 on "Addressing SUPP pollution" encourages member States to develop and implement actions to address the environmental impacts of SUPP, identify environmentally friendly alternatives to SUP, promote improved waste management and more resource-efficient design, production, use and sound management of plastics across their life cycle.[49]
	SUPP are designed and produced to be used once before being thrown away or recycled.[50]
Single-use plastic product	Plastic products not conceived, designed, or introduced into the market for multiple circuits, rotations, or uses throughout their life cycle but designed to be used only once and with a short useful life; useful life was understood as the average time in which the product performs its function.[51]
	Single-use (low durability), non-biodegradable and non-recyclable, containing harmful additives, prone to leaching, and impact on inland waterways and oceans.[52]
	Key factor is extent of usage before disposal (e.g. plastic chair as compared to plastic packaging and cutlery)[53]
	Products made wholly or partly from plastic and that are not conceived, designed or placed on the market to accomplish, within their lifespan, multiple trips or rotations by being returned to a producer for refill or reused for the same purpose for which they were conceived. Often also referred to as disposable plastic products.[54]
	Products made from oxo-degradable plastics which degraded into microplastic particles when littered.[55]
Particularly problematic products	Single-use (low durability), non-biodegradable and non-recyclable, containing harmful additives, prone to leaching, and impact on inland waterways and oceans.[56]
Reusable	Durable.[57]
	Reuse of packaging: Operation by which packaging is refilled or used for the same purpose for which it was conceived, with or without the support of auxiliary products present on the market, enabling the packaging to be refilled.[58]

[49] BRS submission to the Workshop (INF/TE/IDP/RD/85).
[50] UNEP submission to the Workshop (INF/TE/IDP/RD/91**)**, referring to Plastics science. Note by the secretariat, Appendix I (UNEP/PP/INC.1/7).
[51] Aide Memoire (INF/TE/IDP/R/9), 17 November 2022 Pre-Plenary Meeting.
[52] Aide Memoire (INF/TE/IDP/R/9), 17 November 2022 Pre-Plenary Meeting.
[53] CIEL statement (INF/TE/IDP/RD/79), 17 November 2022 Pre-Plenary Meeting.
[54] "Addressing Single-use Plastic Products Pollution Using a Life Cycle Approach", UNEP 2021.
[55] Aide Memoire (INF/TE/IDP/R/9), 17 November 2022 Pre-Plenary Meeting.
[56] Aide Memoire (INF/TE/IDP/R/9), 17 November 2022 Pre-Plenary Meeting.
[57] Response to Workshop guiding questions.
[58] "Addressing Single-use Plastic Products Pollution Using a Life Cycle Approach", UNEP 2021.

	Waste management hierarchy: recognized by decision BC-10/2 as prevention, minimization, reuse, recycling, other recovery including energy recovery, and final disposal; in doing so, encouraging treatment options that deliver the best overall environmental outcome, taking into account life-cycle thinking. Waste prevention (i.e. strict avoidance, source reduction and direct reuse), while part of waste minimization (that also covers reuse and recycling), is fundamentally different from all other activities within the waste management hierarchy as it is implemented before products or materials become wastes. Waste prevention measures occur prior to waste management, as part of strategies and actions promoting or even mandating environmentally sound production, trade and consumption. Waste prevention may involve the following strategies: (a) Strict avoidance involves the prevention of waste generation by elimination of the need for a product, or material, or by a reduction of hazardous substances and inputs, or by reducing material or energy intensity in production, consumption, and distribution. Strict avoidance also includes designing products for prolonged life. Waste prevention in this latter context extends the life of products and acts as a diversion of waste flows; (b) Source reduction involves altering production processes to minimize the use of toxic or harmful substances and/or minimizing material or energy consumption and/or maximally substituting primary raw materials with secondary raw materials that result from high quality recycling. Waste prevention in this context reduces or eliminates waste and pollution at source through process changes; (c) Direct reuse means the using again of a product, object or substance that is not waste for the same purpose for which it was conceived without the necessity of repair or refurbishment.[59]
Biodegradable	Biodegradable in natural condition.[60]
	Capable of biodegrading under biological process of organic matter, which is completely or partially converted to water, CO2/methane, energy and new biomass by microorganisms (bacteria and fungi).[61]
	Biodegradable plastics are plastics that can be broken down by living organisms into elements that are found in nature, such as carbon dioxide or methane, water and biomass. When true biodegradation is complete, no microplastics remain. Biodegradable plastics can be manufactured from renewable feedstocks or fossil fuels. Soil-biodegradable plastics can be broken down by organisms found in soil. Marine-biodegradable plastics can be broken down by organisms found in seawater.[62]
	Oxo-degradable (also called oxo-biodegradable or oxo-plastics): Oxo-degradable plastics contain additives that cause them to break down under favourable conditions, most often ultraviolet radiation or heat. Oxo-degradable plastic fragments into smaller and smaller plastic particles but has not yet been shown to truly biodegrade, raising concerns that oxo-degradable plastics are a source of microplastics.[63]

[59] BRS submission to the Workshop (INF/TE/IDP/RD/85), referring to Practical manual for the promotion of the environmentally sound management of waste: terminology (footnotes omitted).

[60] Response to Workshop guiding questions.

[61] "Addressing Single-use Plastic Products Pollution Using a Life Cycle Approach", UNEP 2021.

[62] "Single-Use Plastics Products and their alternatives: Recommendations from Life Cycle Analysis", UNCTAD 2022.

[63] "Single-Use Plastics Products and their alternatives: Recommendations from Life Cycle Analysis", UNCTAD 2022.

	Only plastics that are completely and naturally biodegradable, and NOT: partially biodegradable and forming microplastics, plastics that are biodegrade but contain toxic additives, or plastics that are biodegradable under industrial composting conditions but survive for years under most normal environmental condition.[64]
	Biodegradable plastics are broadly understood to refer to plastics that can be degraded under certain conditions, such as temperature, UV, humidity, oxygen content and pH, by microorganisms in nature, such as bacteria, mould, and algae, and turn into water or carbon dioxide and other small molecules. The timeframe, the level of biodegradation, and the environment condition required for biodegradation need to be provided, along with claim of biodegradability of plastics (European Bioplastics, 2018). Standard specifications or protocols are required for biodegradability of plastics. Some of the available standard protocols for assessment of biodegradation of plastics include ISO/17556 for aerobic biodegradability of plastic materials in soil, ISO/15985 for anaerobic biodegradation under high-solids anaerobic-digestion conditions. Both fossil-based plastic and bio-based plastic can be biodegradable or non-biodegradable under certain conditions.[65]
	Switch to biodegradables should be carefully considered as they might be more harmful for the environment (lack of controlled waste management, hindering recycling systems, higher emissions, etc.).[66]
Erodible	-
Recyclable	Recyclable under normal condition.[67]
	That can be effectively and efficiently collected, separated from the waste stream, sorted and aggregated into defined streams for recycling processes, and recycled at scale through state-of-the-art processes so that it is turned into secondary raw material of a sufficient quality so that it can find end markets to substitute for the use of the primary raw material or organic.[68]
	Material recycling: Reprocessing, by means of a manufacturing process, of a used (packaging) material into a product, a component incorporated into a product, or a secondary (recycled) raw material; excluding energy recovery and the use of the product as a fuel.[69]
	A packaging or packaging component is recyclable if its successful post-consumer collection, sorting and recycling is proven to work in practice and at scale.[70]
	Recyclable plastics must not be uneconomic or too difficult to recycle due to their size or how they were combined or multi-layered with other plastics.[71]

[64] WCO Statement (INF/TE/IDP/RD/20), 18 March 2022 Pre-Plenary Meeting.
[65] BRS submission to the Workshop (INF/TE/IDP/RD/85), referring to Draft TG on ESM of plastic wastes (subject to ongoing discussions).
[66] Response to Workshop guiding questions.
[67] Response to Workshop guiding questions.
[68] Plastic Recyclers Europe presentation (INF/TE/IDP/RD/74), 17 November 2022 Pre-Plenary Meeting.
[69] "Addressing Single-use Plastic Products Pollution Using a Life Cycle Approach", UNEP 2021.
[70] "Single-Use Plastics Products and their alternatives: Recommendations from Life Cycle Analysis", UNCTAD 2022.
[71] University of Portsmouth statement (INF/TE/IDP/RD/68), 17 October 2022 Pre-Plenary Meeting.

	Most plastic recycling is a form of down-cycling by which the polymer chains shorten and degrade with each recycling requiring the addition of virgin plastic to make the second use viable; plastics, due to their inability to break down in the environment into benign materials, equate unsightliness and damage to the aesthetics of nature and wilderness.[72]
	Plastic waste recycling (operation R3) can be categorized as follows: (a) Mechanical recycling, with the processing of waste plastic through physical sorting, size reduction, cleaning and drying, thermal melt-extrusion and pelletizing, and compounding; (b) Physical recycling, with the removal of constituents (e.g., flame-retardants) from plastic waste while keeping the plastic polymer molecules chain largely intact (solvent-based purification); c) Chemical recycling, where the plastic polymer molecules chains are broken down (recovery of chemical constituents that have been de-polymerized) and used as base chemicals, including feedstock for plastic manufacture (feedstock recycling). There are also specific aspects of recycling of common types of plastic waste (PE, PP, PS, ABS, PET, PC, PVC). "Recyclable" also could also be assumed as free of POPs and other hazardous chemicals.[73]
Recycled content	Bamboo material.[74]
	Plastic polymers made from recycled material.[75]
Compostable	Compostable in natural condition.[76]
	Implies that plastics will break down which *per se* is not a net positive unless breakdown products are benign (e.g. do not create toxicity issues, or microplastics); conditions and time by when breakdown takes place: Does it break down into benign compounds in a timely manner, and can this happen in nature or open air environments, or only in industrial settings? Do the compostable products cause conventional waste management systems to malfunction?[77]
	Capable of biodegrading under specified conditions and timescales, usually only encountered in an industrial composter (standards apply).[78]

[72] CIEL presentation (INF/TE/IDP/RD/79), 17 November 2022 Pre-Plenary Meeting.
[73] BRS submission to the Workshop (INF/TE/IDP/RD/85), referring to Draft TG on ESM of plastic wastes.
[74] Response to Workshop guiding questions.
[75] BRS submission to the Workshop (INF/TE/IDP/RD/85), referring to Draft report on Global governance of plastics and associated chemicals, November 2022.
[76] Response to Workshop guiding questions.
[77] CIEL presentation (INF/TE/IDP/RD/79), 17 November 2022 Pre-Plenary Meeting.
[78] "Addressing Single-use Plastic Products Pollution Using a Life Cycle Approach", UNEP 2021.

	Plastic designed to biodegrade in a certain period of time under managed conditions, predominantly characterized by forced aeration and natural heat production resulting from the biological activity taking place inside the material; biodegrades during composting but does not contribute to the value of the compost product, as it does not contain nutrients in its composition; industrially compostable plastic requires conditions achieved only in industrial composting facilities (i.e. temperatures over 50°C) in order to biodegrade; standards exist to specify the conditions and time required in order for a material to be labelled as compostable; home- or backyard-compostable plastic is capable of breaking down at the soil temperature and conditions found in home compost piles.[79]
	Compostable plastics are considered those plastics which have been tested and adhere to international standards, such as American Society for Testing and Materials ASTM D6400-21 (ASTM, 2001) (in the U.S.) or European Standard EN 13432:2001 (European Standard, 2001) (in Europe), for biodegradation in an industrial composting facility: in addition, this may be certified by a third party. For compostable plastics to be fully composted, disposal must happen under specific conditions of temperature, moisture, oxygen level and microbial activity, normally found in controlled composting.[80]
	Switch to compostables should be carefully considered as they might be more harmful for the environment (lack of controlled waste management, hindering recycling systems, higher emissions, etc.).[81]
Plastic-related emissions	Plastic production most often equates to releasing carbon, sequestered as fossil fuel in the earth, into the biosphere and climate; plastic production from extraction through refining and manufacturing is highly damaging to the environment, to workers, and communities; all plastics require additions of most often unknown and often harmful additives.[82]
	Bamboo products are low-carbon products to reduce high emission of plastics after substitution.[83]
	Landfilling of plastic wastes can have impacts on human health and the environment, in particular in non-engineered landfills or open dumpsites such as the potential leaching of plastics additives, particles and items into the wider environment. Gasification, pyrolysis and combustion, in particular open burning, of plastic wastes, can also have impacts on human health and the environment due to emissions and releases of greenhouse gases; and pollutants, such as unintentionally produced POPs and mercury. Pollutant emissions related to disposal and treatment of plastic wastes at respective facilities can include liquids, solids, gases, and others, which can be determined following the specific national legislation or international regulations and standards.[84]

[79] "Single-Use Plastics Products and their alternatives: Recommendations from Life Cycle Analysis", UNCTAD 2022.
[80] BRS submission to the Workshop (INF/TE/IDP/RD/85), referring to Draft TG on ESM of plastic wastes.
[81] Response to Workshop guiding questions.
[82] CIEL presentation (INF/TE/IDP/RD/79), 17 November 2022 Pre-Plenary Meeting.
[83] Response to Workshop guiding questions.
[84] BRS submission to the Workshop (INF/TE/IDP/RD/85), referring to Draft TG on ESM of plastic wastes.

Waste management technologies	Technologies are closely linked to the operations which are applied for the ESM of plastic wastes. There can be technologies for sorting, mechanic recycling, etc. Detailed information on the technologies is available. Plastics technologies that are relevant to the environment including technologies for prevention, recycling, conversion or disposal of waste; for leakage removal; and for bio-based feedstock.[85]

11. One stakeholder suggested that a glossary of terms could be developed that draws on work already underway and undertaken by international organizations.[86] In addition to the definitions included in the table above, further definitions were proposed in UNEP and UNCTAD reports of the term "bio-based plastics": "A type of plastic derived from biomass such as organic waste material or crops grown specifically for the purpose, which may or may not be biodegradable."[87] and "Plastics fully or partially produced from renewable feedstocks, such as corn, potatoes and sugarcane, or other biomass, rather than fossil fuels. The feedstock used to produce plastic is independent of its ability to be biodegraded or composted." [88]

12. Another stakeholder emphasized that a particular caution seemed to be appropriate in the context of bioplastics, compostable and biodegradable plastics as possible alternative to plastics. The definition of the term "bioplastics" varied greatly around the world but was most commonly used to describe bio-based, biodegradable, and/or compostable plastics. The use of the term "bioplastic" brought confusion about the difference between bio-based, biodegradable, and compostable materials. Just like plastics, bioplastics could also contain toxic additives and could accordingly aggravate the toxification of the planet.[89]

13. Stakeholders also proposed definitions of additional terms:

- *Environmentally sound (waste) management*: Taking all practicable steps to ensure that hazardous wastes or other wastes are managed in a manner which will protect human health and the environment against the adverse effects which may result from such wastes.[90]
- *Environmental management system*: A set of processes and practices that enable an organization to reduce its environmental impacts and increase its operating efficiency. A waste facility should have an environmental management system (EMS) in place, taking into account the size of the enterprise, the level of risk associated with the operation of the facility and other factors relevant to implementation. An EMS is often designed to be integrated into the "plan, do, check and act" model for continuous improvement and many existing systems already use this approach. It helps to ensure that environmental issues are systematically identified, controlled and monitored in the context of the need to reinforce continuous improvement. Several applicable EMS already exist in countries which are members of the Organization for Economic Cooperation and Development (OECD): ISO 14001, which is worldwide; the Eco-Management and Audit Scheme (EMAS), which is specific to European countries and has somewhat more ambitious requirements than ISO 14001. Also considered to be applicable EMS are those that are tailor--made for individual circumstances – for example, systems designed for the purpose of specific industrial sectors or enterprises.[91]

[85] BRS submission to the Workshop (INF/TE/IDP/RD/85), referring to Draft TG on ESM of plastic wastes and Draft report on Global governance of plastics and associated chemicals, November 2022.

[86] TESS Statement (INF/TE/IDP/RD/63/Rev.1), 11 May 2022 Pre-Plenary Meeting.

[87] "Addressing Single-use Plastic Products Pollution Using a Life Cycle Approach", UNEP 2021.

[88] "Single-Use Plastics Products and their alternatives: Recommendations from Life Cycle Analysis", UNCTAD 2022.

[89] CIEL submission to the Workshop (INF/TE/IDP/RD/80), referring to the Special Rapporteur on the implications for human rights of the environmentally sound management and disposal of hazardous substances and wastes, Marcos Orellana, Report on the stages of the plastics cycle and their impacts on human rights (A/76/207).

[90] BRS submission to the Workshop (INF/TE/IDP/RD/85), referring to Basel Convention, Article 2(8) and ESM Framework. See also UNEP submission to the workshop.

[91] BRS submission to the Workshop (INF/TE/IDP/RD/85), referring to Practical manual for the promotion of the environmentally sound management of waste: terminology.

- *Management (of waste)*: The collection, transport and disposal of hazardous wastes or other wastes, including after-care of disposal sites.[92]
- *Oxo-degradable plastic*: Made by blending a pro-degradant additive into the plastic during the extrusion process, which accelerates the fragmentation of plastics into plastic fragments under certain conditions. Once the product is buried in the soil, and out of sunlight, the degradation process stops and residual small plastic particles remain intact, causing the release of microplastics.[93]
- *End-of-waste*: The Basel Convention does not clarify when a waste ceases to be a waste. The Glossary of Terms of the Basel Convention provides explanatory notes in this regard (UNEP, 2017f). Possibilities for waste to cease to be waste referenced in the glossary of terms include when: (i) It has been prepared for reuse; (ii) It has undergone a recycling operation and that operation is completed; (iii) It has otherwise gained end-of-waste status as a result of a recovery operation. Some Parties have adopted conditions in their national legislation that can determine the point at which a material need no longer be classified as waste, such as the European Union (European Union, 2008) and the UK (English Environment Agency, 2016).[94]
- *Recycling*: Processing of waste materials for the original purpose or for other purposes, excluding energy recovery.[95]
- *Reuse*: Use of a product more than once in its original form.[96]

14. At the Workshop, participants highlighted that there were two types of definitions found in other international processes/fora: those contained in legally binding or otherwise agreed to documents and those found in more *soft-law* documents such as draft guidelines.[97] Some pointed to the fact that it would be important to avoid a multiplicity of competing definitions, especially when internationally agreed definitions already existed. Also, caution was called to ensure that concepts like biodegradability sufficiently took into consideration environmental, social and economic elements. There seemed to be in any case broad agreement on the value of having at least baseline or common understandings on certain key terms, such as plastic substitutes, alternatives, recycling, compostability, etc. to help ensure trade promotion could be environmentally solid and price effective. In some cases (e.g. recycling) further disaggregation of terms was considered relevant. The importance of continued close coordination with international processes such as the negotiations launched by UNEA was raised, as well as the need to focus on how these definitions would be useful for the Dialogue. In this regard, many stakeholders offered to continue to cooperate on the topic, including by working on new definitions that might be useful for the Dialogue. Participants also heard UNCTAD's recent analysis on trends in plastics trade, which had grown 20% in a short time span to USD 1.2 trillion per year, as well as on the potential for a significant increase in trade in plastic substitutes, which amounted to be USD 388 billion in 2020.[98]

2 HS CODE IDENTIFICATION EXERCISE AND TRADE-RELATED MEASURES ENABLING SUBSTITUTION OF SINGLE-USE PLASTIC PRODUCTS (SUPP) AND OTHER "PROBLEMATIC" GOODS BY SUSTAINABLE MATERIALS

15. The 2021 Ministerial Statement emphasizes the importance of identifying actions needed to improve gathering of data on trade flows and supply chains, including by utilizing the HS System of the World Customs Organization (WCO). The HS is an important starting point for

[92] UNEP submission to the Workshop, referring to Basel Convention, art. 2 (2). UNEP noted that the definition in the Basel Convention was used for environmentally sound management of hazardous wastes or other wastes.

[93] BRS submission to the Workshop (INF/TE/IDP/RD/85), referring to Draft TG on ESM of plastic wastes.

[94] BRS submission to the Workshop (INF/TE/IDP/RD/85), referring to Draft TG on ESM of plastic wastes.

[95] UNEP submission to the Workshop, referring to International Organization for Standardization, "Plastics –Vocabulary", document ISO:472:2013, s.2.1706.

[96] UNEP submission to the Workshop, referring to International Organization for Standardization, "Plastics –Vocabulary", document ISO:472:2013, s.2.1708.

[97] In both cases, there were several references to existing definitions for terms listed in the guiding questions shared in preparation to the workshop – including under the UNEA process, BRS conventions, ISO and OECD, as well as regional and domestic contexts.

[98] UNCTAD (forthcoming, 2023). Plastic pollution – The pressing case of natural and environmentally friendly substitutes to plastics.

governments and stakeholders wishing to have a more granular picture of trade flows across the life cycle of plastics products and their alternatives and substitutes.

16. Discussions highlighted that, at present, there is no yet an internationally recognized and comprehensive list (or classification) of plastics or their alternatives and substitutes to facilitate a straightforward identification[99] and participants in the Dialogue discussions identified promoting further development of the HS, and more specifically classifications relevant to material substitutes, as an area for further exploration.[100] As part of the WCO-WTO cooperation and as requested by the Dialogue Communication to the WCO[101], the WTO Secretariat also shared potential areas of work the two organizations had agreed to. One of them included better identification/differentiation of preferable goods (*e.g.* through exploring additional subheadings for finished preferable alternatives as well as substitutes).[102]

17. The WCO summarised the challenge with HS code identification as follows: while there were millions of products, there was limited capacity in a usable customs nomenclature with a six-digit limit. In evaluating a proposal to add a good to the nomenclature, the WCO HS Committee examines the trade value and global relevance of the proposal, but also whether the goods have a high priority for reasons of "global good".[103] In addition, the WCO identified several other important elements that need to be taken into consideration:

- A clear rationale: taking the example of efforts to develop HS codes for biodegradable plastic bags, the question would be whether this is an effective way to substantially reduce plastic pollution from plastic bags which would gain the support of sufficient Members.
- A robust definition: a definition must be clear and protected against legal challenges. *E.g.* with biodegradable plastic bags, the absence of any globally accepted international standards defining the term "biodegradable plastics" meant the scope was unclear. This raises a number of questions, such as the meaning of the term, *e.g.* whether it covers plastics that are only partially biodegrade and form microplastics, plastics that are biodegrade but contain toxic additives, or plastics that are biodegradable under industrial composting conditions but survive for years under most normal environmental conditions.
- Use of verifiable provisions: the ability of customs officials to verify whether goods claiming a classification actually comply is essential for an HS provision. By a practical sense, the level of difficulty or the level of expense, time or resources required for such verification, should be reasonably within the capacity of Customs in both developed and developing countries. The available tests for biodegradability of plastics involve exposing samples to controlled conditions and generally last between 28 days to six months. The practical difficulties of this at the border are clear. Given the variety of plastic materials and the variety of additives to plastic that can impact biodegradability, no reliable alternative testing methods had been found at that point.
- An indication of where the goods are currently classified: when goods move to a new provision, their duty rates are similarly transposed. It is therefore important to be able to identify where the goods are currently classified. In the area of plastic articles or plastic packaging, this is a real challenge. Plastic packaging is one of the largest areas of hidden plastics in the HS. It permeates throughout the HS, with everything from live trees to works of art shipped in plastic packaging that is not separately classified. But it is also a problem with plastic articles. For instance, separately classifying articles made of high-shedding polyester fleece fabrics into their own provision would involve goods moving not only from many headings in the textile and garment chapters, but also the movement of fleece covered goods from a range of headings for other goods such as toys, bedding and soft-furnishings.[104]

[99] "Plastic Pollution and Trade Across the Life Cycle of Plastics: Options for Amending the Harmonized System to Improve Transparency", TESS 2022.

[100] Aide Memoire (INF/TE/IDP/R/7), 19-20 September 2022 Pre-Plenary Meetinghttps://docs.wto.org/dol2fe/Pages/SS/directdoc.aspx?filename=q:/INF/TEIDP/R7.pdf&Open=True, para. 30.

[101] Communication to the World Customs Organization (WCO) on the Work of the IDP in Support of Efforts to Address Plastics Pollution (INF/TE/IDP/W/6/Rev.1), 8 June 2022.

[102] Aide Memoire (INF/TE/IDP/R/7), 19-20 September 2022 Pre-Plenary Meeting, para. 24.

[103] WCO Statement (INF/TE/IDP/RD/20), 18 March 2022 Pre-Plenary Meeting.

[104] WCO Statement (INF/TE/IDP/RD/20), 18 March 2022 Pre-Plenary Meeting.

18. Essentially, there were four broad categories: (i) alternatives/substitutes that were currently classified under "traditional" plastic products HS codes (e.g. shopping bags made of vegetable starch); (ii) alternatives/substitutes that were not classified under the same HS code, but in "general", material based HS codes that did not differentiate the specific good (e.g. moulded dinner plates made of sugar cane); (iii) alternatives/substitutes that already had their own, well-defined HS codes (e.g. certain bamboo goods); (iv) alternatives/substitutes that could potentially be classified in more than one HS code leading to potential confusion. For some materials (e.g. banana leaves) even the base input was not well defined under the HS.[105]

19. Discussions amongst participants underscored that the revisions of WCO HS2027 were currently ongoing, and the Dialogue should contribute to it. One delegation noted that the refinement of the HS Code in differentiating plastics products for environmental purposes was one of the key elements in reducing plastics pollution and thus WCO's expert advice was essential to Dialogue discussions.[106] Another delegation noted that customs classifications on recycling were unclear, and this was also an issue that had to be addressed.[107]

20. Stakeholders also highlighted the lack of transparency with regard to types of plastics, plastic products, plastic additives as well as plastic alternatives and substitutes that were traded internationally, in part because these were not fully captured by the HS classification. A policy brief on the potential amendments to the HS classification laid out concrete options for addressing the main gaps identified and that could be pursued as part of the current amendment cycle at the WCO, such as creating new HS subheadings for the most commonly recycled primary polymers or amending HS subheadings to incorporate specific information for products made of polymers that contain POPs and other harmful chemical additives.[108]

21. One suggested area for further research was to compile an illustrative list of plastic substitutes and alternatives with their HS codes, as well as to produce analysis of production, trade flows and employment related to plastic substitutes and alternatives based on identified HS codes.[109] One stakeholder proposed an initial illustrative HS codes list for purposes of facilitating trade in plastics substitutes.[110] Another stakeholder indicated bamboo and ratan as specific examples of HS code development. Historically, there had been a lack of specific HS codes for these products leading to them being misclassified or mixed with timber products and other materials. However, in 2007 and 2017, the WCO approved a series of individual HS codes and currently there were 24 HS codes – 18 for bamboo and six for rattan – reflecting a much broader range of commonly traded bamboo and rattan commodities.[111]

22. On the topic of trade-related measures enabling substitution of SUPP, one delegation emphasized that regulatory measures to support or stimulate the usage of plastic substitutes or alternatives in terms of international trade should be consistent with WTO rules.[112] Such measures had to take into account readiness of industry to switch to alternatives or substitutes and the timing for such a transition, as well as the cost of the alternatives, consequences for consumers and environment and the expediency of plastic substitutes against other regulatory instruments. It was also highlighted that the life cycle of most substitutes to plastic was more carbon-intensive and therefore due consideration should be given to consequences of such decisions for the environment. It was important to ensure the usage of only those alternatives and substitutes that were truly circular and non-toxic.[113]

23. The following table reflects specific HS codes put forward by participants and stakeholders during Dialogue's pre-plenary and plenary meetings, as well as in response to the guiding questions to the Workshop:

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[105] WCO presentation (INF/TE/IDP/RD/98) at the Workshop.
[106] Aide Memoire (INF/TE/IDP/RD/41), 11 May Pre-Plenary Meeting, para. 8.
[107] Aide Memoire (INF/TE/IDP/RD/41), 11 May Pre-Plenary Meeting, para. 8.
[108] TESS Statement (INF/TE/IDP/RD/63/Rev.1), 11 May 2022 Pre-Plenary Meeting, referring to Policy Brief "Plastic Pollution and Trade Across the Life Cycle of Plastics: Options for Amending the Harmonized System to Improve Transparency".
[109] UNCTAD presentation (INF/TE/IDP/RD/25), 18 March 2022 Pre-Plenary Meeting.
[110] UNCTAD presentation (INF/TE/IDP/RD/36), 11 May 2022 Pre-Plenary Meeting.
[111] INBAR presentation (INF/TE/IDP/RD/73), 17 November 2022 Pre-Plenary Meeting.
[112] Aide Memoire (INF/TE/IDP/R/7), 19-20 September 2022 Pre-Plenary Meeting, para. 19.
[113] Aide Memoire (INF/TE/IDP/R/7), 19-20 September 2022 Pre-Plenary Meeting, para. 19.

Table 3: HS Codes for plastic substitutes and alternatives

HS code	Description
04	Dairy produce; birds' eggs; natural honey; edible products of animal origin, n.e.c.
05	Animal originated products; not elsewhere specified or included
07	Vegetables and certain roots and tubers; edible
08	Fruit and nuts, edible; peel of citrus fruit or melons
12	Oil seeds and oleaginous fruits, ..., industrial or medicinal plants; straw and fodder
14	Vegetable plaiting materials; vegetable products not elsewhere specified or included
14.01	Vegetable materials of a kind used primarily for plaiting (for example, bamboos, rattans, reeds, rushes, osier, raffia, cleaned, bleached or dyed cereal straw, and lime bark)
1401.10	**Bamboos**
1401.20	**Rattans**
1401.90	**Vegetable materials of a kind used primarily for plaiting (for example, bamboos, rattans, reeds, rushes, osier, raffia, cleaned, bleached or dyed cereal straw, and lime bark); Other [*can be used for banana leave*]**
15	Vegetable waxes (other than triglycerides); whether or not refined
20	Preparations of vegetables, fruit, nuts or other parts of plants
20.05	Other vegetables prepared or preserved otherwise than by vinegar or acetic acid, not frozen, other than products of heading 20.06
2005.91	**Bamboo shoots**
23	Food industries, residues and wastes thereof; prepared animal fodder
28	Inorganic chemicals; organic and inorganic compounds of precious metals
32	Glass; glass frit and other glass, in the form of powder, granules or flakes
39	
3907.70	**Polyactic acid (PLA) [*a bio-based plastic*]**
41	Raw hides and skins (other than furskins) and leather
42	Articles of leather; saddlery and harness; travel goods, handbags and similar containers; articles of animal gut (other than silk-worm gut)
4202.92	**Nonwoven natural fibre insulation (as a finished cooler box product)**
44	Wood and articles of wood; wood charcoal
44.02	Wood charcoal (including shell or nut charcoal), whether or not agglomerated
4402.10	**Of bamboo**
44.09	Wood (including strips and friezes for parquet flooring, not assembled) continuously shaped (tongued, grooved, rebated, chamfered, V-jointed, beaded, moulded, rounded or the like) along any of its edges, ends or faces, whether or not planed, sanded or end-jointed
4409.21	**(Non-coniferous) Of bamboo**
44.12	Plywood, veneered panels and similar laminated wood
4412.10	**Of bamboo**
44.18	Builders' joinery and carpentry of wood, including cellular wood panels, assembled flooring panels, shingles and shakes
	- Assembled flooring panels
4418.73	**-- Of bamboo or with at least the top layer (wear layer) of bamboo**
	- Other
4418.91	**-- Of bamboo**
44.19	Tableware and kitchenware, of wood
	- Of bamboo

4419.11	**-- Bread and boards, chopping boards and similar boards**
4419.12	**-- Chopsticks**
4419.19	**-- Other**
44.21	Other articles of wood
	- Other
4421.91	**-- Of bamboo**
45	Cork and articles of cork
46	Manufactures of straw, of esparto or of other plaiting materials; basketware and wickerwork
46.01	Plaits and similar products of plaiting materials, whether or not assembled into strips; plaiting materials, plaits and similar products of plaiting materials, bound together in parallel strands or woven, in sheet form, whether or not being finished articles (for example, mats, matting, screens)
4601.21	**-- Of bamboo**
4601.22	**-- Of rattan**
4601.90	**- Other**
4601.92	**-- Of bamboo**
4601.93	**-- Of rattan**
46.02	Basketwork, wickerwork, and other articles, made directly to shape from plaiting materials or made op from goods of heading 46.01; articles of loofah
	- Of vegetable materials
4602.11	**-- Of bamboo**
4602.19	**Basketwork, wickerwork and other articles, made directly to shape from plaiting materials or made up from goods of heading 4601; articles of loofah; Of other vegetable materials [*Food containers: banana/plantain leaf; coconut husk; Straws: wheat fibre*]**
4602.22	**-- Of rattan**
47	Pulp of wood or of other fibrous cellulosic material; recovered (waste and scrap) paper or paperboard
47.06	Pulps of fibres derived from recovered (waste and scrap) paper or paperboard or other fibrous cellulosic material
	- Other
4706.30	**-- Of bamboo**
48	Paper and paperboard; articles of paper pulp, of paper or of paperboard
4811.90	**Other paper, paperboard, cellulose wadding and webs of cellulose fibres**
4819.10	***Food containers: paper***
4819.20	***Food containers: paper***
4819.30	***Grocery bags/packaging: paper***
4819.40	***Grocery bags/packaging: paper***
48.23	Other paper, paperboard, cellulose wadding and webs of cellulose fibres, cut to size or shape; other articles of paper pulp, paper, paperboard, cellulose wadding or webs of cellulose fibres
	- Trays, dishes, plates, cups and the like, of paper or paperboard
4823.61	**-- Of bamboo**
4823.69	***Food containers: paper***
4823.90	***Straws: paper***
50	Silk
51	Wool, fine or coarse animal hair; horsehair yarn and woven fabric
52	Cotton
53	Vegetable textile fibres; paper yarn and woven fabrics of paper yarn
5303.10	Jute and other textile base fibres, raw or retted

54	Man-made filaments; strip and the like of man-made textile materials
56	Wadding, felt and nonwovens, special yarns; twine, cordage, ropes and cables
5607.21	Binder or baler twine; Of sisal
5607.29	Other; Of sisal
57	…
5702.20	**Nonwoven natural fibre insulation (to replace plastic foams, incl. expanded PS and PE)**
63	Textiles, made up articles; sets; worn clothing and worn textile articles; rags
6305.10	***Grocery bags/packaging: jute***
6305.20	***Grocery bags/packaging: Cotton***
6305.90	**Sacks and bags, of a kind used for the packing of goods; Of other textile materials [*Grocery bags/packaging: Hemp*]**
67	Feathers and down, prepared; and articles made of feather or of down
68	Stone, plaster, cement, asbestos, mica or similar materials; articles thereof
69	Ceramic products
70	Glass and glassware
7010.90	***Liquid containers: glass***
76	Aluminium and articles thereof
7612.90	***Liquid containers: aluminium***
7615.90	***Liquid containers: aluminium***
7616.99	***Liquid containers: aluminium***
94	Furniture; bedding, mattresses, mattress supports, cushions and similar stuffed furnishings; lamps and lighting fittings, not elsewhere specified or included; illuminated signs, illuminated name-plates and the like; prefabricated buildings
94.01	Seats (other than those of heading 94.02), whether or not convertible into beds, and parts thereof
	- Seats of cane, osier, bamboo or similar materials
9401.52	**-- Of bamboo**
9401.53	**-- Of rattan**
94.03	Other furniture and parts thereof
	- Furniture of other materials, including cane, osier, bamboo or similar materials
9403.82	**-- Of bamboo**
9403.83	**-- Of rattan**
95	Toys, games and sports requisites; parts and accessories thereof

24. At the Workshop, discussions broadly recognized that there already existed several substitutes and alternatives being traded internationally. However, they were not easily identifiable in current trade data and HS code classifications, complicating efforts to understand market opportunities as well as potential trade barriers. The experience with the development of new HS code subdivisions for bamboo goods was highlighted as a positive example; the existence of commercial interest and the fact that goods were easily identifiable were noted as clear positives. However, this was hard to replicate for all material substitutes as it would require many HS subdivisions and countries would need additional flexibility to create further domestic subdivisions. There was a potential for coordination then among national customs authorities on such domestic subdivisions. On specific HS reforms, a few elements were raised such as the need for countries or trade institutions to come forward with proposals; the potential for technical support to "clean up" proposals and make them operational; and the importance of commonly accepted definitions. Finally, in terms of trade measures to promote substitutes and alternatives, it was noted that the Dialogue's survey captured a number of them, which mostly included regulatory measures indicating a general intention to promote sustainable substitutes and alternatives. It was noted that the issue of access and price sensitivity was an important point to consider with regards to these measures. At the same time, coherence was necessary between

trade policies promoting substitutes and those imposing restrictions on traditional plastics to avoid stifling innovation.

3 ILLUSTRATIVE AND EXTENDED LIST OF MATERIAL SUBSTITUTES AND MATERIAL IDENTIFICATION EXERCICE

25. The 2021 Ministerial Statement highlights the importance of moving towards environmentally sustainable and effective substitutes and alternatives and the role for multilateral trade cooperation in promoting good practices. It also identifies addressing trade-related capacity building and technical assistance needs of developing Members, including expanding trade in environmentally sustainable and effective substitutes and alternatives, as an area of common interest where work must be intensified.

26. Participants in the Dialogue's discussions in 2021 and 2022 highlighted this difference between plastic substitutes and plastic alternatives. According to the definition proposed by one stakeholder, plastic substitutes were non-plastic or polymer materials of vegetable, animal, or mineral origin (e.g. agriculture, waste, marine or mineral-based). These were materials such as paper that could be reused and were biodegradable, compostable, or recycled. In general, they had a more positive lifecycle analysis impact than plastics and did not include additives. Plastic alternatives, on the other hand, would comprise products made of biomass-based polymer molecule with zero or low-carbon footprint, as well as of biodegradable polymers which did not accumulate in nature (bioplastics or biodegradable plastics). They could therefore have similar properties to plastics because they were made of similar molecules. These could be used for nonfuel feedstock use and some could be reused, were compostable or biodegradable.[114] However, several participants noted that some plastic alternatives had similar waste disposal problems to conventional plastic depending on chemical composition.

27. The following substitutes and alternatives were raised and/or discussed:

Table 4: Plastic substitutes

CATEGORY[115]	PLASTIC SUBSTITUTES
General	Vegetable fibres; animal fibres; mineral materials
Traditional	Aluminium
	Cardboard
	Cellulose
	Ceramics
	Clay
	Cotton
	Glass
	Linen
	Natural fibers and wools
	Paper
	Steel
Mulch	Hay
	Leather
	Ray
	Straw
	Seaweed film & fibers
	White clover
	Wood bark
	Woodchip
	Wool
Textiles/ Packaging/ SUP	Abaca (Manila hemp)
	Algae biomass
	Balsa Wood
	Bamboo

[114] UNCTAD presentation (INF/TE/IDP/RD/36), 11 May 2022 Pre-Plenary Meeting.
[115] Categories based on UNCTAD submission to the Workshop (INF/TE/IDP/RD/83).

	Cellulose nanofibers
	Coconut Husks
	Coir
	Cork
	Corn-based
	Cotton
	Flax
	Fish skin or residues
	Hemp
	Jute
	Leather
	Microbial cellulose of mixed vegetables and bacteria
	Nettles
	Rattan
	Seaweed – brown and red algae by-products
	Silk
	Sisal
	Sugarcane pulp – bagasse
	Other plant materials
	Palm
	Plant Waste
	Wheat Husks
	Wheat stems
	Wood Pulp
	Woodchip
Textiles	Areca leaves
	Banana leaves, stem, or fibers
	Bamboo fibres
	Beeswax-coated cloth
	By-products of ready-made garments ("jhoot")
	Fruit peels
	Down
	Grape waste
	Murta
	Pineapple leaves
	Tofu waste
	Silk
	Various animal wools (alpaca, angora, cashmere, sheep, etc.)
Packaging/ SUP	Banana/Plantain pseudo-stems, leaves and paper
	Calabash hard shell
	Casein
	Cotton linters
	Mushroom
	Ray
	Rice paper
	Seaweed and fruit peels Films & paper
	Wood bark

Table 5: Plastic alternatives

PLASTIC ALTERNATIVES
Bioplastics
Biodegradable plastics
Recyclable plastic
Recyclable resin
rPET
Bio-polypropylene
Low-density polyethylene (multiple use)
Polylactic acid (PLA) and CPLA
Polybutylene succinate (PBS)

28. Participants also identified a number of avenues for further exploration as regards material substitutes which would support progress in the Dialogue[116]:

- Develop an expanded list of material substitutes (e.g., vegetable and animal fibers, algae biomass, and mineral materials) and produce an illustrative list of plastic alternatives including HS codes and related life cycle analysis.
- Promote further research, development, and adoption of material substitutes to SUP to address plastic pollution in the ocean.
- Explore opportunities to make use of natural materials, marine by-products, and post-harvest agricultural waste, which could help spur innovation, support circular economy, and develop new industrial capacities.
- Promote incentives to eliminate plastics, including by addressing the tariff rates applied to substitute materials to facilitate trade of substitute materials which are less polluting.
- Need for collaborative action with other stakeholders in identifying best practices as well as barriers to dissemination of green alternatives to plastics.
- Support positive and negative incentives for environmentally sustainable and effective substitutes and alternatives to plastics.
- Undertake a material identification exercise: Countries, IGOs and NGOs introduce and justify materials they consider more suitable as better SUP substitutes in terms of Life Cycle Analysis (LCA), sustainable production, scale-up and disposal.
- Improve working definitions to assist the Dialogue and the INC process.
- Work on consolidated list of plastics substitutes based on identified clusters and corresponding identified HS codes for plastics substitutes.
- Phase out fossil fuel subsidies to create economic incentives to move towards material substitution.
- Explore policy options to enable sunrise industries focusing on substitutes, especially where those can be competitive, scalable, recyclable, and promoting job creation.
- Undertake additional exploratory work to identify existing innovative and scalable products (with the lowest carbon footprint possible) that could substitute plastics.
- Agree on a minimum set of LCA indicators on which actionable policy could be based to define substitutes which should be produced.

29. Trade-related challenges in using substitute packaging materials were also discussed, including lack of coherence in national regulations and differences in recycling processes posed a barrier to trade.[117] Some delegations underscored specific limitations in national legislations, for instance a law stating that environmentally unacceptable products should not be prohibited unless there were alternatives available to consumers at no more than ten percent greater cost than the disposable product. The law had made it very challenging to identify solutions that would meet this legal requirement.[118] At the same time, other Members had banned some SUP, such as straws and cutlery, and other measures were in place for items for which no clear sustainable alternatives were available (e.g. consumer information labelling requirements).[119] Certain delegations had coordinated efforts in place to educate population on plastic waste, to intercept plastic waste, and to redesign alternative and new solutions to plastics.[120] Others had introduced national waste policies that would require all packaging to be recyclable or compostable by 2025.[121]

30. Discussions amongst participants underscored the need for assistance for developing countries to produce environmentally sustainable and effective substitutes or alternatives to plastics.[122] Delegations from developing countries emphasized the need for improved access to cost-effective and environmentally friendly alternatives to plastics, in particular SUP. International cooperation and assisting developing countries were important to incentivize trade

[116] See UNCTAD presentations at the 18 March 2022 Pre-Plenary Meeting (INF/TE/IDP/RD/25), 30 March 2022 Plenary Meeting (INF/TE/IDP/RD/32), 11 May 2022 Pre-Plenary Meeting (INF/TE/IDP/RD/36), and at the Workshop (XX/XX/XX/RD/XX). See also [116] Informal summary (INF/TE/IDP/R/5), 30 March 2022 Plenary Meeting, paras. 5 and 14.

[117] Nestlé presentation (INF/TE/IDP/RD/54), 19-20 September 2022 Pre-Plenary.

[118] Informal summary (INF/TE/IDP/R/5), 30 March 2022 Plenary Meeting.

[119] 3rd co-sponsors meeting, June 2021.

[120] 3rd co-sponsors meeting, June 2021.

[121] Informal summary (INF/TE/IDP/R/5), 30 March 2022 Plenary Meeting.

[122] Aide Memoire (INF/TE/IDP/RD/41), 11 May 2022 Pre-Plenary Meeting.

and investment opportunities in new markets of substitute and alternative plastics.[123] It was also observed that plastic substitutes may be of export interest to some developing countries and that they may also have a role in displacing plastic imports. That is, in domestic marketplace in some developing countries, there could be opportunities for communities that produce traditional packaging materials to replace plastic imports while also supporting livelihoods in rural communities, including by generating employment for women.[124] For instance, some plastic substitutes, such as jute, that were of export interest to developing countries and LDCs, were still subject to high tariffs in certain markets and also faced non-tariff barriers related to certification. Competing synthetic fibres also faced lower costs of production, partly because of energy subsidies.[125] One delegation highlighted that alternatives and substitutes should be accessible and available with a preference for indigenous and/or localized/regional supply chains, and should integrate the notion of industrial development.[126]

31. More generally, an analysis of applied tariff rates specifically on finished plastics and plastics substitutes based on an HS codes analysis revealed that not only substitutes were more expensive, but also faced higher tariffs.[127]

32. Delegations shared experiences with local alternatives and substitutes, mentioning mechanical recycling (e.g. PET bottle-to-bottle recycling, as well as of polyethylene, polypropylene, and polystyrene), use of flexible plastic waste as filler material for plastic products and construction materials, and use of mixed plastic waste to asphalt road and plastic lumber.[128] A number of alternatives and substitutes for specific products were discussed, including the use of:

- Marine-biodegradable plastic and recyclable plastic for fishing gear.[129]
- Recycled resin as an alternative to conventional resin.[130]
- Cellulosic fibre in place of plastic for cosmetics packaging.[131]
- Jute polybags replacing low-density polyethylene (LDPE) plastic bags.[132]

33. One stakeholder presented a study identifying the six plastic subcategories with the largest substitute potential by mass: monomaterial films (45 million metric tons); other rigid monomaterial packaging (9.5 million metric tons); sachets and multimaterial films (4 million metric tons); carrier bags (4 million metric tons); pots, tubs, and trays (3 million metric tons); and food service disposables (2 million metric tons).[133]

34. The following substitutes and alternatives were proposed for specific categories of plastic products[134]:

Table 6: Products, base line materials and substitutes/alternatives

PRODUCT TYPE	BASE CASE	SUBSTITUTES / ALTERNATIVES
Fishing nets	Nylon	Polypropylene, cotton, hemp
Beverage bottles	PET	Aluminium, glass, polypropylene
Beverage cups and food containers	EPs	Paper (cardboard), PLA, polypropylene, Banana/plantain leaf, coconut husk
Shopping bags	LDPE (single-use)	LDPE (multiple use), jute, paper, cotton, hemp

[123] 3rd co-sponsors meeting, June 2021.
[124] TESS Statement (INF/TE/IDP/RD/63/Rev.1), 11 May 2022 Pre-Plenary Meeting.
[125] CTE minutes (WT/CTE/M/68), meeting held on 26-27 November 2019.
[126] Aide Memoire (INF/TE/IDP/R/9), 17 November 2022 Pre-Plenary Meeting.
[127] UNCTAD presentation (INF/TE/IDP/RD/36), 11 May 2022 Pre-Plenary Meeting.
[128] Informal summary (INF/TE/IDP/R/5), 30 March 2022 Plenary Meeting.
[129] OECD presentation (INF/TE/IDP/RD/18) and policy paper "Towards G7 action to combat ghost fishing gear", 18 March 2022 Pre-Plenary Meeting.
[130] Aptar Group presentation (INF/TE/IDP/RD/53), 19-20 September 2022 Pre-Plenary Meeting.
[131] Yves Rocher Foundation presentation (INF/TE/IDP/RD/61), 19-20 September 2022 Pre-Plenary Meeting.
[132] CTE minutes (WT/CTE/M/68), meeting held on 26-27 November 2019.
[133] PEW presentation (INF/TE/IDP/RD/76) referring to the Breaking the Plastic Wave study, 17 November 2022 Pre-Plenary Meeting.
[134] World Bank Group presentation (INF/TE/IDP/R/7), Aide Memoire, September 2022 Pre-Plenary Meeting.

Disposable utensils	Polypropylene	Bio-polypropylene, steel, wood
Food wrappers	PVC	Aluminium, PET, Bio-LDPE
Sachets	HDPE and PET	Aluminium wrap, PET
Beverage cartons	Multimaterial	PET, Glass
Clothing	Multimaterial	Cotton, linen, bamboo
Diapers	Miltimaterial	Cotton, bamboo
Fishing gear	Durable plastic	Marine-biodegradable and recyclable plastic
Cosmetics packaging	Plastic	Cellulosic fibre
Straws	Plastic	Wheat fibre, paper

35. Delegations observed that more information was needed on trade flows in plastic substitutes and alternatives.[135] There were ongoing regional efforts to build a matrix for the trade of substitute products in Latin America, as well as trade discussions with the participation of small and medium enterprises (SMEs) focusing on alternatives and substitutes, such as banana leaves and biodegradable packaging.[136]

36. Several stakeholder studies and publications were discussed:

- The OECD "Towards G7 action to combat ghost fishing gear" which found *inter alia* that trade policy could facilitate the trade of less harmful plastics and substitutes and dis-incentivize (or even forbid) trade in the most harmful plastics.[137]
- The UNCTAD Sustainable Manufacturing and Environmental Pollution (SMEP) and the Oceans Economy programme conducting a study on alternative materials which can competitively substitute SUP in SMEP regions. SMEP had an open call for proposals on plastics in the areas of biodegradability of alternatives to plastics and improved manufacturing and remanufacturing solutions.[138]
- The World Economic Forum conducted the Global Plastic Action Partnership (GPAP) Ghana study illustrated that at the national level there was scope for trade policy to play a greater role in mitigating plastic pollution and waste, and in particular moving to alternatives for a more circular economy.[139]
- The Graduate Institute published a report "How can international trade policy help tackle plastic pollution". Among its suggestions was to lower or eliminate tariffs and trade barriers to non-plastic substitutes and environmentally sound waste management technologies and facilitate trade in recycled plastics and recyclable plastics.[140]

37. Materials and products identified in reply to the Workshop guiding questions included:

Table 7: Substitute/alternative material and manufactured product

MATERIAL	MANUFACTURED PRODUCT
Coconut fibre	Nonwoven coconut fibre mats, Pulped and moulded coconut fibre dust
Bagasse	Pulped and moulded bagasse
Bamboo	Single-use bamboo products: bamboo straw, cattery, and chopsticks, plates, cups, and coffee stir and ice cream sticks, cotton swab Bamboo toothbrush, pen Kitchen items: chopping boards, toothbrushes Bamboo fibre/pulp packing material Bamboo electronic product shell Natural bamboo fibre for mattress, mask, and interior decoration (vehicles, buildings, etc.) Bamboo filling in cooling tower Bamboo winding pipe Bamboo skateboard, surfboard, bamboo woven helmet Bamboo blades

[135] Aide Memoire (INF/TE/IDP/R/7), September 2022 Pre-Plenary Meeting.
[136] Aide Memoire (INF/TE/IDP/R/7), September 2022 Pre-Plenary Meeting.
[137] OECD presentation (INF/TE/IDP/RD/18) and policy paper "Towards G7 action to combat ghost fishing gear", 18 March 2022 Pre-Plenary Meeting.
[138] UNCTAD presentation, 3rd co-sponsors meeting, June 2021.
[139] WEF presentation, 3rd co-sponsors meeting, June 2021.
[140] GI presentation, 3rd co-sponsors meeting, June 2021.

38. One delegation proposed the Dialogue work on an illustrative list of plastic substitutes and alternatives already traded internationally in anticipation of MC13. This illustrative list would be non-binding, non-exhaustive, and could be progressively amended. The list could also serve as a basis to develop working definitions which would in turn serve as useful inputs for HS code identification and amendments discussions.[141]

39. At the workshop, discussions reflected various experiences, latest studies, and examples on challenges and opportunities in the trade and use of natural materials and new delivery models (e.g., marine by-products, post-harvest agricultural waste, packageless retail, etc.). On intra- and extra-regional trade of plastics and its substitutes, it was noted that in, Latin America, intra-regional preferences were originally designed based on export interests of countries in the region and not on environmental criteria. Statistical data analysis of international trade on plastics substitutes was also limited. However, at the consumer level, regulations existed to limit the use and marketing of SUPP and plastic packaging. Regarding options for rethinking delivery of goods, it was observed that measures related to plastic substitutes products, low inputs business models, and environmental consumer patterns varied globally and regionally. For instance, while the EU focused on waste reduction and limitation, Asia focused on new packaging forms based on health and safety. At the private sector level, although companies were proving able to adapt to the ever-changing regulatory landscapes of compliance, the lack of harmonization on content and scope of such measures persisted in many markets. It was also important for substitutes and alternatives to be affordable and accessible for low-income communities.

4 MINIMUM CRITERIA FOR LIFE CYCLE ANALYSIS (LCA) AND AFFORDABILITY, ACCESSIBILITY, AND AVAILABILITY

40. The 2021 Ministerial Statement recalls the need for further commitment and actions across the life cycle of plastics to address marine litter and microplastics, including through a circular economy approach. One of the potential areas for further research suggested by Dialogue participants was minimum criteria for LCA for plastic alternatives and substitutes such as land use, type of feedstocks, emissions, biodegradability, composability, and recyclability.[142] A few delegations underscored the need to not lose sight of the full lifecycle issue while tackling specific aspects of plastic value chains, such as plastic substitutes and alternatives, and ensuring environmental soundness.[143]

41. Regarding LCA of substitutes more specifically, some participants noted that it was important to ensure that substitutes were sustainable and that a lifecycle environmental impact assessment was carried out to avoid creating further damage. Products and packaging should be replaced exclusively by environmentally friendly materials, as alternative materials such as bio-based plastics were not necessarily more environmentally friendly than petroleum-based plastics. This demonstrated the importance of a LCA of the foreseen substitute.[144]

42. Stakeholders underscored that the criteria for sustainable substitutes would vary spatially, depending on resource availability and case-by-case product-level life cycle assessment could be necessary. There were some tools in this area that already existed such as the World Business Council for Sustainable Development SPHERE[145] packaging sustainability assessment framework; the World Bank's Plastic Substitution Trade-off Estimator[146] and UNEP's 10 Objectives and Guiding Considerations for Green and Sustainable Chemistry[147]. The need to consider reuse as well as substitution was underscored. Substitution was often a favourite approach, but reuse had a lower climate impact across the entire lifecycle and kept material circulating in the economy for longer.[148]

[141] Informal summary, 7 December 2022 Plenary Meeting. (forthcoming)
[142] UNCTAD presentation (INF/TE/IDP/RD/25), 18 March 2022 Pre-Plenary Meeting.
[143] Informal summary (INF/TE/IDP/R/6), 24 May 2022 Plenary Meeting.
[144] Aide Memoire (INF/TE/IDP/R/7), 19-20 September 2022 Pre-Plenary Meeting.
[145] WBSCD presentation (INF/TE/IDP/RD/55), 19-20 September 2022 Pre-Plenary Meeting.
[146] World Bank presentation (INF/TE/IDP/RD/56), 19-20 September 2022 Pre-Plenary Meeting.
[147] University of Portsmouth statement (INF/TE/IDP/RD/68), 17 October 2022 Pre-Plenary Meeting.
[148] University of Portsmouth statement (INF/TE/IDP/RD/68), 17 October 2022 Pre-Plenary Meeting.

43. Dialogue participants discussed research on LCA that had revealed that reusable products had a better environmental footprint than SUP. However, research had also shown that plastic alternatives and substitutes had different environmental impacts, and the success of a life cycle approach was largely contingent on the behaviour of consumers and businesses.[149]

44. A number of stakeholders introduced projects related to LCA of alternatives and substitutes. UNCTAD presented certain LCA considerations based on their SMEP programme country specific LCA assessments[150] underscoring that LCAs can be costly and time consuming and therefore necessitate a standard approach. UNEP presented its technical work on LCA for SUP products and their alternatives.[151] Some of the key messages from this work included:

- The single-use nature of products was most problematic for the planet, more so than the material that they were made of.
- Cleverly designed products needed to be durable, and the lighter a product's weight, the lower its environmental impact.
- Countries were encouraged to promote actions that allowed keeping resources at their highest value, by replacing SUP products with reusable products.
- Taking a life cycle approach was key in informing the right decision to address plastics pollution.

45. Further analysis of specific products, including plastic bags, bottles, beverage cups and nappies, revealed that:

- Reusable options were generally preferable over single-use products of any material.
- To understand the environmental performance of products, it was critical to look at their life cycle and use stage.
- There was a need to reduce unnecessary or unsafe plastics and materials as well as to shift from single-use to reusable products.
- Biodegradable or bio-based products did not necessarily have "better" environmental impacts than conventional products.
- Substitution of a single-use plastic product by another single-use material substitute does not necessarily yield a net positive benefit, according to LCA indicators.
- Substitute materials could have a more positive social impact in terms of income generation and development of new productive and innovation capacities across various countries.[152]

46. Yves Rocher Foundation addressed LCA from the perspective of the (RE)SET Cosmetics initiative to replace plastic of cosmetics packaging by cellulosic fibre.[153] They faced challenges in terms of:

- Recyclability – developing packaging made up of at least 85% cellulosic fibres for a significant material yield during recycling and the need to ensure sustainable fibres (FSC, PEFC) or other biomass did not compete with food crops while guaranteeing the availability of resources and the supply capacity of the cosmetics sector; and
- Chemistry – changing the chemical nature of coatings towards 100% bio-based coatings and the need to ensure barrier properties and preservation of formulas (restitution rate, water resistance, formula stability, etc.).

47. The World Bank Group shared their recent study on the Plastic Substitution Tradeoff Estimator which provided a holistic comparison of the costs and benefits of plastics and their alternatives.[154] The estimator compared ten plastic products with up to four alternatives currently available in the market. The comparison was based on the basis of input, one-to-one weight of the alternative, function performed, lifecycle assessment, external cost analysis as

[149] UNEP and UNCTAD presentations, Informal summary (INF/TE/IDP/R/6), 24 May 2022 Plenary Meeting.
[150] UNCTAD presentation (INF/TE/IDP/RD/36), referring to its SMEP Programme report "Substitutes for single-use plastics in sub-Saharan Africa and south Asia: Case studies from Bangladesh, Kenya and Nigeria". Aide Memoire (INF/TE/IDP/RD/41), 11 May 2022 Pre-Plenary Meeting.
[151] UNEP Presentation (INF/TE/IDP/RD/40), referring to its report "Single-Use Plastics Products and their alternatives: Recommendations from Life Cycle Analysis", 11 May 2022 Pre-Plenary Meeting.
[152] UNCTAD presentation (INF/TE/IDP/RD/90) at the Workshop.
[153] Yves Rocher Foundation presentation (INF/TE/IDP/RD/61), 19-20 September 2022 Pre-Plenary Meeting.
[154] World Bank presentation (INF/TE/IDP/RD/56), 19-20 September 2022 Pre-Plenary Meeting.

well as on monetary valuation including quantitative assessment and qualitative assessment. The tool that was designed to be implemented in any given country, provided best alternatives depending on national capacity and possibility for local production and imports. It compared impacts on several fronts including greenhouse gas emissions as well as land and water use, consumption etc. The tool not only allowed to tailor the analysis to a country context but also allowed monetary valuation to determine the external costs of plastics and their alternatives. The World Bank had piloted this data-driven model in five countries (Bangladesh, Mozambique, Nigeria, St. Lucia, and Vietnam). The estimator also had some limitations: it could not be used to assess the effectiveness of regulatory schemes and policies; financial implications of product substitution; and affordability and acceptability by users of the alternative materials.

48. The World Business Council for Sustainable Development (WBCSD) presented their packaging sustainability framework (SPHERE) to support companies in switching to sustainable packaging.[155] SPHERE defined packaging sustainability as maximum circularity and minimum environmental footprint, while avoiding the presence of harmful substances. To support this definition, six principles had been developed: minimize the drivers of climate change; optimize efficiency; optimize circularity, optimize end of life; avoid harmful substances; and minimize the drivers of biodiversity loss.

49. As regards areas for further analysis, it was recognized that each Member may have different substitutes and alternatives appropriate for them and their environmental sustainability across the life cycle would depend on local production and disposability options. It would therefore be useful to learn more about the kinds of challenges Members were facing in the scale-up of manufacturing and exports of environmentally sound substitutes and alternatives. It would also be helpful to learn more about the operation of global supply chains for plastic substitutes. For example:

    - What sort of North-South private sector linkages or collaboration exists? Are there any companies in OECD countries for example that have invested in plastic substitutes in developing countries?
    - How has that worked and what have been the challenges they faced?
    - Are their examples of South-South cooperation or value chains for plastic substitutes?
    - What lessons can be drawn from private sector companies that are involved in such supply chains?[156]

50. Discussions underscored that circularity considerations, full environmental impact assessments and adequate evidence needed to be considered when assessing single-use plastic alternatives to avoid unintended consequences. One delegation noted that there was currently a lack of evidence that biodegradable plastic consistently breakdown in real world environments. This required a life cycle assessment of a product which should, as far as possible, cover the entire life cycle of the product. Another delegation observed that the scale of the problem largely depended on the efficiency of the waste management systems and recycling and encouraged discussions on stimulating measures and development of infrastructure for waste collection, transportation, and disposal, for instance, the transformation of waste into valuable raw material for the market.

51. One stakeholder highlighted that while substitutes created opportunities, they also had trade-offs that needed to be carefully managed and assessed in a case-by-case basis. Possible criteria to consider for substitutes included identifying problematic plastic. This could be done by using several criteria such as, inter *alia*, the likelihood of being littered or ending up in the environment; if the product was not reusable, recyclable or compostable, if the product could be avoided. Other elements for consideration included the presence of waste infrastructure to collect and process substitutes; the issue of lowering overall GHG emissions in production and end-of-life disposal phases; and health concerns considerations. Finally, when changing the plastic system – many SUPP would be eliminated or replaced by reusable items and new delivery

[155] WBSCD presentation (INF/TE/IDP/RD/55), referring to its report "SPHERE: the packaging sustainability framework", 19-20 September 2022 Pre-Plenary Meeting.
[156] TESS statement (INF/TE/IDP/RD/65), 11 October 2022 Plenary Meeting.

models. Non-recyclable and hard-to-recycle plastics could be substituted for paper or compostable materials.[157]

52. Bamboo was discussed as a specific example as the fastest-growing plant in the world and with high productivity. Bamboo was also a low-carbon, biodegradable and sustainable substitute for plastic and its products could help reduce greenhouse emissions.[158] One delegation noted that while bamboo was a good candidate for potential substitute for plastic as it was a fast-growing grass, the whole lifecycle should be examined, being mindful of the potential biodiversity impacts when considering land use and land use change for alternatives like bamboo and other products materials. The alternative had to be sustainably produced and harvested, durable (lifespan) and repairable, and sustainably disposable at end of life. Another delegation argued that bamboo was not water intensive and did not require the removal of huge carbon sinks by harvesting them. The Dialogue could enhance cooperation and build on efforts and experience in promoting environmentally sustainable and effective substitutes and alternatives with bamboo and rattan taken as samples to start an in-depth discussion on facilitation.[159]

53. One participant underscored that plastic polymers could not be effectively replaced by any currently existing substitutes or alternatives either in the context of the economy or in terms of environmental protection for the following reasons: (i) average carbon intensity of polymers: it is approximately 0,2 tons of CO2 per 1 ton of manufactured product which is three times less than that of cellulose and paper, 3 and a half times less than that of a glass, seven times less than that of iron, etc.; (ii) light weight of polymers: polypropylene is eight times lighter than steel, nine times lighter than copper, and three times lighter than aluminium; and (iii) ability of polymers to resist diffusion of gases: highly applicable to food packaging and allows to extend the shelf life of content.[160]

54. The following table summarised the criteria for LCA highlighted by participants at the Dialogue's meetings, as well as in response to the Workshop guiding questions.

Table 8: Criteria for lifecycle analysis

LCA CRITERIA	ELEMENTS TO CONSIDER
Cost-effectiveness	• Availability and affordability • Scalability of production and usage
Design / technology	• Type of feedstocks. • Material. • Air permeability; Water permeability; Water solubility; Tensile strength; Colour fastness; UV fastness. • Design for recyclability.
Recyclability, Reusability, Compostability, Biodegradability	• Recyclability/Compostability: Especially important for naturally biodegradable feedstock materials. • Reusability: Especially important in the case of reusable plastics. • Natural breakdown in 30/90/365 days without extra enzymes or inputs. • Possibility to enter municipal recycling, waste, or compost streams. • Backyard-compostable in 30 days.
End of life and circularity	• Economic value captured at end of life; costs associated with end of life. • Renewable or recycled content, recovery rate. • Different costs and processes in different regions. • Existing or emerging Extended Producer Responsibility regimes. • Industry certifications.

[157] PEW presentation (INF/TE/IDP/RD/76) referring to the Breaking the Plastic Wave study, 17 November 2022 Pre-Plenary Meeting.
[158] INBAR presentation (INF/TE/IDP/RD/73), 17 November 2022 Pre-Plenary Meeting.
[159] Aide Memoire (INF/TE/IDP/R/9), 17 November 2022 Pre-Plenary Meeting.
[160] Aide Memoire (INF/TE/IDP/R/9), 17 November 2022 Pre-Plenary Meeting.

Resiliency	• Durable and lightweight. • Equipment and handling requirements by intermediate processors (including new machinery and new training required to work with substitutes, and frequency of machinery replacement and retraining). • Failure rates and manufacturer tolerances. • Repairability–potential and cost. • Supply disruption risk, present day and 5-25 years forward (present/potential production locations, producer, total number of locations where materials can theoretically be produced at commercial volumes and existing cost, and future propects). • Order lead times, at different volumes. • Upper and lower capacity constraints–max and min order quantities as well as ability, limits, and timeframe to scale-up production, including pricing effects.
Environmental impact	• Emissions: whether production, use, and disposal of the material increases/decreases the current CO2 emissions. • Land use: effect of new demand. • Water use: whether material production diverts/pollutes potable or non-potable water. • Acidification, fresh water and marine eutrophication. • Leakage potential or mismanaged waste index. • Energy use of production processes. • Impact on biodiversity loss. • Other potential environmental impacts: stratospheric ozone depletion; ionizing radiation; ozone formation (human health, terrestrial ecosystems); fine particulate matter; terrestrial acidification; terrestrial, freshwater, and marine ecotoxicity; carcinogenic and non-carcinogenic toxicity; mineral and fossil resource scarcity.
Social impact	• Local community engagement and familiarity with the material: level of indigenous knowledge and indigenous support present, level of local political knowledge and support present. • Effect of new demand on local economy. • Industrial support: whether material production creates new business or employment opportunities in places with high unemployment and/or limited advanced industrial opportunities.
Health impact	• Consumer safety in case of plastic alternatives for food contact application: depending on the application, problems of undesired contamination (e.g. paper/cardboard straws) or hygienic risks (e.g. replacement of cling film with oilcloth) are possible.
Supply chain resiliency and redundancy	• Climate change risk (important when considering biomaterials): when, where, and what is grown at what cost, and how this could change in a warming climate as well as a planet with more intense and less predictable weather. • Climate policy risk: new and emerging government restrictions and subsidies for things like oil refineries, which impacts all plastic and most bioplastic production, as well as direct taxes and extended producer responsibility fees on plastics and plastic alternatives. Restrictions and taxes on emission-intensive trade, such as international air freight and mining, that can radically change material availability and cost. • Accessibility: a preference for indigenous and/or localized/regional supply chains for material substitutes.

Local conditions	• Local production, consumption, and end-of-life disposal activities. • Domestic availability of feedstock, manufacturing capacity, price competitiveness of end-use products. • Differences in the energy mix and the proportion of energy drawn from clean or renewable energy sources. • Local waste management practices, systems, and infrastructure. • Consumption and post-consumption behaviour of the local population (e.g., frugal or wasteful consumption habits, salvaging of resources, and responsible disposal of waste).
Efficiency	• Optimize packaging efficiency while ensuring content integrity. • Efficiency (e.g. product protection for packaging).

55. At the Workshop, discussions focused on experiences, examples of key criteria to be included in the LCA of plastics, their alternatives and substitutes, and tools to allow comparisons and understanding of trade-offs which were faced during material substitution. A key message was that reduction of material use and reduction of waste were the best approach from LCA perspective. LCA assessments were necessary to support country-level decision and policymaking strategies as they provided guidance to compare products that performed similar functions. When analysing substitute materials, it was important to examine characteristics such as tradability, non-toxicity, affordability, accessibility and availability of substitute materials and products. It was equally important to examine considerations on toxicity, GHG emissions, reuse, and recyclability. There was a missing link between setting targets to phase out plastics and consideration of material substitutes. To address this, the World Bank plastic substitute estimator helped identify better substitutes at country level. Comparison had to be based on a similar function, impacts at all stages of the product lifecycle, trade-offs, the number of times that the product would be used, as well as consumer behaviour and existing local sustainable practices. It was also mentioned that countries should pay attention to gender aspects related to material substitution, especially concerning demand for natural or mineral materials which could have social consequences through additional labour demand in different areas. Finally, attention had to be paid to the consequences of reuse systems on gender dimensions as material systems based on reusability tended to require additional services for their maintenance which in many countries could be led by women.