WORLD TRADE ORGANIZATION

INF/TE/IDP/RD/88

5 December 2022

(22-9041)

Page: 1/19

Original: English

UNOFFICIAL ROOM DOCUMENT[1]

DIALOGUE ON PLASTICS POLLUTION AND ENVIRONMENTALLY SUSTAINABLE PLASTICS TRADE

FACTUAL SUMMARY OF DISCUSSIONS ON SUSTAINABLE AND EFFECTIVE ALTERNATIVES AND SUBSTITUTES

Workshop 6 December 2022

[1] Documents issued in the RD series are not official WTO documents. They are intended for use in the WTO meeting rooms and are attributed an unofficial symbol for archiving purposes only.

DIALOGUE ON PLASTICS POLLUTION AND ENVIRONMENTALLY SUSTAINABLE PLASTICS TRADE

FACTUAL SUMMARY OF DISCUSSIONS ON SUSTAINABLE AND EFFECTIVE ALTERNATIVES AND SUBSTITUTES

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 is 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 (Workshop), organized in cooperation with the United Nations Conference on Trade and Development (UNCTAD) and scheduled to take place on 6 December 2022, will cover 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 to date on these topics covered by the Workshop.

3. In total, since the Dialogue's first 2021 meeting[7], 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 (October 2022).

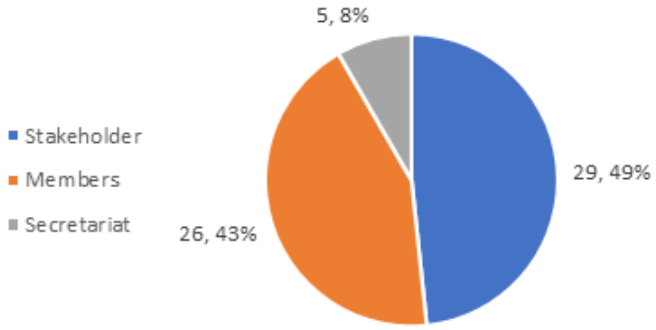
Table 1: Delegations and Stakeholders who intervened on topics related to trade promotion to tackle plastic pollution

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)
	Pew Charitable Trusts	WBCSD	

[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 Session, 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.

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 9 to "HS code identification exercise and trade-related measures enabling substitution of single-use plastic products (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 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. One stakeholder 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.*

[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 Session.

without plastics), that can increase the ratio of societal worth over costs of damage done (negative externalities)?[11]

8. 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.[12] 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.[13]

9. 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.[14] 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 sessions, as well as in response to the guiding questions to the Workshop:

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

CONCEPT	KEY ELEMENTS
Plastic	-
Micro-plastics	Generic term for small pieces of plastic under 5 mm.[15]
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. .[16]
	Similar or better quality than plastics.[17]
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. .[18]
	Similar or better quality than plastics.[19]

[11] CIEL presentation (INF/TE/IDP/RD/79), 17 November 2022 Pre-Plenary Session.
[12] University of Portsmouth statement (INF/TE/IDP/RD/68), 17 October 2022 Pre-Plenary Session.
[13] Informal Summary (INF/TE/IDP/R/8), 11 October 2022, Plenary Session.
[14] Workshop on sustainable alternatives and substitutes to plastic agenda and guiding questions (INF/TE/IDP/RD/87).
[15] "Addressing Single-use Plastic Products Pollution Using a Life Cycle Approach", UNEP 2021.
[16] UNCTAD submission to the Workshop (INF/TE/IDP/RD/83).
[17] Response to questions circulated by the WTO Secretariat.
[18] UNCTAD submission to the Workshop (INF/TE/IDP/RD/83).
[19] Response to questions circulated by the WTO Secretariat.

Environmentally sustainable	Alternatives and substitutes that do not generate waste.[20]
	Substitution by multi-use products preferable to substitution of a single-use (plastic) product by another single-use (e.g. paper) product.[21]
	Substitute or alternative materials that have far less negative impactful externalities than plastics.[22]
	Truly circular alternatives and substitutes that are toxic free. [23]
	Must not contribute more than plastics to consumption and waste due to food spoilage and transportation losses.[24]
	Renewable.[25]
	Competitive price.[26]
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.[27]
	Need for improved access to cost-effective and environmentally friendly alternatives to plastics, in particular single-use plastics, in developing countries.[28]
	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.[29]
	Accessible and available with a preference for indigenous and/or localized/regional supply chains; integrating the notion of industrial development.[30]
	Disposable.[31]
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 re-used for the same purpose for which it was conceived.[32]
	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.[33]
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.[34]

[20] CIEL statement (INF/TE/IDP/RD/66), 19-20 September 2022 Pre-Plenary Session.
[21] Aide Memoire (upcoming), 17 November 2022 Pre-Plenary Session, para. 17.
[22] CIEL statement (INF/TE/IDP/RD/79), 17 November 2022 Pre-Plenary Session.
[23] CIEL statement (INF/TE/IDP/RD/79), 17 November 2022 Pre-Plenary Session.
[24] Informal Summary (INF/TE/IDP/R/8), 11 October 2022, Plenary Session.
[25] Response to Workshop guiding questions.
[26] Response to Workshop guiding questions.
[27] Response to Workshop guiding questions.
[28] 3rd co-sponsors meeting, June 2021.
[29] TESS Statement (INF/TE/IDP/RD/63/Rev.1), 11 May 2022 Pre-Plenary Session.
[30] Aide Memoire (upcoming), 17 November 2022 Pre-Plenary Session.
[31] Response to Workshop guiding questions.
[32] Aide Memoire (upcoming), 17 November 2022 Pre-Plenary Session.
[33] Aide Memoire (upcoming), 17 November 2022 Pre-Plenary Session.
[34] Aide Memoire (upcoming), 17 November 2022 Pre-Plenary Session.

	Single-use (low durability), non-biodegradable and non-recyclable, containing harmful additives, prone to leaching, and impact on inland waterways and oceans.[35]
	Key factor is extent of usage before disposal (e.g. plastic chair as compared to plastic packaging and cutlery)[36]
	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.[37]
	Products made from oxo-degradable plastics which degraded into micro-plastic particles when littered.[38]
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.[39]
Re-usable	Durable.[40]
	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.[41]
Biodegradable	Biodegradable in natural condition.[42]
	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).[43]
	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.[44]
	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.[45]

[35] Aide Memoire (upcoming), 17 November 2022 Pre-Plenary Session.
[36] CIEL statement (INF/TE/IDP/RD/79), 17 November 2022 Pre-Plenary Session.
[37] "Addressing Single-use Plastic Products Pollution Using a Life Cycle Approach", UNEP 2021.
[38] Aide Memoire (upcoming), 17 November 2022 Pre-Plenary Session.
[39] Aide Memoire (upcoming), 17 November 2022 Pre-Plenary Session.
[40] Response to Workshop guiding questions.
[41] "Addressing Single-use Plastic Products Pollution Using a Life Cycle Approach", UNEP 2021.
[42] Response to Workshop guiding questions.
[43] "Addressing Single-use Plastic Products Pollution Using a Life Cycle Approach", UNEP 2021.
[44] "Single-Use Plastics Products and their alternatives: Recommendations from Life Cycle Analysis", UNCTAD 2022.
[45] "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 micro-plastics, 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.[46]
Erodible	-
Recyclable	Recyclable under normal condition.[47]
	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.[48]
	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.[49]
	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.[50]
	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.[51]
	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.[52]
Recycled content	Bamboo material.[53]
Compostable	Compostable in natural condition.[54]
	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?[55]
	Capable of biodegrading under specified conditions and timescales, usually only encountered in an industrial composter (standards apply).[56]

[46] WCO Statement (INF/TE/IDP/RD/20), 18 March 2022 Pre-Plenary Session.
[47] Response to Workshop guiding questions.
[48] Plastic Recyclers Europe presentation (INF/TE/IDP/RD/74), 17 November 2022 Pre-Plenary Session.
[49] "Addressing Single-use Plastic Products Pollution Using a Life Cycle Approach", UNEP 2021.
[50] "Single-Use Plastics Products and their alternatives: Recommendations from Life Cycle Analysis", UNCTAD 2022.
[51] University of Portsmouth statement (INF/TE/IDP/RD/68), 17 October 2022 Pre-Plenary Session.
[52] CIEL presentation (INF/TE/IDP/RD/79), 17 November 2022 Pre-Plenary Session.
[53] Response to Workshop guiding questions.
[54] Response to Workshop guiding questions.
[55] CIEL presentation (INF/TE/IDP/RD/79), 17 November 2022 Pre-Plenary Session.
[56] "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.[57]
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.[58]
	Bamboo products are low-carbon products to reduce high emission of plastics after substitution.[59]
Waste management technologies	-

10. One stakeholder suggested that a glossary of terms could be developed that draws on work already underway and undertaken by international organizations.[60] In addition to the definitions included in the table above, further definitions were proposed by UNEP and UNCTAD of the term "biobased 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."[61] 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." [62]

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

11. 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 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.

12. Discussions highlighted that, at present, there is no internationally recognized and comprehensive list (or classification) of plastics or their alternatives and substitutes to facilitate a straightforward identification[63] 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.[64] As part of the WCO-WTO cooperation and as requested by the

[57] "Single-Use Plastics Products and their alternatives: Recommendations from Life Cycle Analysis", UNCTAD 2022.
[58] CIEL presentation (INF/TE/IDP/RD/79), 17 November 2022 Pre-Plenary Session.
[59] Response to Workshop guiding questions.
[60] TESS Statement (INF/TE/IDP/RD/63/Rev.1), 11 May 2022 Pre-Plenary Session.
[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] "Plastic Pollution and Trade Across the Life Cycle of Plastics: Options for Amending the Harmonized System to Improve Transparency", TESS 2022.
[64] Aide Memoire (INF/TE/IDP/R/7), 19-20 September 2022 Pre-Plenary Session, para. 30.

Dialogue Communication to the WCO[65], 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).[66]

13. 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".[67] 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 micro-plastics, 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.[68]

14. 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.[69] Another delegation noted that customs classifications on recycling were unclear, and this was also an issue that had to be addressed.[70]

15. 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

[65] 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.
[66] Aide Memoire (INF/TE/IDP/R/7), 19-20 September 2022 Pre-Plenary Session, para. 24.
[67] WCO Statement (INF/TE/IDP/RD/20), 18 March 2022 Pre-Plenary Session.
[68] WCO Statement (INF/TE/IDP/RD/20), 18 March 2022 Pre-Plenary Session.
[69] Aide Memoire (INF/TE/IDP/RD/41), 11 May Pre-Plenary Session, para. 8.
[70] Aide Memoire (INF/TE/IDP/RD/41), 11 May Pre-Plenary Session, para. 8.

amending HS subheadings to incorporate specific information for products made of polymers that contain POPs and other harmful chemical additives.[71]

16. 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.[72] UNCTAD proposed an initial illustrative HS codes list for purposes of facilitating trade in plastics substitutes.[73]One 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 6 for rattan – reflecting a much broader range of commonly traded bamboo and rattan commodities.[74]

17. 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.[75] 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.[76]

18. 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:

Table 3: HS Codes for plastic substitutes and alternatives

CHAPTER	HS CODE	PRODUCTS
14	1401.10	Bamboo raw materials
42	4202.92	Nonwoven natural fibre insulation (as a finished cooler box product)
44	4402.10	Bamboo charcoal
	4409.21	Bamboo flooring
	4412.10	Bamboo plywood
	4418.73	Assembled bamboo flooring panels used for construction
	4418.91	Other bamboo panels used for construction
	4419.11	Bamboo chopping boards
	4419.12	Bamboo chopsticks
	4419.19	Small bamboo sticks
	4421.91	Bamboo articles of daily use
46	4601.21	Bamboo mats/screens
	4601.92	Semi-finished bamboo plaits & plaiting articles
	4602.11	Bamboo basketwork/ wickerwork products
	4602.19	Food containers: banana/plantain leaf; coconut husk Straws: wheat fibre
47	4706.30	Bamboo pulp

[71] TESS Statement (INF/TE/IDP/RD/63/Rev.1), 11 May 2022 Pre-Plenary Session, referring to Policy Brief "Plastic Pollution and Trade Across the Life Cycle of Plastics: Options for Amending the Harmonized System to Improve Transparency".
[72] UNCTAD presentation (INF/TE/IDP/RD/25), 18 March 2022 Pre-Plenary Session.
[73] UNCTAD presentation (INF/TE/IDP/RD/36), 11 May 2022 Pre-Plenary Session.
[74] INBAR presentation (INF/TE/IDP/RD/73), 17 November 2022 Pre-Plenary Session.
[75] Aide Memoire (INF/TE/IDP/R/7), 19-20 September 2022 Pre-Plenary Session, para. 19.
[76] Aide Memoire (INF/TE/IDP/R/7), 19-20 September 2022 Pre-Plenary Session, para. 19.

48	4819.10	Food containers: paper
	4819.20	Food containers: paper
	4819.30	Grocery bags/packaging: paper
	4819.40	Grocery bags/packaging: paper
	4823.69	Food containers: paper
	4823.61	Bamboo paper-based articles
	4823.90	Straws: paper
57	5702.20	Nonwoven natural fibre insulation (to replace plastic foams, incl. expanded PS and PE)
63	6305.10	Grocery bags/packaging: jute
	6305.20	Grocery bags/packaging: Cotton
	6305.90	Grocery bags/packaging: Hemp
70	7010.90	Liquid containers: glass
76	7612.90	Liquid containers: aluminium
	7615.90	Liquid containers: aluminium
	7616.99	Liquid containers: aluminium
94	9401.52	Bamboo seats
	9403.82	Bamboo furniture

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

19. 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.

20. 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.[77] However, several participants noted that some plastic alternatives had similar waste disposal problems to conventional plastic depending on chemical composition.

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

Table 4: Plastic alternatives and substitutes

PLASTIC SUBSTITUTES	PLASTIC ALTERNATIVES
General categories: Vegetable and animal fibres; mineral materials	Bioplastics
Algae biomass	Biodegradable plastics
Cotton, Linen, Hemp	Recyclable plastic
Abaca (Manila hemp)	Recyclable resin

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

By-products of ready-made garments ("jhoot")	rPET
Murta, Areca leaves	Bio-polypropylene
Sisal, Wheat stems	Low-density polyethylene (multiple use)
Wood, Bamboo, Palm	Polylactic acid (PLA) and CPLA
Bagasse (sugarcane pulp), Jute	Polybutylene succinate (PBS)
Pineapple (clothing fibre)	
Steel, Aluminium	
Glass	
Paper, Cardboard, Cellulose	
Banana/plantain pseudo-stem and leaves	
Coconut husks (coco coir)	

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

- 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.[78]
- Promote further research, development, and adoption of material substitutes to single-use plastics to address plastic pollution in the ocean.[79]
- 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.[80]
- 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.[81]
- Need for collaborative action with other stakeholders in identifying best practices as well as barriers to dissemination of green alternatives to plastics.[82]
- Support positive and negative incentives for environmentally sustainable and effective substitutes and alternatives to plastics.[83]
- Undertake a material identification exercise: Countries, IGOs and NGOs introduce and justify materials they consider more suitable as better SUP substitutes in terms of LCA, sustainable production, scale up and disposal.[84]

23. 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.[85] 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.[86] At the same time, other Members had banned some single-use plastics, 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).[87] 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.[88] Others had introduced national waste policies that would require all packaging to be recyclable or compostable by 2025.[89]

24. Discussions amongst participants underscored the need for assistance for developing countries to produce environmentally sustainable and effective substitutes or alternatives to plastics.[90] Delegations from developing countries emphasized the need for improved access to cost-effective

[78] UNCTAD presentation (INF/TE/IDP/RD/25), 18 March 2022 Pre-Plenary Session.
[79] UNCTAD presentation (INF/TE/IDP/RD/32), 30 March 2022 Plenary Session.
[80] UNCTAD presentation (INF/TE/IDP/RD/32), 30 March 2022 Plenary Session.
[81] UNCTAD presentation (INF/TE/IDP/RD/32), 30 March 2022 Plenary Session.
[82] Informal summary (INF/TE/IDP/R/5), 30 March 2022 Plenary Session, para. 5.
[83] Informal summary (INF/TE/IDP/R/5), 30 March 2022 Plenary Session, para. 14.
[84] UNCTAD presentation (INF/TE/IDP/RD/36), 11 May 2022 Pre-Plenary Session.
[85] Nestlé presentation (INF/TE/IDP/RD/54), 19-20 September 2022 Pre-Plenary.
[86] Informal summary, 30 March 2022 Plenary Session.
[87] 3rd co-sponsors meeting, June 2021.
[88] 3rd co-sponsors meeting, June 2021.
[89] Informal summary (INF/TE/IDP/R/5), 30 March 2022 Plenary Session.
[90] Aide Memoire (INF/TE/IDP/RD/41), 11 May 2022 Pre-Plenary Session.

and environmentally friendly alternatives to plastics, in particular single-use plastics. International cooperation and assisting developing countries were important to incentivize trade and investment opportunities in new markets of substitute and alternative plastics.[91] 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.[92] 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.[93] 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.[94]

25. 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.[95]

26. 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.[96] A number of alternatives and substitutes for specific products were discussed, including the use of:

- Marine biodegradable plastic and recyclable plastic for fishing gear.[97]
- Recycled resin as an alternative to conventional resin.[98]
- Cellulosic fibre in place of plastic for cosmetics packaging.[99]
- Jute polybags replacing low-density polyethylene (LDPE) plastic bags.[100]

27. 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).[101]

28. The following substitutes and alternatives were proposed for specific categories of plastic products[102]:

Table 5: 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

[91] 3rd co-sponsors meeting, June 2021.
[92] TESS Statement (INF/TE/IDP/RD/63/Rev.1), 11 May 2022 Pre-Plenary Session.
[93] CTE minutes (WT/CTE/M/68), meeting held on 26-27 November 2019.
[94] Aide Memoire (upcoming), 17 November 2022 Pre-Plenary Session.
[95] UNCTAD presentation (INF/TE/IDP/RD/36), 11 May 2022 Pre-Plenary Session.
[96] Informal summary (INF/TE/IDP/R/5), 30 March 2022 Plenary Session.
[97] OECD presentation (INF/TE/IDP/RD/18) and policy paper "Towards G7 action to combat ghost fishing gear", 18 March 2022 Pre-Plenary Session.
[98] Aptar Group presentation (INF/TE/IDP/RD/53), 19-20 September 2022 Pre-Plenary Session.
[99] Yves Rocher Foundation presentation (INF/TE/IDP/RD/61), 19-20 September 2022 Pre-Plenary Session.
[100] CTE minutes (WT/CTE/M/68), meeting held on 26-27 November 2019.
[101] PEW presentation (INF/TE/IDP/RD/76) referring to the Breaking the Plastic Wave study, 17 November 2022 Pre-Plenary Session.
[102] World Bank Group presentation, Aide Memoire, September 2022 Pre-Plenary.

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

29. Delegations observed that more information was needed on trade flows in plastic substitutes and alternatives.[103] 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.[104]

30. 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.[105]
- The UNCTAD Sustainable Manufacturing and Environmental Pollution (SMEP) programme conducting a study on alternative materials which can competitively substitute single-use plastics 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.[106]
- 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.[107]
- 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.[108]

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

Table 6: 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

[103] Informal summary (INF/TE/IDP/R/7), September 2022 Plenary Session.
[104] Informal summary (INF/TE/IDP/R/7), September 2022 Plenary Session.
[105] OECD presentation (INF/TE/IDP/RD/18) and policy paper "Towards G7 action to combat ghost fishing gear", 18 March 2022 Pre-Plenary Session.
[106] UNCTAD presentation, 3rd co-sponsors meeting, June 2021.
[107] WEF presentation, 3rd co-sponsors meeting, June 2021.
[108] GI presentation, 3rd co-sponsors meeting, June 2021.

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

32. 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.[109] 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.[110]

33. 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.[111]

34. 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[112] packaging sustainability assessment framework; the World Bank's Plastic Substitution Trade-off Estimator[113] and UNEP's 10 Objectives and Guiding Considerations for Green and Sustainable Chemistry[114]. The need to consider re-use as well as substitution was underscored. Substitution was often a favourite approach, but re-use had a lower climate impact across the entire lifecycle and kept material circulating in the economy for longer.[115]

35. Dialogue participants discussed research on LCA that had revealed that reusable products had a better environmental footprint than single use plastics. 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.[116]

36. 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[117] underscoring that LCAs can be costly and time consuming and therefore necessitate a standard approach. UNEP presented its technical work on LCA for single-use plastics products and their alternatives.[118] 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 single-use plastics products with reusable products.
- Taking a life cycle approach was key in informing the right decision to address plastics pollution.

---

[109] UNCTAD presentation (INF/TE/IDP/RD/25), 18 March 2022 Pre-Plenary Session.
[110] Informal summary (INF/TE/IDP/R/6), 24 May 2022 Plenary Session.
[111] Aide Memoire (INF/TE/IDP/R/7), 19-20 September 2022 Pre-Plenary Session.
[112] WBSCD presentation (INF/TE/IDP/RD/55), 19-20 September 2022 Pre-Plenary Session.
[113] World Bank presentation (INF/TE/IDP/RD/56), 19-20 September 2022 Pre-Plenary Session.
[114] University of Portsmouth statement (INF/TE/IDP/RD/68), 17 October 2022 Pre-Plenary Session.
[115] University of Portsmouth statement (INF/TE/IDP/RD/68), 17 October 2022 Pre-Plenary Session.
[116] UNEP and UNCTAD presentations, Informal summary (INF/TE/IDP/R/6), 24 May 2022 Plenary Session.
[117] 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, May 2022 Pre-Plenary, 11 May 2022 Pre-Plenary Session.
[118] 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 Session.

37. 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 biobased products did not necessarily have "better" environmental impacts than conventional products.

38. Yves Rocher Foundation addressed LCA from the perspective of the (RE)SET Cosmetics initiative to replace plastic of cosmetics packaging by cellulosic fibre.[119] 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.).

39. The World Bank Group shared their recent study on the Plastic Substitution Trade off Estimator which provided a holistic comparison of the costs and benefits of plastics and their alternatives.[120] 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 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 5 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.

40. The World Business Council for Sustainable Development (WBCSD) presented their packaging sustainability framework (SPHERE) to support companies in switching to sustainable packaging.[121] 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.

41. 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:

[119] Yves Rocher Foundation presentation (INF/TE/IDP/RD/61), 19-20 September 2022 Pre-Plenary Session.

[120] World Bank presentation (INF/TE/IDP/RD/56), 19-20 September 2022 Pre-Plenary Session.

[121] WBSCD presentation (INF/TE/IDP/RD/55), referring to its report "SPHERE: the packaging sustainability framework", 19-20 September 2022 Pre-Plenary Session.

- 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?[122]

42. 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.

43. 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 single-use plastic products would be eliminated or replaced by reusable items and new delivery models. Nonrecyclable and hard-to-recycle plastics could be substituted for paper or compostable materials.[123]

44. 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, bio-degradable and sustainable substitute for plastic and its products could help reduce greenhouse emissions.[124] 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.[125]

45. 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 3 times less than that of cellulose and paper, 3 and a half times less than that of a glass, 7 times less than that of iron, etc.; (ii) light weight of polymers: polypropylene is 8 times lighter than steel, 9 times lighter than copper, and 3 times lighter than aluminium; and (iii) ability of polymers to resist diffusion of gasses: highly applicable to food packaging and allows to extend the shelf life of content.[126]

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

[122] TESS statement (INF/TE/IDP/RD/65), 11 October 2022 Plenary Session.
[123] PEW presentation (INF/TE/IDP/RD/76) referring to the Breaking the Plastic Wave study, 17 November 2022 Pre-Plenary Session.
[124] INBAR presentation (INF/TE/IDP/RD/73), 17 November 2022 Pre-Plenary Session.
[125] Aide Memoire (upcoming), 17 November 2022 Pre-Plenary Session.
[126] Aide Memoire (upcoming), 17 November 2022 Pre-Plenary Session.

Table 7: Criteria for lifecycle analysis

LCA CRITERIA	ELEMENTS TO CONSIDER
Cost-effectiveness	• Availability and affordability
Design / technology	• Type of feedstocks. • Material. • Air permeability; Water permeability; Water solubility; Tensile strength; Colour fastness; UV fastness.
Recyclability, Reusability, Compostability, Biodegradability	• Recyclability/Compostability: Especially important for naturally biodegradable feedstock materials. • Reusability: Especially important in the case of reusable plastics. • Natural break down 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. • Different costs and processes in different regions. • Existing or emerging Extended Producer Responsibility regimes. • Industry certifications.
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. • Energy use of production processes. • 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.

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