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Preparation of an international legally binding instrument on plastic pollution, including in the marine environment

Addendum document on priorities, needs, challenges and barriers to end plastic pollution at national level (UNEP/PP/INC.1/11)

Note by the Secretariat

The annexed document is an addendum to working document UNEP/PP/INC/1/11 entitled 'Priorities, needs, challenges and barriers relating to ending plastic pollution at the national level'. The addendum sets out a more complete literature review to support working document UNEP/PP/INC.1/11. It is presented without formal editing.

ANNEX

Literature review of priorities, needs, challenges and barriers to end plastic pollution at national level

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A. Overview of the plastic life cycle

1. UNEA Resolution 5/14, in deciding that the INC should develop an international legally binding instrument on plastic pollution (the instrument), indicated that the instrument should be based on a 'comprehensive approach that addresses the full life cycle of plastic'. Resolution 5/14 did not further define the life cycle of plastic.[1]

2. As set out in UNEP/PP/INC.1/7, the life cycle of plastics is considered to include the full value chain of plastics, starting from the extraction of the materials that constitutes the feedstock (whether oil, gas, agricultural or other bio-based feedstocks, or recycled content) to end-of-life management of plastic waste, namely:

   a. Upstream

   - Extraction of the materials for plastics feedstock (crude oil, natural gas, agricultural or other bio-based feedstocks, recycled or renewable feedstock)
   - Monomer production
   - Polymer production
   - Plastic conversion
   - Trade of polymers

   b. Midstream

   - Design of plastic products
   - Manufacture of plastic products
   - Trade of manufactured plastic products
   - Distribution
   - Use, maintenance, and service
   - Reuse

   c. Downstream

   - Repair, refurbishment, remanufacturing
   - Segregation, collection, sorting, and recycling (waste management – including formal and informal sectors)
   - Trade of plastic waste
   - Disposal (incineration, landfill)

3. The type of feedstock from which plastic is made is highly relevant to pollution and impacts caused by plastics.

4. Depending on which activities around the life cycle countries engage in, each country faces different challenges and barriers, and from those will flow certain priorities and needs in addressing plastic pollution.

5. Within countries, most emphasis in actions is currently given to the downstream phase of the life cycle (waste management), with less focus on upstream and midstream issues. A narrow focus on certain phases of the life cycle will have a limited effect in reducing overall plastic pollution and may lead to trade-offs in other phases. For instance, focusing on recycling, one of the strategies lower in the hierarchy within a circular economy typology, may not, on its own, achieve significant reductions in the downward flow of plastics. The challenge is to prioritize the reduction of the upstream sources of plastics pollution while keeping the stocks of plastic materials within the economy through mechanisms such as design, reuse, repair and remanufacturing.

1 The description of the life cycle used in UNEP/PP/INC.1/7 is used as the basis for the review.

B. Priorities, needs, challenges and barriers for countries with activities along the plastic life cycle

6. The present section provides an overview of key activities and roles along the plastic life cycle, highlighting the critical hotspots and key problems. Priorities and needs, based on submissions from Member States, are set out in UNEP/PP/INC.1/7. Challenges and barriers to meet these priorities and needs are presented below, based on relevant literature. Information is also provided for developing countries and Small Island Developing States (SIDS) with specific conditions. The overview is divided into the upstream, midstream and downstream phases of the plastic life cycle. It should be noted that reference to "needs" and "priorities" are not "recommendations" from the secretariat, but rather reflect submissions or proposals from Member States in either this INC process, other UNEP processes, or literature research.

I. Upstream phase of the plastic life cycle

7. Key industrial activities affecting countries in the upstream phase of the plastic life cycle are:

- the extraction of fossil fuels to produce plastics (oil and gas industries including shale gas);
- the use of alternative feedstocks for production (e.g., bio-based feedstocks, recycled content);
- the production process of petrochemical industries producing plastics.

a. Priorities and needs in the upstream phase

8. As reported in UNEP/PP/INC.1/11, the priorities identified by Member States include:

(a) Measures to reduce virgin plastics;
(b) Harmonized standards for feedstock materials and quality;
(c) Access to competitively priced, high-quality recycled materials;
(d) Incentives to encourage the use of recycled plastic materials produced at the national level.

9. Based on UNEP/PP/INC.1/7 'Plastics science', for countries with a prevailing upstream role where large-scale raw material extraction and plastic production is part of the industrial landscape, the priority may be set to reduce the size of the problem by eliminating and substituting problematic and unnecessary plastic items, including hazardous additives.

b. Challenges and barriers

10. The following challenges and barriers to meeting the identified priorities and needs have been reported as existing in countries.

Hydrocarbons as stranded assets and climate litigation during the transition from virgin feedstocks

11. **The Paris Agreement[2] presents challenges for countries with significant plastic production**, especially those using fossil fuel and its by-products as feedstocks, to review their carbon footprints to meet their commitments. The INC submissions included recognition of the need to 'achieve global carbon reduction efforts'.

12. Following the Paris Agreement, there is **evidence that litigation against countries3 and corporations[4] around climate change is increasing.**5 This trend is also extending to the climate change impacts of plastic production.6 The need is for countries to implement climate change law applicable to plastics production and for stakeholders including corporations across the plastic life cycle to incorporate it in their policies.

2 United Nations Framework Convention on Climate Change; 2015. United Nations Treaty Series, December 12, FCCC/CP/2015/10/Add.1
3 Urgenda Foundation v. State of the Netherlands, [2015] HAZA C/09/00456689 (24 June 2015); aff'd (9 October 2018) (District Court of the Hague, and The Hague Court of Appeal (on appeal)) (affirmed by the Supreme Court, 20 December 2019)
4 Netherlands: Milieudefensie et al. v. Royal Dutch Shell plc. ECLI:NL:RBDHA:2021:5339, on 26 May 2021 (appeal pending).
5 Setzer, J. and Higham, C., (2022) Global Trends in Climate Change Litigation: 2022 Snapshot. London: Grantham Research Institute on Climate Change and the Environment and Centre for Climate Change Economics and Policy, London School of Economics and Political Science
6 RvVb-UDN-2021-0287 d.d. 13 November 2021, vzw ClientEarth *et al.* Vlaams Gewest available at RVVB.UDN.2021.0287_0.pdf (dbrc.be)

13. **Hydrocarbons may become stranded assets** during the transition from virgin feedstocks, due to disruptions in the demand for plastic packaging and the supply of alternative materials as feedstock. The challenge of stranded assets with their repercussions for industries (including insurers) as well as governments, is relevant for countries with raw material production of fossil fuels, and with large petrochemical companies producing fossil-based plastics, as a key component of their industrial landscape.[7] Stranded assets may imply huge costs for investors who are re-evaluating and adjusting their portfolio allocation with consequences on the economy of latecomers in the production of fossil fuels.[8] The need is for countries to adjust their policies to support the just transition and avoid the economic impact of stranded assets. Developing countries which have recently discovered fossil fuel resources, may face the challenge of stranded assets in the future.[9] Policy development needs to anticipate the transitional changes brought about by a circular plastic economy.

14. **In the insurance and reinsurance sector, climate change will cause an increased risk in assets and liabilities** connected to upstream and downstream energy, as well as shipping and residential and commercial properties.[10] This will result in reduced appetite to provide insurance cover for specific sets of activities, assets or customers.[11] The challenge here is to anticipate this risk and move to implementation of climate change policies[12] and circular solutions that address climate change while enabling a plastics economy to thrive, with circularity as a potential goal, in tandem.

The plastic industry's dependence on the by-products of the oil and gas industries

15. **There is an evident link between fossil fuel production and the production of plastics**. A recent study traced investments made by 12 of the largest global plastics manufacturers from 2012 to 2019 and highlighted the trend that plastics companies are increasingly investing in fossil fuel production.[13]

16. By-products from natural gas processing, shale gas and petroleum refining (such as ethane and propane) are major feedstocks for plastic manufacturing. Some countries have a large-scale production of plastic polymers, and a substantial need to find a market for ethane, a combination which contributes to their expanding virgin plastic production. Raw material producers of oil and gas, monomer producers and polymer producers provide jobs to economically deprived areas.[14] The need to find an outlet for the by-products of fossil fuel extraction such as ethane may lead to carbon dependence and present a barrier for plastic processing countries seeking to embrace the use of recycled content. The challenge is to reverse this trend.

State aid and incentives for virgin fossil fuels

17. **Pricing of feedstocks and market incentives:** state aid and other economic incentives provided by governments are frequently aimed at plastic production plants which use virgin fossil fuels and their by-products. Such economic incentives for fossil fuels can lead to growth in plastic production,[15] due to the reduced price for producing virgin plastics and an increased price gap between recycled and virgin plastics which ultimately decreases the economic viability of the recycled plastics market.[16] This challenge is pertinent to plastic processors, remanufacturing or recycling plants using/producing feedstock from recycled content[17] and presents a barrier for countries managing these conflicting market demands. The use

7 Caldecott, B., Dericks, G., Pfeiffer, A., & Astudillo, P. (2017). Stranded Assets: the transition to a low carbon economy. Overview for the insurance industry. Innovation Series: Society and Security. Emerging Risk Report 2017.
8 Bos, K., & Gupta, J. (2019). Stranded assets and stranded resources: Implications for climate change mitigation and global sustainable development. Energy Research & Social Science, 56, 101215.
9 Ibidem
10 Caldecott, B., Dericks, G., Pfeiffer, A., & Astudillo, P. (2017). Stranded Assets: the transition to a low carbon economy. Overview for the insurance industry. Innovation Series: Society and Security. Emerging Risk Report 2017.
11 Bank of England Prudential Regulation Authority (2015). The impact of climate change on the UK insurance sector. A Climate Change Adaptation Report available at https://www.bankofengland.co.uk/-/media/boe/files/prudential-regulation/publication/impact-of-climate-change-on-the-uk-insurance-sector.pdf
12 UNEP 2021 'Insuring the Climate Transition', Published by UNEP's Principles for Sustainable Insurance Initiative available at https://www.unepfi.org/industries/insurance/insuring-the-climate-transition/
13 Bauer, F., & Fontenit, G. (2021). Plastic dinosaurs–Digging deep into the accelerating carbon lock-in of plastics. Energy Policy, 156, 112418.
14 IEA (2018), The future of petrochemicals: Towards more sustainable plastics and fertilisers, IEA, Paris; Sicotte, D. M. (2020). From cheap ethane to a plastic planet: Regulating an industrial global production network. Energy Research & Social Science, 66, 101479.
15 IISD (2021), 'Subsidies: Under the Radar or Moving into the Spotlight?', Earth Negotiation Bulletin, 20 May 2021
16 Staub C (2020) 'Low virgin plastics pricing pinches recycling market further', Resource Recycling, 6 May 2020.
17 Vela, I. C., Vilches, T. B., Berndes, G., Johnsson, F., & Thunman, H. (2022). Co-recycling of natural and synthetic carbon materials for a sustainable circular economy. Journal of Cleaner Production, 365, 132674.

of ‘incentive mechanism(s) as a priority to allow the readjustment of tariffs to encourage the use of recycled plastic materials produced at the national level’ and the ‘establishment of incentives to promote the use of recycled plastic by improving the competitiveness of these products on the market and by providing more information to consumers’ has been recommended.

18. Lack of regulation and failure of operational licenses to address the use of hydrocarbons as the main source of feedstock, lead to increasing climate impact of plastic production.

19. Prior to development decisions being made, many countries assess the environmental impact of the proposed industrial installation to implement the preventive principle. These Planning and Environmental Impact Assessment laws are adopted worldwide from low to middle income countries to highly industrialized countries, but implementation varies. **Planning and Environmental Impact Assessment laws may present a barrier** as they might not be totally effective in assessing the broad environmental implications of plastic production plants. This can include the local effects of leakage, high stack emissions, and the global impact of climate change and plastic pollution. The priority and need are to require the inclusion of all the environmental impacts of plastics production at the preventive stage.

20. **Operational licences need to include requirements on climate impact.** These licences are normally issued by local or national enforcement agencies and focus on emissions and impacts during the operational phase of an industrial installation. Requirements on climate impact or the percentage of recycled content for feedstock are not routinely included as criteria in the operational licensing of fossil-fuel based production plants. The priority is to include these factors as requirements in the operational phase.

Lack of sustainable and competitively priced alternative feedstocks for plastic production

21. **Land demands for bio-based feedstock:** The demand for bio-based feedstock is a very small percentage of the overall feedstock for plastic production and is unlikely to change significantly in the near future.[18] The potential competition with the production of agricultural products in respect of food security and agricultural land use presents a challenge for countries to consider alongside the risk of deforestation. The need is for countries to consider the priorities among competing factors (such as alternative feedstock for plastic pollution, food security, land use, biodiversity, climate and pollution), while meeting economic and social benefits all in tandem at the planning stage.

22. In order to overcome the identified challenges and barriers a list of example actions can be found in Table 3 and Appendix 2 of working document UNEP/PP/INC.1/7.

II. Midstream phase of the plastic life cycle

23. Key activities for countries with a significant role in the midstream phase of the plastic life cycle include the design and manufacture of plastic and plastic-containing products, the distribution and trade of such products, and their use and reuse. The production of plastic products is relevant for countries with large-scale manufacturing sectors (packaging, food and beverage, automotive, electrical and electronic, construction, healthcare, textiles, etc.), while all countries face issues relating to growing consumption of plastic products by individual and business users.

a. Priorities and needs in the midstream phase

24. As reported in UNEP/PP/INC.1/7, Member States made specific mention of the following needs:

(a) Lack of regulation and failure of operational licences to limit the climate impact of plastic production caused by the use of hydrocarbons as feedstock;
(b) Plastics design measures, from the establishment of design criteria to the implementation of measures that eliminate or reduce harmful, hazardous or unnecessary plastics;
(c) Extended producer responsibility policies and schemes;
(d) Removing hazardous chemicals used as additives in plastics that pose risks to human health, and the need to innovate and develop more sustainable alternatives;

18 OECD (2022), Global Plastics Outlook: Economic Drivers, Environmental Impacts and Policy Options, OECD Publishing, Paris.

(e) Labelling systems for products to improve transparency and traceability throughout the supply chain regarding the type of plastic as well as other chemicals and additives used, and to enable correct disposal, including remanufacturing or recycling;
(f) Recognizing the importance of trade in the plastics value chain and the need for the clear identification and tracking of plastics;
(g) An "international risk assessment framework that considers the multidimensionality of plastic and microplastic particles";
(h) A system for compiling data on plastics material flow and balance throughout the life cycle of plastics at the national, regional and global levels;
(i) "Good science" to enhance the distribution and trade of plastic products;
(j) A scientific body for decision-making, with "scientific decision-making to include (a) parameters, (b) a pollution standard index, (c) sampling procedures and (d) laboratory testing".

25. Based on UNEP/PP/INC.1/7 'Plastics science', for countries with a prevailing midstream role on production and consumption of plastic products, the priority may be set to ensure that plastic products are designed to be circular (reusable, recyclable, or compostable).

b. Challenges and barriers

26. The following challenges and barriers to meeting the identified priorities and needs have been reported as existing in countries:

Lack of policies, standards, incentives, support, markets and good practices for sustainable product design

27. **The design of a product will primarily influence its environmental impacts throughout its life cycle**, as all activities (manufacturing, use, reuse, remanufacturing, repair and recycling) depend on the characteristics of products. Several Member States in their INC-1 submissions supported the inclusion of product design in the instrument. The need for discussion on product design, including 'exchanges on eco-design, recycled content targets, standards, chemical and additive restrictions and restrictions on certain uses' was also recognised.

28. A very significant barrier is that plastic products (such as packaging in the food and beverage, and personal care sectors) are usually designed to be single-use. With their immediate disposal after use, this leads to the proliferation of plastic waste with little being collected and recycled. **The need is to remove as far as possible the production of single-use plastic products (SUPPs).**

29. There has been **little regulation at the design stage in many countries** other than under general product laws and for health and safety.[19] Existing rules around the design of plastic products present a barrier as they have mainly focused on the functionality and cost of the products, and do not usually consider the environmental and social impacts, due to absence of relevant technical guidance and regulation. The priority is to enhance the rules around product design to incorporate broader elements. Due to lack of data and information on toxicity, use and exposure, the use of hazardous chemicals in plastic products has not been regulated and managed sufficiently at product design stage.

30. A priority is to use standardisation to achieve uniform quality on which markets can rely, especially for product design. Although there have been proposals for 'standardization around materials feedstock requirements/quality', **no design standardization** has been effectively applied so far to specific plastic or plastic product groups for the purpose of reducing plastic pollution and increasing sustainability. This leaves the possibility of varying interpretations between countries of the meaning of sustainability and the creation of an uneven playing field in the market.

31. The lack of standardisation leads to **the problem of 'green' product claims** being made which are not founded on scientific evidence.[20] There is, however, experience with legislation on ecodesign, such as the EU Ecodesign Directive, which involves a methodology consisting of a techno-economic-environmental

19 Malcolm, R., 'Life Cycle Thinking as a Legal Tool: A Codex Rerum', 15/2 Law, Environment and Development Journal (2019), p. 208
20 European Commission 'sweep' on misleading sustainability claims, 2020. Available at: https://ec.europa.eu/info/live-work-travel-eu/consumer-rights-and-complaints/enforcement-consumer-protection/sweeps_en#2020-sweep-on-misleading-sustainability-claims

assessment of products during the design phase based on the Least Life Cycle Cost (LLCC). This allows individual manufacturers to choose how, and with which technologies, to produce a compliant product.

32. Where materials and products are designed to be functional under very specific conditions, they require the logistics and infrastructure to meet design requirements. The challenge is that a product which has been designed for reuse, composting, refurbishment or remanufacture will require separate collection and segregation, and specific facilities need to be available in the country to achieve the desired results. Barriers to meeting this challenge are that, when **the logistics and infrastructure are absent locally**, the requirements predefined at design stage will not be met. The priority is for these requirements for logistics and infrastructure to be developed and there will be a need for financial support to encourage this development.

Lack of links between extended producer responsibility and other end-of-life oriented policies and upstream and midstream goals

33. Extended producer responsibility (EPR) schemes which could stimulate better product design, require coordinated development and implementation around the world. But a barrier is that **current EPR schemes mainly focus on funding end-of-life waste management systems**. Better product design has not been sufficiently motivated by EPR schemes and relevant economic instruments, to achieving adequate transformation towards more sustainable product and system design. The priority is to design EPR schemes which create an environment for the good design of plastic products based on prevention and precaution resulting in least waste and pollution.

34. Despite the essential role of product design in affecting the circularity of the plastic life cycle, a barrier to its development is that funding for design research and raw materials remains one of the lowest in the plastics life cycle (page 22, UNEP/AHEG/4/INF/7). There is a need to fund this essential research as well as support the uptake of more sustainable products and service.

Lack of consistent standards, data, information, transparency and traceability relating to the distribution and trade of plastic products

35. Plastics are used, distributed, traded and applied extensively, across many industrial applications such as: packaging, consumer & institutional products, building & construction, electrical and electronics equipment, marine coatings, industrial/machinery, personal care products, textiles, road marking and in transport.[21] Some leakages are deliberate and are part of the design of a product (e.g., microbeads in cosmetics, balloons). **Information and data related to the material and product properties, their uses, and detailed information on re-use, recycling and disposal are required.**

36. A critical challenge is the **availability of reliable and disaggregated data** on cross-border trade flows across the life cycle of plastics. For instance, data related to polymer types and their combinations, additives embedded in plastic products, and the packaging associated with products are all required.[22]

37. A growing number of countries are developing and applying standards and labelling requirements to improve transparency of the material composition or properties of plastic products. In its submission, Indonesia referenced the need for standardised tools and instruments including parameters, pollution standard index, sampling procedures and laboratory testing. However, barriers arise when countries do not recognize each other's standards or certification systems, when there is **inconsistency between standards** or where testing facilities are not available to verify compliance.[23] This raises a need to improve cooperation on standardisation.

Lack of reliable information, awareness, and incentives to encourage sustainable consumption

38. **Labelling schemes are also critical during the midstream phase of use and reuse.** Various labelling schemes exist across a number of countries on a range of products including plastic products, but not relating to the content in terms of chemicals used, reusability, etc. While mandatory labelling schemes could control which products enter the market, labelling schemes could also be used on a voluntary basis to

21 OECD (2022), Global Plastics Outlook: Economic Drivers, Environmental Impacts and Policy Options, OECD Publishing, Paris.
22 TESS (2022), Policy Brief: Plastic Pollution and Trade Across the Life Cycle of Plastics: Options for Amending the Harmonized System to Improve Transparency.
23 Wessinger, R. (2021). Standards and the International standardization landscape: Relevance to plastics and plastic pollution. Global Governance Centre, The Graduate Institute. and the Forum on Trade, Environment & the SDGs (TESS)

encourage the consumer to purchase more 'environmentally-friendly' products.[24] Labels should provide reliable and transparent information on the composition of plastics, chemicals and additives used and disposal instructions to help consumers make more sustainable choices in the purchase and disposal of plastic packaging and to help recyclers understand the recyclability of the products. The barrier for countries in adopting proper labelling schemes include the lack of standardization and harmonization of labels on a worldwide basis. There may also be problems around the extent to which companies may be exaggerating green claims in relation to their products. This raises the need to achieve consistency and standardisation of labelling for plastic materials and products.

39. **Procurement practices** where purchasing decisions are made by government bodies and large companies can drive the market in certain directions by affecting the demands of more sustainable products, e.g. product with recycled content. Where countries focus on economic considerations for directing purchasing policies, then environmental and social impacts can be overlooked. The challenge here is the lack of regulatory drivers for change in some countries, as well as inclusion of sustainability criteria on procurement policies for government bodies and large companies.

40. **Littering during the use phase is a challenge especially in relation to single-use plastic products (SUPPs).** SUPPs are targeted through various mechanisms such as: banning specific types of SUPPs; reducing consumption through awareness-raising campaigns; the disposal options available or to be avoided; introducing waste management and clean-up obligations for producers. Bans on specific types of SUPPs are the most common form of regulation designed specifically for plastic products.

41. **The challenge for countries is to improve monitoring and assessment of the effectiveness of such bans**, in order to understand to what extent banning selected SUPPs is addressing the overall problem of plastic pollution. In the meantime, lack of more sustainable alternatives and solutions while still implementing bans on SUPPs will lead to trade-offs in which problems will be shifted to other materials (e.g., using more paper packaging) or impact areas (e.g., less littering, but more climate impacts). The challenge for countries is to confront the limited use and rebound effects of focusing legislative attention mainly on the banning of selected SUPPs.

42. In order to overcome the identified challenges and barriers a list of example actions can be found in Table 3 and Annex 3 of UNEP/PP/INC.1/7.

III. Downstream phase of the plastic life cycle

43. The downstream phase of the life cycle includes repair, refurbishment and recycling, the trade of plastic waste and the disposal of residual wastes.

a. Priorities and needs in the downstream phase

44. The submissions to the intergovernmental negotiating committee and a literature review indicated that consistent with the principle of waste hierarchy and circular economy, countries had identified as a priority the need for waste minimization and reduction, reuse, repair, refurbishment, remanufacturing, recycling and final disposal, in particular:

(a) Measures that ensure the safe, proper and environmentally sound collection, management and disposal of plastic waste and other types of waste containing plastics while enhancing recyclability and creating a more circular value chain for plastics;
(b) Measures to address the transboundary nature of plastic pollution;
(c) A mechanism for tracing and controlling illegal trade, dumping and transportation of plastic waste and its floating through sea water currents;
(d) Improving the informal sector's links to industrial value chains, including recognition of human rights;
(e) Improving the repair culture.

24 Clift, R., Malcolm, R., Baumann,H., Connell, L., and Rice G. *"Ecolabels and Electric Monks"* (2005) Journal of Industrial Ecology, Vol. 9, No. 3, p. 4.

45. The reference to plastic pollution having a significant impact on human rights may be considered in the context of UN Resolution A/RES/76/300 on the human right to a clean, healthy and sustainable environment.

46. Based on UNEP/PP/INC.1/7 'Plastics science', for countries with a prevailing downstream role on production and consumption of plastic products, the priority may be set to close the loop of plastic in the economy by ensuring plastic products are circulated in practice (reused, recycled or composted), and to manage plastic waste that cannot be reused or recycled in an environmentally sound manner.

b. Challenges and barriers

47. The following challenges and barriers to meeting the aforementioned priorities and needs have been identified through the submissions and literature review as existing in countries:

Lack of legislation and incentives concerning the "right to repair"

48. A barrier is the lack of legislation and economic incentives (such as tax reduction) to meet the challenge of achieving a **"right to repair"**. Repair, as opposed to maintenance, is defined by the event of malfunction.[25]. INC-1 submissions included reference to the support from some municipal authorities for repair cafes.

49. Barriers to repair include technical and legal barriers, lack of durability (including the integration of planned obsolescence26 as part of design27), and the high cost of repair28. The electronics and textiles produced partially as a result of planned obsolescence practices, contain components made of plastics which in turn, being of lower quality, decreases a product's[29] durability. The EU has announced the establishment of a 'right to repair' in several of the European Commission's strategic documents: the European Green Deal, the new circular economy action plan and the new consumer agenda. [30] The challenge here is that trade protection laws may control access to information held by producers, and also limit the availability of spare parts and materials thus restricting the ability of consumers and independent repairers to have sufficient information and resources to manage repairs of the products.[31]

Lack of affordable and accessible reuse schemes

50. A challenge is to ensure that **reuse is systematically promoted**. Currently much reliance is placed on consumer behaviour with attempts to encourage or nudge consumers to recycle. A barrier is the lack of readily available reuse and refill systems which are attractive to consumers especially in the retail space. The challenge is to devise reuse solutions to plastics waste rather than recycling which tends to result in a downgraded recycled product. For example, in the food and beverage sectors, the challenge is to find reusable alternatives to plastic containers which do not compromise food waste reduction and food security. A barrier is lack of facilities (e.g., second-hand or 'preloved' shops) and incentives for consumers to reuse or repair their goods. The challenge is to achieve a social transformation to shift away from the "throw-away" or recycling behaviours by making workable reuse solutions available.

Lack of a common legal definition of end-of-life products as waste that excludes recyclable plastic products

51. **Another challenge to circular solutions relates to the legal definition of end-of-life products as waste in many countries**. The impact of defining end-of-life products as waste incurs expensive and complex waste management regimes to be put in place with onerous duties of care such as licensing which requires proof of resources, probity etc.[32] Products which are disposed of constitute a greater hazard to the

25 Ackermann, L. (2018). Design for product care: enhancing consumers' repair and maintenance activities. The Design Journal, 21(4), 543-551.
26 Bartl, A. (2014). Moving from recycling to waste prevention: A review of barriers and enables. *Waste Management & Research*, 32(9_suppl), 3-18.
27 Hernandez RJ, Miranda C, Goñi J. Empowering Sustainable Consumption by Giving Back to Consumers the 'Right to Repair'. Sustainability. 2020; 12(3):850.
28 Ibidem
29 Lebel, S. (2016). Fast machines, slow violence: ICTs, planned obsolescence, and e-waste. Globalizations, 13(3), 300-309.
30 Šajn N. (2022) Right to Repair. European Parliament: European Parliamentary Research Service. EPRS Briefings.
31 Grinvald, L. C. & Tur-Sinai, O. (2019). Intellectual property law and the right to repair. Fordham L. Rev., 88, 63.
32 Malcolm, R. and Clift, R. Barriers to Industrial Ecology: The strange case of 'the Tombesi Bypass' (2002) Journal of Industrial Ecology, Volume 6, Issue 1 – Winter, Editorial.

environment and public health because of the lack of responsibility for them.[33] Waste management regulatory frameworks impose greater obligations on industry which is dealing with products classified as waste because of this risk factor. But this can be a barrier which discourages industry from dealing in waste management including recycling. The priority is to balance the regulatory requirements so as not to discourage trade in recyclable plastic materials while at the same time not jeopardising the environment and public health.

Lack of legislation, technology, infrastructure, capacity and investment for waste management, along with a lack of effective compliance with and enforcement of waste management laws and policies

52. Most countries have extensive **waste management legal frameworks, but these are often not observed in practice** and in some (especially developing countries) **lack of infrastructure is a key barrier** to the collection, sorting and, recycling of plastic waste. The technical guidelines on the environmentally sound disposal of plastic wastes[34] and of used and waste pneumatic tyres[35] are being updated to reflect the Plastic Waste Amendments to the Basel Convention.[36]

53. **At present, about 2 billion people around the world do not have access to any formal waste management system.** This lack of infrastructure and well-functioning waste management systems affects both urban and rural areas of developing countries. Urbanisation and population increase also leads to the intensification of problems around waste accumulation and collection. In formal settlements, barriers also relate to poor waste collection and sorting. A key barrier here is lack of resources especially in developing countries. There is a need for funding to support infrastructure development.

54. **Another barrier is the lack of effective compliance with and enforcement of waste management laws and policies.** The outcomes vary at national levels either because of lack of resourcing, investment, limited human capital, low capacity, corruption, inadequate facilities, poor collection practices, etc.

55. The key barrier for efficient recycling is the availability of municipal collection and sorting systems for segregating different plastics. As a last resort before disposal, recycling is the option towards the bottom of the waste hierarchy coming after reuse (a midstream activity) and repair and refurbishment (downstream activities). Mechanical recycling is environmentally and thermodynamically more optimal compared to other recycling options (such as chemical recycling). However, mechanical recycling only operates well if its feedstock is homogeneous with minimal contamination of additives and hazardous chemicals. This requires waste management systems in place to enable efficient collection and segregation to sort plastics, rather than sending mixtures of different plastics to mechanical recycling. The automated technology does not perform perfectly in terms of the efficiency of separating out different polymers, especially for mixed plastic waste. [37] Technological development by stakeholders is a priority need.

56. But where recycling is technologically possible, it often fails because of poor collection and segregation of waste, which inhibits effective recycling. There is a need for clear instructions and information to **improve the awareness of citizens** on how to sort at source as failure to do this can result often in contaminated household bins rendering the collected waste unusable.

57. There is a demand for high-quality recyclable plastics,[38] but in many countries in particular SIDS, the barrier is the **lack of industrial recycling processes on a large enough scale** to be sufficiently feasible and profitable for investors. This leaves valuable recyclable plastic materials going into the waste stream. The barriers for increasing and satisfying the demand for recycled plastics include:

33 Steenmans, K and Malcolm, R, *Transitioning towards circular systems: property rights in waste*, Journal of Property, Planning and Environmental Law Vol. 12 No. 3, 2020 pp. 219-234.
34 De Frond HL, van Sebille E, Parnis JM, Diamond ML, Mallos N, Kingsbury T, Rochman CM. Estimating the Mass of Chemicals Associated with Ocean Plastic Pollution to Inform Mitigation Efforts. Integr Environ Assess Manag. 2019 Jul;15(4):596-606.
35 Basel Convention. Technical guidelines: Revised technical guidelines for the environmentally sound management of used and waste pneumatic tyres UNEP/CHW.10/6/Add.1.
36 Basel Convention. Amendments to Annexes II, VIII and IX to the Basel Convention. Decision BC-14/12.
37 Clift, R., Baumann, H., Murphy R.J., and Stahel, W.R. (2019) 'Managing plastics: uses, losses and disposal' Law, Environment and Development Journal, Vol.15.
38 OECD (2018), Improving Markets for Recycled Plastics: Trends, Prospects and Policy Responses, OECD Publishing, Paris, Pages 12-16.

- no differentiated demand for recycled plastics (lack of introduction of recycled content targets at national level);
- uncertainty about the availability and quality of recycled plastics;
- high cost of recycled plastics (subsidies to virgin plastics undermining the competitiveness of the price of recyclables, lack of effective collection system to ensure high-quality recycling).

58. There is also a need for countries to **increase the traceability of recyclable and hazardous materials to ensure transparent and effective recycling**. A priority is, when quantifying the amount of plastic recycled for quantifying the recycling rate, to consider the weight of output of secondary material coming out of recycling facilities rather than input to facilities or rates of collection for recycling. Further, there is a need to track the amount of plastic packaging or products exported which are intended for recycling to ensure that effective recycling takes place. There is usually less certainty that the amount exported will be effectively recycled, compared to the amount recycled domestically.

59. **The lack of recognition of a proximity principle as established under the Rio Declaration (Principle 10),** which advocates that pollution should be managed at the point closest to its source, is a barrier. The principle of managing waste as near to home as possible needs to be implemented in policy at country level.

60. A barrier is the lack of **regulation and fiscal policy** requiring the accountability from producers for a product at each phase of its life cycle. Extended Producer Responsibility (EPR) has been widely recognized as one of the effective instruments for effective end-of-life collection, the environmentally sound treatment of collected plastic waste and improved rates of recycling. The development and implementation of EPR has been witnessed in many countries including developing countries. The design of EPR is key for its success and potential barriers to implement EPR policy include: a lack of proper enforcement and accountability (e.g., free-riders); a lack of transparency and monitoring; and not delivering or even disincentivising circular outcomes because of a focus on the end-of-life rather than whole life stage.

Lack of traceability and control of the illegal trade of plastic waste

61. The challenge is to trace and control illegal trade of plastic waste. The Plastic Waste Amendments to the Basel Convention adopted in May 2019 and which came into effect in January 2021, require that exporting countries obtain consent from countries receiving contaminated, mixed or unrecyclable plastic waste.[39] A barrier is lack of capacity and funds to comply with these new requirements of the Basel Convention. Further barriers to compliance with the Basel Convention include lack of transparent and harmonised inventories on the quantities of plastic waste generated, managed, exported and imported, recycled and finally disposed of, limited capacity of customs authorities and streamlined permitting process. A challenge is for relevant analysis and work on trade of plastic waste needs to have close alignment with the Basel Convention and the Plastic Waste Partnership.

The presence of the informal sector, in which primitive recycling to extract valuable materials is practised in developing countries

62. The **informal waste sector** provides viable and sustainable livelihoods for the urban poor and is a key feature of least developed countries (LDCs) and of most developing countries. Some 60 percent of the plastic recycled worldwide is collected by informal waste-pickers, but this can lead to high value materials being picked and unusable waste remaining as litter. Developing countries are recognising the invaluable contribution of the informal waste sector to waste management strategies. For instance in Vietnam, where informal and formal systems co-exist side by side, the informal system may collect up to 30 percent of the total waste generated compared with 13 percent by the formal system. Integrating them in municipal waste management and EPR schemes was considered essential to the success of the scheme.[40] The priority for countries is to empower informal waste workers and integrate them and their collective organisations into the decision-making framework, by integrating their skills and knowledge and recognising the need to improve their livelihoods and their impact on the transition to a circular plastics economy.

63. One challenge of waste management particularly notable in SIDS and developing countries is to prevent **the open burning and dumping of plastic waste** in uncontrolled circumstances where affordable waste management is not available. This practice can release toxic chemicals such as dioxins and furans and

39 BC-14/12: Amendments to Annexes II, VIII and IX to the Basel Convention

40 Phuong, N.H. (2021), Policy effectiveness assessment of selected tools for addressing marine plastic pollution. Extended Producer Responsibility in Viet Nam. Bonn, Germany: IUCN Environmental Law Centre.

increase the risk of heart disease, aggravate respiratory ailments such as asthma and emphysema and cause rashes, nausea or headaches, and damage the nervous system.[41] This can impact on the health of both the informal waste pickers and the local community who may use it as part of a self-management waste strategy causing massive problems of local air pollution quality. The Stockholm Convention guidelines on best available techniques and best environmental practices provide the necessary guidance[42] called for in Article 5 and Annex C to the Stockholm Convention in relation to unintentionally released chemicals. A challenge is for waste management strategies for the end phase of a plastic product to meet the needs of many developing countries to ensure the environmentally sound management of plastic waste.[43]

64. In order to overcome the identified challenges and barriers a list of example actions can be found in Table 3, Annex 4 and Annex 5 of UNEP/PP/INC.1/7.

IV. Summary of challenges and barriers in countries along the plastic life cycle

The present section groups challenges and barriers into the following categories: knowledge-related, regulatory, economic, technological and behavioural. They are presented in the below table.

Overview of challenges and barriers at national level

Life-cycle phase	**Types of challenges and barriers at national level**				
	Knowledge-related	**Regulatory**	**Economic**	**Technological**	**Behavioural**
Cross-cutting	Lack of data across the whole plastic life cycle on quantities, flows, pathways, and impacts at different scales Lack of knowledge on the impacts of plastics on human health and the environment Lack of monitoring schemes to evaluate the progress and effectiveness of existing measures	Lack of a coherent, overarching and holistic regulatory framework on plastics at the national level, covering the full life cycle Lack of definitions, standards and technical specifications for recyclability, reusability, safety and labelling of chemical content, plastic types and disposal means Lack of clear, timebound targets, monitoring and reporting schemes at the national level End-of-life-oriented policies that do not link to upstream and midstream goals	Limited understanding of the costs of plastic pollution on the environment and human health Costs and benefits for different strategies, interventions and actions are not always quantified Limited implementation of extended producer responsibility schemes with eco-modulated fees	Lack of harmonized labelling and tracking systems for plastic products	Lack of awareness from the private sector on the impacts of plastic pollution Lack of awareness and responsible action by individual and business users regarding plastic pollution

41 Verma, R., Vinoda, K. S., Papireddy, M., & Gowda, A. N. S. (2016). Toxic pollutants from plastic waste – A Review. Procedia Environmental Sciences, 35, 701-708.
42 BAT and BEP Guidance. Available at http://chm.pops.int/Implementation/BATandBEP/Guidance/Overview/tabid/5121/Default.aspx
43 *Ibidem.*

		Lack of coordination between countries on the development of action plans for reducing plastic pollution			
Upstream	Lack of information and transparency regarding the content of and trade information (sources and destinations) for plastics	Lack of legislation (e.g. planning, environmental impact assessments, licensing regulations) for sustainable material sourcing (virgin or recycled materials) Lack of legislation to phase out harmful chemicals as well as intentionally added microplastics Lack of inclusion of environmental criteria in public procurement decision-making	The plastic industry's dependence on the by-products of the oil and gas industries Fossil fuel aid and subsidies keeping virgin plastic cheaper than recycled plastic Lack of markets for secondary plastics Lack of investment in the development of alternatives	Lack of development and uptake of sustainable alternative feedstock	Lack of awareness of climate change and other environmental impacts of fossil fuels
Midstream	Lack of transparent and reliable consumer information (e.g. eco-labelling, sustainability information) for individual and business users on the content of, impacts of and disposal means for plastic products	Lack of legislation on the design of plastic products to reduce the production of unnecessary, disposable and difficult-to-recycle plastics, and the need for greater stimulation for upstream innovative solutions Lack of legislation and policy to support reuse Lack of legislation to encourage the use of recycled content by setting mandatory targets for packaging and durable goods containing plastics Lack of public procurement policies favouring	Lack of economic disincentives targeting single-use plastic products Lack of economic incentives for more sustainable products No fiscal policies or economic incentives to encourage reuse Lack of investment for reuse systems, reuse infrastructure and reverse logistics	Lack of technology to design out hazardous chemicals while ensuring the functionalities of products Insufficient innovation for new business models for reduction and reuse Lack of design and innovation to reduce the prevalence of hard-to-recycle plastics (e.g. multi-layered plastics) and foster sustainable alternatives	Lack of communication, education and public awareness regarding sustainable consumption Lack of awareness regarding reuse Voluntary targets for reducing packaging set by industry are not ambitious enough Lack of standardization leads to misleading ''green product'' claims

		sustainable alternatives			
Downstream	Lack of information and transparency on the content of and trade information for plastic products and waste Lack of information on the performance of formal and informal waste management systems, including on efficiency, leakage and impacts	Lack of repair and waste management regulation and policies and their enforcement Lack of effectively implemented extended producer responsibility and lack of the use of eco-modulation to stimulate the reduction of problematic and unnecessary packaging and plastic products Lack of integration of the informal sector in decision-making Lack of effective enforcement of regulations against open burning and dumping	No fiscal policies or economic incentives to encourage the repair, remanufacturing and environmentally sound management of plastic waste Collection and recycling of single-use plastic products and hard-to-recycle plastics are not profitable No industrial recycling process exists which is sufficiently feasible and profitable for investors Lack of investment in waste management infrastructure Existing infrastructure for recycling limited by poor collection and sorting	Lack of affordable and accessible repair and remanufacturing solutions tailored to specific country needs Insufficient technologies and solutions for hard-to-recycle plastic products Lack of technologies to improve sorting and recycling Lack of technologies for the filtering of microplastics in wastewater treatment plants	Lack of awareness regarding repair and remanufacturing “Throw-away” attitude of consumers and lack of awareness on how to properly sort and collect plastic waste Lack of awareness in the informal sector of the environmentally sound management of plastic waste

V. Challenges, barriers, priorities and needs for Small Island Developing States (SIDS) with specific conditions and needs

65. SIDS constitute a special case for consideration due to their unique and collective nature. Key characteristics of SIDS are that most plastic products are imported, and there is a general lack of adequate waste management infrastructure and capacity. SIDS lack technologies to manage plastic waste onshore and the problem is made acute with many countries refusing plastic waste imports. SIDS are especially vulnerable to environmental impacts such as climate change and marine litter.

66. SIDS are heavily influenced by the regulatory decision-making of exporting and manufacturing countries. Local bans on the use of certain plastic products may result in the import of alternative goods which have poor environmental impacts of their own.

67. Lack of infrastructure and good waste management systems on the islands is a challenge. A priority is to undertake good waste collection and sorting with places to sell recyclable material or the installation of recycling facilities.

68. Good practices from local communities around the world could be replicated. Through an action plan which relies on the community strengths, small island states can engage in local participatory action and use local labour to repair and reuse products, while keeping the material on the island.

69. Coupled with an approach which bans or restricts the import of SUPPs, there could be a real opportunity for SIDS to build a localised circular economy. This would require support, capacity building, availability of alternatives and resourcing, as well as local skills of craftspeople such as repairers and recyclers to drive this new economy. This would reduce the dependence on the import of materials and resources onto the island and generate employment opportunities further enabling a just transition to a circular plastics economy.

70. Priorities and needs for SIDS include:

- Manage imports of plastic products which do not fit local repair, refurbishment, reuse and recycling schemes, through product, procurement and import policies and actions
- Develop waste recycling solutions, where technically and economically feasible
- Integrate the informal waste sectors into decision-making
- Provide training and capacity building for informal sectors to enhance repair and refurbishment skills
- Raise the awareness of citizens through training or educational programmes

71. The key challenges and barriers for SIDS are:

- Reliance on import of single-use plastic products, and packaging of imported products which are not recyclable, re-manufacturable or reusable
- Proximity of waste management centres (both formal and informal) to the ocean, increasing risk of leakage
- Lack of resources, capacity, space, sufficient feedstock of secondary materials and economy of scale for waste infrastructure
- Geographical location, with long distances to other islands or continents, which complicates collection and sharing of recycling infrastructure
- Lack of skilled local workers involved in waste collection and recycling
- Lack of skilled local workers involved in repair

C. Existing national measures to address plastic pollution

72. This section gives examples of the ways in which countries have responded to the challenge of plastic pollution through a range of national measures.

I. Summary of types of laws, instruments, policies and voluntary agreements

General waste and other laws and measures which include plastics but are not specifically aimed at plastics:

- Tax and tipping fees on waste to landfill.
- End-of-life laws for the segregation, collection, sorting and recycling of packaging waste.
- Eco-design / sustainable product standards (e.g. the impact of the European eco-design directive[44] on targeted product groups).
- Extended producer responsibility regulation and guidance (note these are often end-of-life laws and policies focusing on the downstream phase, requiring that the producer-polluter bears the cost of managing waste products).
- Control of hazardous chemicals, including hazardous chemicals used in components of plastics.
- A carbon tax that directly sets a price on carbon by defining a tax rate on greenhouse gas emissions or on the carbon content of fossil fuels. Around 40 countries and 20 cities, states and provinces already use carbon pricing mechanisms. Carbon pricing schemes now in place cover about half their emissions, which translates to about 13 per cent of annual global

44 Ecodesign Directive 2009/125/EC

greenhouse gas emissions.[45] Carbon taxes have resulted in decreases in fuel consumption without harming economic growth.[46]

- Fossil fuel moratoriums and bans regulating supply side of fossil-fuel-based raw materials for plastics manufacturing as part of decarbonization measures (e.g. the ban on inland fossil fuel production in Denmark).[47]

Legal or economic instruments specific to plastics:

- Bans on problematic and unnecessary types of plastic (e.g. microbeads)
- Bans on the import, production and consumption of single-use plastic products (e.g. plastic bags of a certain film size)
- Charges or levies on single-use plastic products (e.g. plastic bags)
- Extended producer responsibility specific to plastics (e.g. packaging) or products containing plastics (e.g. electronics, vehicles, cigarette butts)
- Taxes on packaging content (graduated according to the content of recycled and/or recyclable material).
- Laws requiring all plastic packaging to be recyclable or compostable by specific dates (e.g. California requires single-use packaging to be at least 30% recycled, reused or composted by 2028, 40% by 2030 and 65% by 2032.[48])
- Bans on the import of plastic waste.

Government policies (not enacted into law and found in numerous jurisdictions)

- Government targets on plastic use and content.
- Action plans, including circular economy action plans, national waste management policies and clean-up beach and coastal clean-up plans.
- Zero waste plans with specific reference to plastics.
- Special protected area plans (with specific bans on single-use plastic products).
- Deposit and return schemes (mainly plastic bottles).
- Subsidy phase-outs, gradually decreasing and ultimately removing fossil fuel subsidies to bridge the cost gap between virgin plastics (which are usually cheaper) and recycled plastics.[49]
- Fossil fuel divestment policies, with the withdrawal or exclusion of funds and assets by governments, companies, non-governmental organizations, universities, individuals or other entities from financial portfolios connected to fossil fuel companies and their extractive activities.[50]

Voluntary schemes – examples

- New Plastics Economy Global Commitment
- Plastics pacts in countries

II. Single-use plastic products (SUPPs)

73. One challenge is the growing amount of single-use plastic products in use and the barrier in dealing with this has been lack of legislation and/or fiscal policy. Many countries have identified this as a priority for legislative or fiscal action and the most common type of law is that which bans types of single use plastic products. The plastic bag has been the priority amongst these for action. For example, in the city of Buenos Aires, Argentina, a charge was first imposed on plastic bags which led to an estimated reduction in their consumption of 50%. The city then expanded this into a full ban on plastic bags. Mauritania was the first

45 Pricing Carbon, 2020, World Bank available at https://www.worldbank.org/en/programs/pricing-carbon#:~:text=A%20carbon%20tax%20directly%20sets,but%20the%20carbon%20price%20is.
46 Elgie, S., Beaty, R., Lipsey, R. "British Columbia's carbon tax shift: An environmental and economic success". The World Bank available at https://blogs.worldbank.org/climatechange/british-columbia-s-carbon-tax-shift-environmental-and-economic-success
47 Carter, A. V., & McKenzie, J. (2020). Amplifying "keep it in the ground" first-movers: Toward a comparative framework. Society & Natural Resources, 33(11), 1339-1358.
48 US State of California Plastic Pollution Prevention and Packaging Producer Responsibility Act Senate Bill 54
49 Erickson, P., Lazarus, M., & Piggot, G. (2018). Limiting fossil fuel production as the next big step in climate policy. Nature Climate Change, 8(12), 1037-1043.
50 Gaulin, N., & Le Billon, P. (2020). Climate change and fossil fuel production cuts: assessing global supply-side constraints and policy implications. Climate Policy, 20(8), 888-901.

country in Africa to ban plastic bags in 2013. Bans on other types of single-use plastic products have followed where commonly used items such as stirrers, cutlery, earbuds, cigarette packets have been banned. Legislation on microplastics is less common although bans on microbeads in cosmetics is one exception to that.

74. While these bans are being implemented widely, one challenge is to understand how effective these bans are so a barrier to progress is lack of systems for monitoring. Where monitoring takes place there is evidence that such bans are effective in reducing production and consumption of these plastic products. But there is evidence in some countries of illegal trade in banned plastic products. A priority therefore is to follow bans with effective monitoring systems and the need is for countries to have sufficient resources and capacity to achieve effective follow-up and monitoring for regulatory bans and fiscal levies.

III. SUPP - plastic bags (film size)

75. **Single use plastic bags are a common type of packaging widely used which create pollution and littering problems.** A ban is the most widely selected approach to regulating plastic bags. But the approach varies across (and within) countries. For example, biodegradable bags are excluded from bans, e.g., in San Francisco (2007), Italy (2011), Vietnam (2012) and France (2016). The thickness of plastic bags is also a variant in regulation. Very thin plastic bags of less than 30 mm are banned in for example, South Africa (2003), Kenya (2007–2011), Mozambique (2016) and Senegal (2016), while the EU directive 2015/720 addresses bags with a thickness of 15–50 mm (European Parliament and the Council, 2015). Thinner bags are excluded in the EU for hygiene purposes, while thicker bags are excluded since it is assumed they are re-used more frequently.

76. **This difference in film thickness presents barriers for trade and the inconsistency creates uncertainty for industry.** While there is clear evidence that such a ban reduces the amount of plastic bags in circulation the challenge is to find a common standard across countries and a common agreement to prevent black market operations across borders.

77. By contrast, an alternative way used is to control pollution from plastic bags by charging a levy on the bag at point of sale. This is an approach used by many countries including SIDS (e.g. (Fiji), and across Latin America, many EU countries, the USA and Africa (Senegal), (UNEP, 2018[51]).

78. More research has been undertaken on pricing policies than bans so the lessons to be learned as to which approach works best are inconclusive. For example, one study collated the following evidence presented in the below table:

Effectiveness of plastic bag policies

Country (Year of implementation)	Policy type	Effect (reduction in consumption in %)
Denmark (1994)	Tax	66%
Bangladesh (2002)	Ban	No noticeable effect (lack of implementation)
Ireland (2002)	Levy	More than 90%
South Africa (2003)	Partial ban + levy	Initially 80%, after increased sales 44%, with further sales increases expected
Belgium (2003; 2007)	Tax + voluntary fee	86% between 2003 and 2011
Botswana (2007)	Partial ban + levy	50%
China (2008)	Partial ban + fee	49%
Hong Kong (2009)	Fee	75%

Source: Nielsen et al 2019.[52]

51 UNEP 2018, 'Legal Limits on Single-Use Plastics and Microplastics: A Global Review of National Laws and Regulations',
52 Nielsen, T., Holmberg, K., Stripple, J. (2019). Need a bag? A review of public policies on plastic carrier bags – Where, how and to what effect? Waste Management. 87. 428-440.

IV. Examples of Bans on Single-use Plastic Products

79. Other bans are wider and cover a range of single use plastic products (SUPP). Again, there is variance between countries in the SUPPs which are banned. Some examples are included in the below table.

National level measures	Impacts	Barrier	Lesson Learned
Straws, other single use plastics products to be phased out by 2025 as per the category of business in which they are used. (China)	Still in implementation stage	Still in implementation stage	Viewed as part of progress towards a circular plastics economy[53]
Straws, cutlery, earbuds, packaging films, plastic sticks for balloons, candy and ice cream, and cigarette packets, PVC banners less than 100 micron, stirrers (India)	The ban includes a comprehensive list of 19 items and will have significant impact on India's plastics waste.	Enforcement	The ban does not yet include packaging of many fast-moving consumer good (FMCGs) [54]
Blanket ban on all SUPPs- (Costa Rica)[55]	Blanket ban on SUPPs can reduce plastics pollution within 24 months of introducing the ban[56] and can also help in scaling biodegradable alternatives	Raw material for biodegradable alternatives to SUPPs (like paper) is still expensive posing challenges to packaging industry, especially fast-moving consumer goods (FMCGs) in developing world.	Banning SUPPs could be complemented by cutting import tax, custom duty on substitute raw material (like paper) to produce viable alternatives for the FMCG industry.

V. Legal And Fiscal Measures on Products Which Do Not Contain a Certain Prescribed Amount Of Recycled Plastic

80. The use of taxation or some fiscal policy to provide an incentive to use a certain amount of recycled plastic in a product is less common than a levy on plastic bags but is beginning to develop. For example, a new tax in the UK will impose a tax at the rate of £200 per tonne of chargeable plastic packaging components. A plastic packaging component is chargeable if the proportion of recycled plastic in the finished component, when measured by weight, is less than 30 percent of the total amount of plastic in the component. The impact intended is for this to drive the use of recycled plastic content.

Ban on products which do not contain a certain prescribed amount of recycled plastic

81. Instead of a tax or levy on such products, some countries impose a ban or restriction. Examples are provided in the below table.

Country	Impact: Material composition requirement (recycled material)	Barrier	Lessons learned

53 Liu, J., Yang, Y., An, L. *et al.* The Value of China's Legislation on Plastic Pollution Prevention in 2020. Bull Environ Contam Toxicol **108,** 601–608 (2022).
54 World Economic Forum (2022) "India has just imposed a ban on single-use plastic to tackle pollution" available at https://www.weforum.org/agenda/2022/07/india-ban-policy-single-use-plastic-pollution#:~:text=India%20has%20imposed%20a%20ban%20on%20single%2Duse%20plastics%20on,streets%20are%20strewn%20with%20waste.
55 Herberz, T., Barlow, C.Y., Finkbeiner, M. "Sustainability assessment of a single-use plastics ban." Sustainability 12.9 (2020): 3746.
56 UNEP 2021, 'From Pollution to Solution: A Global Assessment of Marine Litter and Plastic Pollution' Nairobi, p. 92.

Turkey	Ban on production, import and putting on the market packaging products including plastic bags that cannot be recycled or recovered. Plastic bags and packaging must also contain a certain percentage of recycled material, from 4 percent in 2018 to 8 percent from 2020 and beyond	Although the ban significantly controls the components of plastics waste, Turkey is now facing saturation of its market due to increasing import of plastic waste.[57]	The regulation could move beyond the composition aspect and put a threshold on plastic waste imports.
Colombia	Plastic bag must contain at least forty percent (40 percent) of post-consumer or post- industrial recycled material demonstrated according to technical standards	Production of recycled plastics is limited due to infrastructural constraints.[58]	Increases the overall demand for recycled plastics

Source: UNEP, 2018[59]

82. Other national level measures to drive recycled content may include government targets. For example, Australia's recycling goals under the 2025 National Packaging Targets will require that all packaging must be 100% reusable, recyclable, or compostable, 70% of plastic packaging is recycled or composted, and 50% of average recycled content is included in the packaging. These targets will be applied to all packaging that is made, used, and sold in Australia. Some states and territories in Australia are already legislating on these targets to make them legally binding.

83. Other national measures include consideration of replacing black and low-grade plastics especially in electrical and electronic equipment and food packaging which are difficult to detect for recycling. Initiatives at industry level in the UK have sought to replace black plastic in food packaging.[60]

84. Other approaches include retail taxes for waste management purposes such as the Jamaica Environmental Protection Levy.[61] Such tax can alter consumer behaviour and can shift market behaviour towards biodegradable products, but need to closely assess potential rebound effects.

D. Conclusion

85. The present document provides further background to document UNEP/PP/INC.1/11 which summarizes the priorities, needs, challenges and barriers that countries have in addressing plastic pollution, based on submissions by Member States and a literature review that examined the diverse activities of countries along the plastic life cycle. Countries with similar activities along the plastic life cycle share common priorities, needs, challenges and barriers, but country-specific features also exist owing to differing socioeconomic and geographical contexts. Challenges and barriers comprise knowledge-related, regulatory, economic, technological, and behavioural aspects, which require a multitude of complementary solutions to address them collectively. This suggests that the general principles of life cycle thinking and circular economy are relevant in developing national measures and interventions addressing plastic pollution when considering the adaptation of actions at national and local level.

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57 Gündoğdu, S., & Walker, T. R. (2021). Why Turkey should not import plastic waste pollution from developed countries. Marine Pollution Bulletin, 171, 112772.
58 Pheakdey, D. V., Quan, N. V., Khanh, T. D., & Xuan, T. D. (2022). Challenges and Priorities of Municipal Solid Waste Management in Cambodia. International Journal of Environmental Research and Public Health, 19(14), 8458
59 UNEP 2018, 'Legal Limits on Single-Use Plastics and Microplastics: A Global Review of National Laws and Regulations', p 77-82
60 Shaw, E. and Turner, A. (2019). Recycled electronic plastic and marine litter. Science of The Total Environment 694, 133644; House of Common Library Research Briefing by Louise Smith, 2022: Plastic Waste https://researchbriefings.files.parliament.uk/documents/CBP-8515/CBP-8515.pdf (Pg 98)
61 UNEP 2021 "From Pollution to Solution: A Global Assessment of Marine Litter and Plastic Pollution. pg. 93.