Solid waste management in the UN Plastics Treaty

Why action to address solid waste management is both crucial and complementary to upstream actions in ending plastic pollution, and our proposal for how this should be addressed in the Plastics Treaty

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📷 Front cover photo: Dar es Salaam, Tanzania – waste burning at the university dump. Daniel Msirikale/Tearfund © Tearfund (2019)

[1] www.iswa.org/blog/guest-blog-waste-management-on-the-main-agenda-plastic-treaty-negotiations/

Contents

Acronyms and abbreviations

ESM	Environmentally Sound Management
ILO	International Labour Organization
INC	Intergovernmental Negotiating Committee
MSW	Municipal Solid Waste
OECD	Organisation for Economic Co-operation and Development
rZD	revised Zero Draft
SDG	Sustainable Development Goals
UN	United Nations

Executive summary

The Plastics Treaty provides the opportunity to tackle the plastic pollution crisis through both waste prevention and waste management. However, to date, measures to address waste management have not received sufficient attention within the negotiations and some stakeholders view them as a distraction from the challenge of reducing plastic production.

It is crucial that the Plastics Treaty contains strong, legally-binding measures to reduce the production of primary plastic polymers and certain short-lived and single-use plastic products, as well as interventions to reduce plastic consumption and incentivise alternative delivery models. Yet this alone will not be enough to fully address the plastic pollution crisis. With one in four people globally lacking access to waste collection, there is a clear need for waste management infrastructure that can address the plastic waste that will remain even if ambitious upstream targets are achieved. Effective action on waste management is entirely complementary to action that reduces plastic production, and both will be needed to eliminate plastic pollution.

Getting waste management right in the Plastics Treaty will have an impact on many other aspects of the plastic pollution crisis. Preventing plastic from reaching the environment will mitigate macro-, micro- and nano-plastic pollution as well as the leakage of chemicals of concern. Scaling up waste management infrastructure will help to prevent harmful waste management practices such as open dumping and burning. It will also contribute to the achievement of a just transition for the informal recycling sector through its integration into waste management and recycling policies. Furthermore, plastic pollution has a direct impact on over half of the Sustainable Development Goals (SDGs), and the Plastics Treaty provides an opportunity to accelerate progress towards the delivery of many SDG targets.

However, none of this will be achieved unless the waste management provisions in the Plastics Treaty are fit-for-purpose. The provisions must recognise and account for the different starting points and pressure points of different countries and must not impose one-size-fits-all obligations. They should be informed by the evidence regarding ‘what works’ when it comes to scaling up waste collection and management, in particular the way in which progress proceeds along four relevant axes: collection, basic controlled disposal, fully controlled disposal, and recycling. They must also allow countries the flexibility to improve waste collection services more generally where this is the most efficient and effective approach to addressing plastic waste.

In light of this, this paper offers a proposal for the provision on waste management in the Plastics Treaty, as well as key considerations for the relevant annexes, and for the envisaged future guidelines on waste management. We call on Member States to support these proposals at the next session of the INC (INC-4) in Ottawa, Canada.

Our proposal for the provision on waste management

Our proposal for the waste management provisions in the Plastics Treaty (Box 1) builds on the revised Zero Draft (rZD) prepared by the Secretariat of the Intergovernmental Negotiating Committee (INC) in December 2023. This proposal and this paper as a whole deals only with section 9a of the revised Zero Draft (rZD) – Waste management – and does not address section 9b – Fishing gear.[2]

Box 1: Our proposal for the provision on waste management

1. Each Party shall take the necessary steps towards achieving the safe, effective and environmentally sound management of plastic waste throughout its life cycle, including sorting, collection, transportation, storage, recycling, recovery, and final disposal, in order to prevent the open dumping, ocean dumping, littering and open burning of plastic waste.
2. Pursuant to Paragraph 1, each Party shall first give priority to establishing a basic effective social and governance system at local level, with the involvement of waste pickers and workers in informal and cooperative settings, for sorting, collection, transportation, storage, recycling and treatment of waste, which is indispensable to the safe, effective and environmentally sound management of plastic waste and just transition.
3. Also pursuant to Paragraph 1, each Party shall take the necessary measures to meet the requirements for minimum safe, effective and environmentally sound collection, recycling and disposal rates based on the minimum collection and disposal rates set out in part I of annex F.
4. Also pursuant to Paragraph 1, each Party shall not allow the waste management practices listed in part III of annex F and shall regulate the other allowed waste management practices in order to prevent the emissions and releases of hazardous substances listed in part IV of annex F.
5. Parties shall take additional measures related to waste management, according to their national capacities, with developing countries being supported by international cooperation and, in particular, the cooperation mechanism referred to in Part III, article number yet to be defined, which could include, inter alia:
    - **a.** establishing and operating Extended Producer Responsibility (EPR) schemes, in accordance with Part III, article number yet to be defined, and wider product stewardship schemes to incentivize increased reuse and recyclability, promote higher recycling rates, and enhance the accountability of producers and importers for environmentally sound management of plastics and plastic products throughout their life cycle;
    - **b.** promoting investment and mobilization of resources from all sources for waste management systems and infrastructure, including through making financial and technical support available to subnational governments, that enables safe and environmentally sound management of plastic waste and enhances waste management capacity;
    - **c.** incentivizing behavioural changes throughout the value chain and raising public awareness about plastic waste management, including as appropriate, disposal prevention and minimization;

[2] Section 9a of the rZD is included as an Appendix to this paper.

d. Recognising the critical role of all stakeholders in reducing and managing plastic waste, taking into account the waste hierarchy.

6. The measures taken to implement this article shall be reflected in the national plan communicated pursuant to Part IV.1 on national plans. Where appropriate, Parties should cooperate internationally or regionally to implement this article.

7. The governing body* shall adopt at its first session, and subsequently update as needed, guidelines on safe, effective and environmentally sound management of plastic waste, including on the adoption of a stepwise approach. These guidelines shall take into account, as appropriate, international guidelines developed under the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, other relevant international agreements, the UN-Habitat Waste Wise Cities Tool, the waste hierarchy, and the ILO guidelines on Just Transition.

8. Developing countries shall be supported in the implementation of this article by international cooperation and, in particular the cooperation mechanism referred to in Part III, article number yet to be defined.

Key considerations for the annex on waste management

Annex F of the revised Zero Draft (rZD) is intended to provide further detail on the implementation of the waste management provisions, including proposed waste management indicators through which parties would set minimum targets. We have set out below our recommendations for Sections I, III and IV of Annex F, based on the issues explored in this paper.

I

Minimum safe and environmentally sound collection, recycling and disposal rates for plastic waste

- Separate targets are required for different aspects of waste management.
- We propose four components for an overall waste management target (see Table 1 on page 16): 1. Proportion of waste collected; 2) Proportion of collected waste managed in basic control and disposal facilities; 3) Proportion of collected waste managed in full control recovery and disposal facilities; 4) Proportion of waste generated that is reused or recycled.

III

List of waste management practices that may lead to the emissions and releases of hazardous substances

- The current title that has been given to this section of Annex F is not in line with the intention of the draft treaty text. Our proposal reframes this part as a list of waste management practices to be prohibited.
- Further discussion is required to decide which practices will be listed in this section, but as a minimum this must include open dumping and burning.

IV

List of hazardous emissions and releases to be regulated from plastic waste management

- Further discussion is required to decide which emissions and releases will be listed in this section.

Key considerations for the guidelines on waste management

The revised Zero Draft (rZD) envisages that the governing body adopts guidelines on safe and environmentally sound management of plastic waste, at its first session.[3] These guidelines must take into account existing guidance on improving solid waste management in developing countries, such as UN-Habitat's Waste Wise Cities Tool (WaCT), which is the methodology used for measuring SDG indicator 11.6.1 (see page 14).[4] The guidelines must recommend a step-by-step ('stepwise') approach to tackling waste management, recognising that progress is unlikely to proceed at the same pace along all the relevant axes (see page 15). The Plastics Treaty should therefore include separate targets for each of these axes, rather than a one-size-fits-all target or obligation. Nevertheless, ambition must not differ by context. The final goal must be the same for all contexts and we must not accept lower standards in waste management for some countries than others.

[3] Primarily Option 2, paragraph 2 but also Option 1, paragraph 3.

[4] UN-Habitat (2021) *Waste Wise Cities Tool: Step-by-Step Guide to Assess a City's MSWM Performance through SDG indicator 11.6.1 Monitoring,* prepared by Takeuchi, Nao, Imanol Zabaleta, Andrew Whiteman and Costas Velis (UN Habitat, Wasteaware, EAWAG and University of Leeds), Nairobi: UN-Habitat. https://unhabitat.org/wwc-tool

Introduction

Negotiations for an international legally binding instrument on plastic pollution, including in the marine environment (the 'Plastics Treaty')[5] cover interventions throughout the entire lifecycle of plastics, with the intended aim of ending plastic pollution.

However, measures to mitigate plastic pollution via waste management have yet to receive sufficient attention, in part because they are perceived to be supported only by stakeholders who want to divert attention from, and limit, upstream interventions that will reduce plastic production. We argue that effective action on waste management is entirely complementary to action that reduces plastic production, and that both will be needed to eliminate plastic pollution. Currently, 20–30 per cent of people globally have no access to a municipal solid waste collection service,[6] so instead they must instead self-manage their waste in an uncontrolled way, either by direct open dumping in the environment or open burning. The lack of emphasis on extending this basic, essential service could result in a collective failure to address many aspects of the plastic pollution crisis.

In this paper, we propose to reframe the discussion around waste management. We argue that decisive and concerted action on waste management does not negate the need to reduce virgin plastic production or to transform the entire plastics lifecycle, and that it should not be used as an excuse for maintaining business-as-usual. Rather, safe, effective and environmentally sound solid waste management is a crucial and complementary component of a multilateral collaboration to eliminate plastic pollution.

[5] UNEP (2022) Resolution 5/14 – *End plastic pollution: Towards an international legally binding instrument*. https://wedocs.unep.org/bitstream/handle/20.500.11822/39812/OEWG_PP_1_INF_1_UNEA%20resolution.pdf

[6] Cottom, Josh, Ed Cook and Costas Velis (2023) *A local-to-global emissions inventory of macroplastic pollution,* PREPRINT (Version 1) available at Research Square https://doi.org/10.21203/rs.3.rs-3376960/v1. Cottom et al. (2023) estimate 1.5 billion have no waste collection and Global Waste Management Outlook 2024 estimates 2.5 billion; we assume 8 billion global population, meaning between 20–30% of global population has no waste collection.

Waste management as a critical element of the Plastics Treaty

Lack of access to solid waste management

Currently, between 1.5[7] and 2.7[8] billion people do not have access to a municipal solid waste collection service. Of the waste that is collected worldwide, 43 per cent goes to uncontrolled disposal sites, where much of it is burned in open, uncontrolled fires.[9] Research by the World Bank has shown that in low-income countries about 93 per cent of municipal solid waste is burned or discarded in roads, open land or waterways.[10] The OECD has suggested that 82 per cent of the 22 million tonnes (Mt) of plastic that leaked into the environment in 2019 was a result of inadequate solid waste collection and disposal.[11]

According to the UN's own principles, the Plastics Treaty must recognise the human right to a clean, healthy and sustainable environment.[12] This requires the extension of basic, essential waste collection services. Indeed, the OECD advocates an early focus on 'basic' policies to close leakage pathways through investing in collection and disposal infrastructure.

As discussed on page 14, SDG indicator 11.6.1 aims to extend waste collection to 95 per cent of the population and to extend controlled recovery and disposal to 95+ per cent of collected wastes. Achieving that would drastically reduce plastic pollution.[13] Calculations carried out for this paper using the SPOT model[14] show that meeting SDG indicator 11.6.1 worldwide would reduce macroplastics dispersal to the environment by 77 per cent and open burning by 90 per cent – resulting in an overall macroplastics pollution reduction of 85 per cent compared to the current (2020) baseline.

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[7] Ibid.

[8] UNEP (2024) Global Waste Management Outlook 2024: *Beyond an age of waste: Turning rubbish into a resource* www.unep.org/resources/global-waste-management-outlook-2024.

[9] Gómez-Sanabria, Adriana, Gregor Kiesewetter, Zbigniew Klimont, Wolfgang Schoepp and Helmut Haberl (2022) 'Potential for future reductions of global GHG and air pollutants from circular waste management systems', *Nature Communications,* vol 13 (1):106. DOI: 10.1038/s41467-021-27624-7 www.nature.com/articles/s41467-021-27624-7.

[10] Kaza, Silpa, Lisa Yao, Perinaz Bhada-Tata and Frank Van Woerden (2018) *What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050*, Urban Development, Washington, DC: World Bank http://hdl.handle.net/10986/30317.

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

[12] United Nations (2022) 'UN General Assembly declares access to clean and healthy environment a universal human right', *United Nations News*, 28 July https://news.un.org/en/story/2022/07/1123482.

[13] Velis, Costas, D Lerpiniere and M Tsakona (2017) *Prevent marine plastic litter – Now!* ISWA Marine Litter Task Force www.iswa.org/marine-litter-task-force.

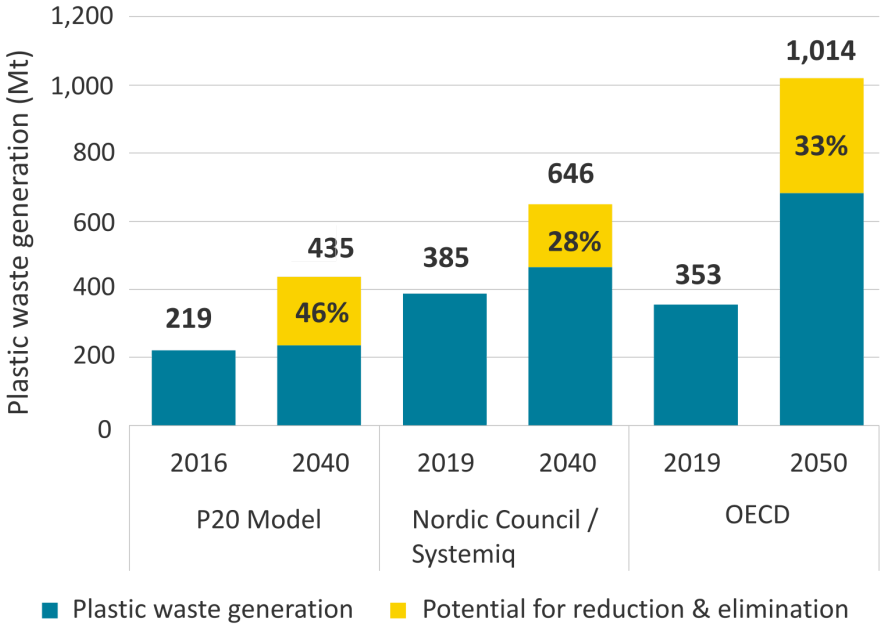
[14] Cottom, Josh, Ed Cook and Costas Velis (2023) *A local-to-global emissions inventory of macroplastic pollution,* PREPRINT (Version 1) available at Research Square https://doi.org/10.21203/rs.3.rs-3376960/v1 Calculations as per SPOT model (Cottom, Cook and Velis, 2023). By assuming for the baseline year of 2020 that each local authority in the world achieves at least 95% by weight (wt.) primary collection of the municipal solid waste, along with at least 95% wt. controlled land disposal – namely less than 5% wt. of open dumpsite disposal for each municipality, it would result in 85% wt. reduction to the total macro-plastic emissions into the environment (leakage as both physical objects and openly burnt). This corresponds to a worldwide boost of the SDG 11.6.1 level at 95.6% from the estimated 57% in the baseline year 2020.

Waste management and plastics reduction are complementary

It is self-evident that reducing the amount of plastic in the system will reduce the amount of plastic waste generated and that, along with careful targeting, elimination, or replacement of items at high risk of leakage to the environment, this will lead to a reduction in plastic pollution. This is why it is crucial that the Plastics Treaty contains strong, legally-binding measures to reduce the production of primary plastics and certain short-lived and single-use plastic products, as well as interventions to reduce plastic consumption and incentivise alternative delivery models.

Figure 1: Comparison of models that evaluate scenarios to reduce plastic pollution

NB: P20 models a sub-fraction of municipal solid waste (MSW), whereas both the Nordic/SYSTEMIQ and OECD models include all plastic waste.



However, on its own, this will not be enough. The three global studies[15,16,17] that model scenarios to reduce plastic pollution suggest that even under ambitious policy conditions, driving rapid and significant reductions in plastic waste generation will be a challenge.[18]

The results of these models underscore the need for genuinely ambitious measures that are capable of driving down plastic production and consumption. However, they also demonstrate that there is a complementary need to manage the remaining plastic that will eventually become waste. In any country where waste collection is below 100 per cent, plastic waste reduction will only be partially effective at mitigating plastic pollution.

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[15] OECD (2022) *Global plastics outlook: Policy scenarios to 2060.* https://www.oecd.org/environment/global-plastics-outlook-aa1edf33-en.htm.

[16] Lau, Winnie et al. (2020) 'Evaluating scenarios toward zero plastic pollution', *Science,* vol 369 pp 1455–1461 https://doi.org/10.1126/science.aba9475.

[17] Shiran, Yoni et al. (2023) *Towards Ending Plastic Pollution by 2040: 15 Global Policy Interventions for Systems Change*, Copenhagen: Nordic Council of Ministers. https://www.systemiq.earth/towards-ending-plastic-pollution-by-2040/.

[18] For example, the 'System Change Scenario' presented by Lau et al. (2020) envisages that we could only achieve an approximate stabilisation of plastic waste generation by 2040 compared to the 2016 baseline. More recent modelling by Systemiq and the Nordic Council of Ministers showed a slightly smaller proportional reduction, but with a much higher baseline, while OECD suggests that plastic waste generation could only be reduced by 33% compared to the 2060 baseline. The assumptions in these models are based on the successful implementation of a range of policy measures worldwide. For example, the OECD scenario requires the introduction of a globally implemented tax on plastic packaging production as well as high taxes on all other plastics. It would require product lifetimes to be increased by 15%, a decrease in demand for durable plastics by 10–20%, an increase in plastic consumption efficiency, and the provision of repair services. The 'System Change Scenario' requires worldwide policy interventions to be implemented to replace plastics with non-plastic, compostable plastic and low plastic content alternatives.

The role of waste management in tackling plastic pollution

Reducing leakage to the environment

Macroplastics, microplastics and nanoplastics

Virtually all of the plastic waste that has ever entered the environment remains,[19] and is eventually dispersed either on the surface of the earth, in water, in sediments beneath rivers and oceans or buried on land.[20,21] Whereas the buried material is likely to remain for many thousands of years, material on the surface can break into fragments over the course of just a few years or decades.[22,23] Despite uncertainty about the volume of plastic at risk of fragmentation, it is likely that a large amount will stay on the surface of the land or in water long enough for it to fragment into smaller pieces. If not effectively curtailed, we could see an exponential increase in microplastic emissions over the coming decades. At the current rate of technological advancement for remediation technology,[24] it is unlikely we will have the capability to depollute the land and sea from micro- and nano-plastics at a sufficient pace to keep up with the rate of emission.

Preventing plastic from reaching the environment in the first place is the only effective solution to mitigating the potential for future mass-fragmentation. To mitigate this risk, ambitious targets for reduced production and consumption would need to be combined with safe, effective and environmentally sound solid waste management.

Furthermore, recent modelling shows that uncollected waste is by far the single largest cause of land-based macroplastic emissions,[25] which has serious consequences for both the environment and human populations. As with micro- and nano-plastics, reductions in production and consumption must be combined with effective solid waste management in order to address this problem.

[19] While this statement is broadly 'unprovable' and empirical data is unattainable, we assert that clean-up operations and biological degradation cannot realistically reduce a significant mass of debris once it has been dispersed into environmental media.

[20] Weiss, Lisa et al. (2021) 'The missing ocean plastic sink: Gone with the rivers', *Science,* vol 373 pp 107–111 https://doi.org/10.1126/science.abe0290.

[21] Stubbins, Aron, Kara Law, Samuel E Muñoz, Thomas Bianchi and Lixin Zhu (2021) 'Plastics in the Earth system', *Science,* vol 373 pp 51–55 https://doi.org/10.1126/science.abb0354.

[22] Order of magnitude evidence suggests some common plastic items may have a half-life of between 5 and 60 years in marine and terrestrial surface environments.

[23] Chamas, Ali et al. (2020) 'Degradation Rates of Plastics in the Environment', *ACS Sustain. Chem. Eng,* vol 8 pp 3494–3511 https://doi.org/10.1021/acssuschemeng.9b06635.

[24] Padervand, Mohsen, Eric Lichtfouse, Didier Robert and Chuanyi Wang (2020) 'Removal of microplastics from the environment. A review', *Environmental Chemistry Letters,* vol 18 pp 807–828 https://doi.org/10.1007/s10311-020-00983-1.

[25] Cottom, Josh, Ed Cook and Costas Velis (2023) *A local-to-global emissions inventory of macroplastic pollution,* PREPRINT (Version 1) available at Research Square https://doi.org/10.21203/rs.3.rs-3376960/v1.

Chemicals of concern

Waste management also has an important role to play in mitigating risks to human health from plastic products that contain chemicals of concern. Recent research has highlighted approximately 2,400 of these substances,[26] of which at least 1,200 have not been assessed for their potential impact on human health.[27] Evidence is also emerging that specific bio-based plastics ('bioplastics') appear to have similar potential toxicity to conventional fossil-derived plastics.[28]

The Plastics Treaty negotiations have focused on eliminating such substances or replacing them with less harmful alternatives.[29] However, previous experience shows that some replacement chemical compounds may result in risks to human health, and the timescales for their implementation are uncertain.[30,31] This means that legacy substances of concern could remain in the system for many years to come.[32] During this transition period, basic waste collection, storage and processing, including recycling, can be effective tools through which to mitigate harm and prevent leakage into the environment. During the recycling phase, increased focus can and should be placed on cleaning material flows and limiting dispersion of chemicals of concern.[33,34]

Preventing harmful waste management practices

Insufficient safe, effective and environmentally sound solid waste collection and management are key drivers of many harmful waste management practices, which the Plastics Treaty should seek to eliminate. The 1.5–2.7 billion people who do not have access to a municipal solid waste collection service are left with little option but to dump, bury or burn it. Open burning in particular has serious implications for human health and the environment, which are widely documented.[35] Research by Tearfund suggests that between 400,000 and 1 million people die each year in low- and middle-income countries from diseases related to mismanaged waste, including plastic, with air pollution from open burning being the major driver. At the

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[26] Wiesinger, Helene, Zhanyun Wang and Stefanie Hellweg (2021) 'Deep Dive into Plastic Monomers, Additives, and Processing Aids', *Environmental Science & Technology,* vol 55, 9339–9351 https://doi.org/10.1021/acs.est.1c00976.

[27] Ibid.

[28] Zimmermann, Lisa, Andrea Dombrowski, Carolin Völker and Martin Wagner (2020) 'Are bioplastics and plant-based materials safer than conventional plastics? In vitro toxicity and chemical composition', *Environment International,* vol 145, 106066 www.sciencedirect.com/science/article/pii/S0160412020320213.

[29] OECD (2021) *Guidance on Key Considerations for the Identification and Selection of Safer Chemical Alternatives*, OECD Series on Risk Management, No. 60 https://www.oecd.org/chemicalsafety/risk-management/guidance-on-key-considerations-for-the-identification-and-selection-of-safer-chemical-alternatives.pdf.

[30] Chen, Da et al. (2016) 'Bisphenol Analogues Other Than BPA: Environmental Occurrence, Human Exposure, and Toxicity – A Review', *Environmental Science & Technology,* vol 50 pp 5438–5453 https://doi.org/10.1021/acs.est.5b05387.

[31] Liu, Jianchao et al. (2021) 'Occurrence, toxicity and ecological risk of Bisphenol A analogues in aquatic environment – A review', *Ecotoxicology and Environmental Safety,* vol 208, 111481 www.sciencedirect.com/science/article/pii/S014765132031318X.

[32] Seewoo, Bhedita et al. (2023) 'The plastic health map: A systematic evidence map of human health studies on plastic-associated chemicals', *Environment International*, vol 181, 108225. www.sciencedirect.com/science/article/pii/S0160412023004981.

[33] Cook, Ed, Michiel Derks and Costas Velis (2022) 'Plastic waste reprocessing for circular economy: A systematic scoping review of risks to occupational and public health from legacy substances and extrusion', *Science of the Total Environment,* vol 859 (Part2), 160385 https://doi.org/10.1016/j.scitotenv.2022.160385.

[34] Johansson, Nils, Costas Velis and Hervé Corvellec (2020) 'Towards clean material cycles: Is there a policy conflict between circular economy and non-toxic environment?' *Waste Management & Research,* vol 37 pp 313–314 https://doi.org/10.1177/0734242X20934251.

[35] Velis, Costas and Ed Cook (2021) 'Mismanagement of Plastic Waste through Open Burning with Emphasis on the Global South: A Systematic Review of Risks to Occupational and Public Health', *Environmental Science & Technology,* vol 55 pp 7186–7207 https://doi.org/10.1021/acs.est.0c08536.

upper end of the scale, that equates to one person every 30 seconds.[36] Furthermore, the open dumping of plastic waste can lead to the accumulation of material in drainage systems and waterways, potentially putting 218 million people at risk of more frequent and severe flooding.[37]

One of the aims of the Plastics Treaty must be to create conditions that mean open dumping and burning are no longer necessary for individuals and companies. These practices are already prohibited in many countries, yet without adequate waste management infrastructure and service provision, effective monitoring, enforcement and alternative waste management systems, and education and awareness raising, they continue unabated. Only a scale-up of these elements, along with reductions in plastic production and consumption, will sustainably prevent these practices. Alongside basic waste collection and disposal, complementary measures to extract value from discarded materials such as recycling/reuse can offer communities and local authorities alternative, safe and sustainable ways of processing some plastic waste. However, these approaches need to consider operational risk, especially in countries without effective, well-resourced and independent environmental regulators.[38]

Achieving a just transition

There has been a widespread recognition during the Plastics Treaty negotiations that workers in informal and cooperative settings should be considered as part of policy measures to address plastic pollution, including a 'just transition', to safer working conditions and practices for the 10–20 million workers who rely on waste as a partial or sole income source.[39,40] In particular, the role of waste pickers in combating plastic pollution has been highlighted both by researchers[41] and stakeholders[42], building on the recognition that workers in the informal recycling sector collect approximately 60 per cent of all plastics collected for recycling.[43] It is important to note that these workers should be considered to be part of waste management systems.[44] Modelling indicates that their efforts result in approximately 45 million metric tonnes of plastic waste collected for recycling each year, which is equivalent to approximately 13 per cent of plastic waste generated.[45] There is evidence that they have been systematically recycling plastics since as early as the late 1980s, and their contemporary efforts are more effective worldwide than all formal systems combined.

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[36] Williams, Mari, Rich Gower and Joanne Green (2019) *No time to waste: Tackling the plastic pollution crisis before it's too late*, Teddington: Tearfund https://learn.tearfund.org/en/resources/policy-reports/no-time-to-waste.

[37] Resource Futures and Tearfund (2023) *The impact of plastic pollution on urban flooding events: Estimating the number of people impacted globally* learn.tearfund.org/en/resources/research-report/plastic-pollution-and-flooding.

[38] Cook, Ed (2021) *Safety first: Recovering value from plastic waste in low- and middle-income countries,* Teddington: Tearfund https://learn.tearfund.org/-/media/learn/resources/reports/2022-tearfund-safety-first-en.pdf.

[39] Cook, Ed, Nathalia Lima Cano and Costas Velis (2023) *Informal recycling sector contribution to plastic pollution mitigation: A systematic scoping review and analysis of prevalence and productivity,* Research Square [PREPRINT, Version 1] https://doi.org/10.21203/rs.3.rs-3791652/v1.

[40] ILO *Decent Work and the 2030 Agenda for Sustainable Development* www.ilo.org/wcmsp5/groups/public/---europe/---ro-geneva/---ilo-lisbon/documents/event/wcms_667247.pdf.

[41] Velis, Costas, Britta Denise Hardesty, Joshua Cottom and Chris Wilcox (2022) 'Enabling the informal recycling sector to prevent plastic pollution and deliver an inclusive circular economy', *Environmental Science & Policy,* vol 138 pp 20–25 https://doi.org/10.1016/j.envsci.2022.09.008.

[42] United Nations Human Settlements Programme (UN-HABITAT) and Norwegian Institute for Water Research (NIVA) (2022) *Leaving no one behind* https://unhabitat.org/sites/default/files/2022/11/un-habitat_niva_report_leaving_no_one_behind.pdf.

[43] Lau, Winnie et al. (2020) 'Evaluating scenarios toward zero plastic pollution', *Science,* vol 369 pp 1455–1461 https://doi.org/10.1126/science.aba9475.

[44] Velis, Costas et al. (2012) 'An analytical framework and tool ("InteRa") for integrating the informal recycling sector into waste and resource management systems in developing countries', *Waste Management & Research*, vol 30 (9 Suppl) pp 43–66. DOI: 10.1177/0734242X12454934 http://wmr.sagepub.com/content/30/9_suppl/43.

[45] Cook, Ed, Josh Cottom and Costas Velis (2024 [unpublished]) 'Contribution of Informal Recycling Sector to Plastic Pollution Mitigation Model (IRIS)'.

The International Alliance of Waste Pickers (IAWP) has consistently argued that while a stand-alone just-transition provision in the Plastics Treaty is important, as is currently envisaged in the rZD, just transition should also be a transversal theme and – as a minimum – included in the most relevant sections,[46] including waste management.[47] A just transition for workers, including those involved in waste management, might involve – as in other sectors – job creation, job substitution, job transformation and job redefinition.[48,49] Just transition within waste management refers not only to the quantity of jobs, but also their quality, with improved working conditions and living incomes a priority.[50]

Given the importance of waste pickers and other workers in informal and cooperative settings to waste management systems, an important part of a just transition for such workers will be their integration into waste management and recycling policies.[51,52] For example, in some communities that currently have no formal waste collection, waste pickers have already initiated their own basic service provision.[53] The waste management provisions of the Plastics Treaty therefore need to cross-refer to, and dovetail with, the provisions on just transition.

Supporting the achievement of Sustainable Development Goals

Research suggests that plastic pollution has a direct impact on over half of the SDGs and that without tackling this crisis, these goals won't be met.[54] While waste management is not one of the high-level SDGs, it is embedded across multiple SDGs and improving waste and resource management will impact on all 17 goals. Municipal solid waste management is seen to sit primarily under SDG 11 (see Box 2 below), known as the 'sustainable cities' goal, and specifically under target 11.6, which has two component indicators: the proportion of municipal solid waste collected and the proportion managed in controlled recovery and disposal facilities.[55]

[46] International Alliance of Waste Pickers (2023) *Recommendations for Member States regarding the Zero Draft* https://globalrec.org/wp-content/uploads/2023/10/iawp-recommendations-for-member-states-zero-draft-INC3-plastic-treaty_november-2023.pdf.

[47] Velis, Costas (2022) 'Plastic pollution global treaty to cover waste pickers and open burning?', *Waste Management & Research*, vol 40 (1) pp 1–2 https://journals.sagepub.com/doi/full/10.1177/0734242X211069583.

[48] Schroeder, Patrick (2020) *Promoting a Just Transition to an Inclusive Circular Economy,* Chatham House Research Paper. https://www.chathamhouse.org/2020/04/promoting-just-transition-inclusive-circular-economy.

[49] ILO (2015) *R204 –Transition from the Informal to the Formal Economy Recommendation.* https://www.ilo.org/wcmsp5/groups/public/@ed_dialogue/@actrav/documents/publication/wcms_545928.pdf.

[50] The Fair Circularity Initiative (FCI) and Systemiq (2023) *Living Income Study Highlights* paper https://faircircularity.org/living-income/.

[51] Rutkowski, Jaqueline E. and Emilia W. Rutkowski (2015) 'Expanding worldwide urban solid waste recycling: The Brazilian social technology in waste pickers inclusion', *Waste Management & Research*. 33(12):1084-1093, https://doi.org/10.1177/0734242X15607424.

[52] Gutberlet, Jutta and Sebastián Carenzo (2020) 'Waste Pickers at the Heart of the Circular Economy: A Perspective of Inclusive Recycling from the Global South', *Worldwide Waste*, 3(1), https://doi.org/10.5334/wwwj.50.

[53] Examples can be found in the following report: *IAWP's Vision for a Just Transition for Waste Pickers under the UN Plastics Treaty* (2023) https://globalrec.org/document/just-transition-waste-pickers-un-plastics-treaty/.

[54] Williams, Mari, Rich Gower and Joanne Green (2019) *No time to waste: Tackling the plastic pollution crisis before it's too late*, Teddington: Tearfund https://learn.tearfund.org/en/resources/policy-reports/no-time-to-waste.

[55] The UN-Habitat Waste Wise Cities Tool provides the rationale for and methodology for measuring SDG 11.6.1. UN-Habitat (2021) *Waste Wise Cities Tool: Step-by-Step Guide to Assess a City's MSWM Performance through SDG indicator 11.6.1 Monitoring* https://unhabitat.org/wwc-tool.

Box 2: Sustainable Development Goal 11

Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable.

Target 11.6: By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management.

Indicator 11.6.1: Proportion of municipal solid waste collected and managed in controlled facilities out of total municipal waste generated by cities.

At least two further indicators are also relevant to measuring 'safe and environmentally sound' solid waste management. While SDG indicator 11.6.1 measures interim progress to a basic standard of control over recovery and disposal,[56] the higher, full-control level is often taken as corresponding to 'environmentally sound management' (ESM), which corresponds to SDG target 12.4. However, indicators are defined there for chemicals and for hazardous waste, but not for other solid wastes. The recycling rate is another relevant indicator, which corresponds to SDG target 12.5.[57] The indicator there is defined for all wastes generated at the national level, rather than for municipal solid waste recycling at the city level.

The Plastics Treaty provides an opportunity to accelerate progress towards the delivery of each of these targets, which are considered in our recommendations for a waste management target (see Table 1 on page 16).

What waste management should look like in the Plastics Treaty

Without significant improvements in municipal solid waste management, plastic waste reduction will only be partially effective at mitigating plastic pollution. Plastic waste cannot and should not be addressed in isolation from other waste streams. The Plastics Treaty provisions should allow countries flexibility to improve collection of plastic waste by extending waste collection services more generally. In many cases – especially where no waste collection currently exists – this may be the most efficient and effective approach to addressing plastic waste. The Plastics Treaty provides a landmark opportunity to make a positive impact in tackling the broader issue of solid waste management, and to contribute to achieving the objective of near universal collection and controlled disposal of all municipal solid wastes in a safe, effective and environmentally sound manner, as envisaged by SDG target 11.6.1 (see Box 2 above).

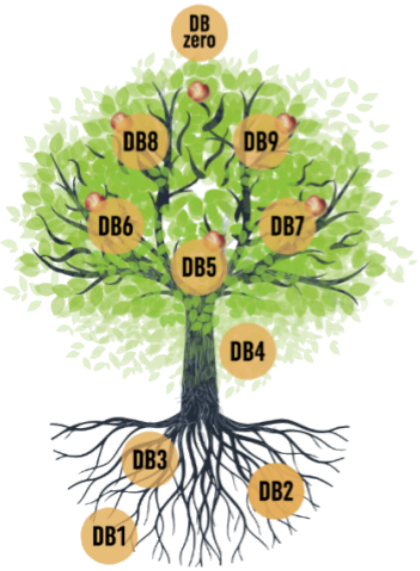
[56] UN-Habitat (2021) *Waste Wise Cities Tool: Step-by-Step Guide to Assess a City's MSWM Performance through SDG indicator 11.6.1 Monitoring* https://unhabitat.org/wwc-tool.

[57] Wilson, David et al. (2015) '"Wasteaware" benchmark indicators for integrated sustainable waste management in cities', *Waste Management*, vol 35 (1) pp 329–343 www.sciencedirect.com/science/article/abs/pii/S0956053X14004905?via%3Dihub.

A stepwise approach

Evidence from the historical development of waste management systems in the Global North[58] has shown that a step-by-step ('stepwise') approach to the improvement of waste management systems is highly effective at reducing emissions to the environment. A recent theory of waste and development outlines nine 'development bands', which move first towards a target of 95+ per cent collection and controlled recovery and disposal, and then on towards a zero waste circular economy.[59]

Figure 2: The nine development bands



DB Zero	Circular Economy	DB Zero: the aspirational future target of zero waste
DB9	Policy Driven by Technical Standards	DB8/9: full collection service level (segregated collection)
DB8	Policy Driven by Fiscal Mechanisms	
DB7	Market Oriented Systems	DB6/7: full control/ environmentally sound management (ESM)
DB6	High Recovery Systems	
DB5	New Target Baseline	DB5: 95+% achievement of basic levels of collection and of controlled recovery & disposal (meeting SDG indicator 11.6.1)
DB4	Consolidating Control	
DB3	Service Extension	DB1–4: early steps to gradually extend basic levels of collection coverage and controlled recovery & disposal
DB2	Early Movement	
DB1	New Beginnings	

Figure © Andrew Whiteman (Graphics: Ecuson Studio)

Developing countries may be able to (and should be encouraged to) leapfrog towards circular systems, for example through incorporation of source separation into basic collection schemes, as illustrated by the door-to-door collections offered by waste pickers in some areas.[60] However, the Plastics Treaty needs to recognise that different countries will have different starting positions and that progress is unlikely to proceed simultaneously and at the same pace along all the relevant axes (such as collection, basic controlled disposal, fully controlled disposal, and recycling).

[58] Wilson, David (2023) 'Learning from the past to plan for the future: An historical review of the evolution of waste and resource management 1970–2020 and reflections on priorities 2020–2030 – The perspective of an involved witness', *Waste Management & Research,* vol 41 https://doi.org/10.1177/0734242X231178025.

[59] Whiteman, Andrew, Mike Webster and David Wilson (2021) 'The nine development bands: A conceptual framework and global theory for waste and development', *Waste Management & Research,* vol 39 (10) pp 1218–1236 doi.org/10.1177/0734242X211035926.

[60] Examples can be found in the following report: *IAWP's Vision for a Just Transition for Waste Pickers under the UN Plastics Treaty* (2023) https://globalrec.org/document/just-transition-waste-pickers-un-plastics-treaty/.

Recommendations for a waste management target

The Plastics Treaty provisions need to recognise and accommodate a stepwise, progressive approach to waste management with separate targets for each of these axes, rather than a one-size-fits-all target or obligation. We propose four components for an overall waste management target in the Plastics Treaty. The table below shows how they relate to the SDG targets and indicators and to the nine development bands discussed above.

Table 1: Four components for a waste management target

Suggested components	Corresponding SDG targets and indicators	Corresponding development bands
1. Proportion of waste collected	11.6.1 (a)	DB1–4 correspond to steps on the way to meeting this target. DB5, the new target baseline, corresponds to 95+% on both indicators 1 and 2.
2. Proportion of collected waste managed in basic control ('controlled') recovery and disposal facilities	11.6.1(b)	DB1–4 correspond to steps on the way to meeting this target. DB5, the new target baseline, corresponds to 95+% on both indicators 1 and 2.
3. Proportion of collected waste managed in full control ('environmentally sound') recovery and disposal facilities	12.4 No specific SDG indicator set here for municipal solid waste. Indicators are defined for chemicals and for hazardous waste, but not for other solid wastes.	DB6/7 correspond to different pathways towards this target as followed by different countries in the Global North.
4. Proportion of waste generated that is reused or recycled	12.5.1 No specific indicator set here for municipal solid waste.	In the Global North, recycling targets were only set at a late stage (DB8/9). Lower income countries can learn from this, by setting early recycling targets to build on existing informal sector recycling, which will significantly reduce the quantities of waste requiring collection and disposal, and thus the costs of moving through the development bands DB1–5.

The 95+ per cent target for basic collection and controlled disposal/recovery (DB5) was only reached in high income countries around 1980, after years of stepwise progress. Higher development bands have only been reached more recently. To set an immediate target in the Plastics Treaty corresponding to the highest development bands as the only target for all countries, without incorporating indicators of progress on each of the different axes (as proposed above), will not provide a meaningful measure of the way in which waste management systems improve over time.

Progress in developing countries in moving up through the lower development bands (DB1–4) has been much slower, although many cities and countries are now making substantial progress (early adoption of source separation and recycling helps). Constraints to progress are generally institutional and financial rather than technical – achieving DB5 is simply unaffordable in many towns and cities in lower income countries. The financial costs of addressing waste management are considered to be a local responsibility even though the benefits in terms of reducing plastic pollution and mitigating the impacts of climate change are global. In developing the financial mechanism to support the implementation of the Plastics Treaty, consideration must be given to where the costs and benefits of reducing plastic pollution fall; a point that is relevant to the development of Extended Producer Responsibility (EPR) schemes and wider product stewardship schemes.

As already noted, the early adoption of source separation and recycling – building on the existing efforts of the informal waste sector – presents an opportunity for developing countries to progress more rapidly through the nine development bands. Despite their limitations,[61] mechanical recycling technologies have been prevalent and commercially viable throughout the Global South for many decades[62,63,64] and more recently in the Global North. This means that we have a high level of certainty about what these processes can achieve in different contexts. Basic size reduction, extrusion and separation technology is highly mature, and even more complex processes such as optical separation now operate at a commercially viable rate of efficiency.[65] Nevertheless, these and other approaches to managing and extracting value from waste should be subject to regulation regarding safety and sustainability.[66]

[61] Schyns, Zoe and Michael Shaver (2020) 'Mechanical Recycling of Packaging Plastics: A Review', *Macromolecular Rapid Communications*, 2000415 https://onlinelibrary.wiley.com/doi/full/10.1002/marc.202000415.

[62] Kaseva, M E and S K Gupta (1996) 'Recycling – an environmentally friendly and income generating activity towards sustainable solid waste management. Case study – Dar es Salaam City, Tanzania', *Resources, Conservation and Recycling,* vol 17 pp 299–309 https://doi.org/https://doi.org/10.1016/S0921-3449(96)01153-6.

[63] van Beukering, Pieter (1994) 'An economic analysis of different types of formal and informal entrepreneurs, recovering urban solid waste in Bangalore (India)', *Resources, Conservation and Recycling,* vol 12 pp 229–252 www.sciencedirect.com/science/article/abs/pii/0921344994900116.

[64] van Beukering, Pieter, Madhushree Sehker, Reyer Gerlagh and Vijay Kumar (1999) *Analysing Urban Solid Waste in Developing Countries: a Perspective on Bangalore, India* www.iied.org/sites/default/files/pdfs/migrate/8113IIED.pdf.

[65] Antonopoulos, Ioannis, Giorgia Faraca and Davide Tonini (2021) 'Recycling of post-consumer plastic packaging waste in the EU: Recovery rates, material flows, and barriers', *Waste Management,* vol 126 pp 694–705 www.sciencedirect.com/science/article/pii/S0956053X21001999.

[66] Cook, Ed (2021) *Safety first: Recovering value from plastic waste in low- and middle-income countries,* Teddington: Tearfund https://learn.tearfund.org/-/media/learn/resources/reports/2022-tearfund-safety-first-en.pdf.

Conclusion

Such is the scale and complexity of the plastic pollution crisis that it cannot be tackled through upstream interventions alone. Effective, complementary action downstream to improve waste management is also urgently needed to address the challenge. Only by treating safe and environmentally sound solid waste management as a complementary rather than a competing priority in the Plastics Treaty negotiations can Member States achieve the fundamental aim of eliminating plastic pollution. Our proposal for the waste management provisions, annex and guidelines will ensure that the waste management provisions in the Plastics Treaty are fit-for-purpose, and so we call on Member States to support this proposal at the next session of the INC (INC-4).

Appendix: The revised Zero Draft (rZD) position[67]

9. Waste management

a. [Plastic] Waste management]

Option 1

1. Each Party shall take effective measures to ensure that [producers manage] plastic waste [is managed] in a [safe and] environmentally sound manner [throughout its [different stages][life-cycle], [including] handling, [collection,] [sorting,] transportation, storage, recycling[treatment][, other recovery including energy recovery] and final disposal][,][taking into account [recognizing that] the waste hierarchy][establishes that greater environmental and social benefit occurs when actions at the top of the hierarchy are prioritized.][[,] and the special circumstances of small island developing States.][Each Party shall take effective measures on safe and environmentally sound waste management at its different stages, including handling, collection, transportation, storage, recycling and final disposal of plastic waste. The measures taken to implement this provision shall be reflected in the national plan communicated pursuant to [Part IV.1 on national plans], with an aim of achieving nationally determined targets and [minimum requirements developed based on the harmonized indicators set out in [part II of annex F]]].
2. Each Party shall meet the requirements, [including]** where relevant through a sectoral approach, for [minimum] [safe and] environmentally sound [management of plastic waste, including through] [collection,] recycling and disposal rates[, set out in part I of annex F,] [taking into account][respecting][the waste hierarchy and other] relevant provisions[,][and taking into account] guidance and guidelines in [accordance with relevant arrangements under] other international agreements, [including those developed under][inter alia] the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal[, as appropriate][, the London Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter and its Protocol on the International Convention for the Prevention of Pollution from Ships][the International Convention for the Prevention of Pollution from Ships (MARPOL) Annex V of the International Maritime Organization and the Bamako Convention on Hazardous Wastes].
3. The governing body* [shall][may][, where necessary,] adopt requirements, [best practice] guidance and guidelines for the implementation of the provisions in paragraph 2, additional or complementary to the relevant guidance and guidelines developed under other international agreements mentioned above.

Option 2

1. Each Party shall take [effective] measures [on safe and][to ensure] environmentally sound [waste] management [of plastic waste.] [[at] [its different stages,]] including handling, [sorting], collection, transportation, storage, recycling, [recovery], and final disposal of plastic waste. The measures taken to implement this provision [shall][are encouraged to] be reflected in the national plan communicated pursuant to [Part IV.1 on national plans], [with an aim to achieving][to achieve] nationally determined targets [and minimum

[67] https://wedocs.unep.org/bitstream/handle/20.500.11822/44526/RevisedZeroDraftText.pdf.

requirements developed][.] [based on the harmonized [indicators] [elements] set out in part II of annex F.]

OP1 bis. To implement the obligation pursuant to paragraph 1, each Party shall give priority/due consideration to establishing a basic effective social system at local level for handing, sorting, collection, transportation, storage, recycling and treatment of plastic wastes, which is indispensable to a safe and environmentally sound waste management and just transition.

2. The governing body* [shall][may][, where necessary] adopt [at its first session,] [requirements, best practice guidance and guidelines] [and subsequently update as needed,] guidelines on [safe and] environmentally sound management of plastic waste, taking into account the waste hierarchy and other relevant international guidelines and guidance[.][, developed under the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal and other international agreements.][,as appropriate, as well as the need for a just transition, including for waste pickers.]

Option 3

1. Each Party should take effective measures to meet best available practices, for minimum safe and environmentally sound collection, recycling and disposal taking into account relevant guidelines, available waste management infrastructure, and national priorities.
2. The governing body* shall, where necessary, utilize the technical guidelines on the environmentally sound management of plastic wastes recently updated and adopted by parties at COP16 of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, avoiding duplication of work and efforts.

Provisions common for Options above

[[4][3] Each Party shall [not allow waste management practices [listed in part III of annex F] that may lead to the emissions and releases of hazardous substances, [based on strong scientific evidence,] and shall regulate the other allowed waste management practices that may lead to the emissions and releases of the hazardous substances [listed in part IV of annex F.][take measures to prevent open dumping and open burning of plastic waste.]

[5][4] Each Party shall take [the necessary] measures to prevent [open dumping, ocean dumping,] littering [and open burning][of plastic waste].

[6][5] [It is recommended to] [Each][Parties][Party] [shall][are][is] encouraged] [to] [take additional measures[, according to their national capacities,] [to][related to waste management, with developing country parties being supported by international cooperation and, in particular, the cooperation mechanism referred to in [Part III, article number yet to be defined], which could include, inter alia]:][to adopt comprehensive economic-driven approaches such as establishing and operating Extended Producer Responsibility (EPR) scheme, including, where relevant, on as sectoral basis, to incentivize increased recyclability, promote higher recycling rates, and enhance the accountability of producers and importers for environmentally sound management, of plastics and plastic products throughout their life cycle.]]

[**a.** [Invest in][Promote investment and mobilization of resources from all sources for] waste management systems and infrastructure, including through financial and technical support to subnational governments, that enable[s] environmentally sound management of plastic waste[and enhances waste management capacity];]

[**b.** Promote investment and mobilize resources from all sources to cover financing gaps for waste management systems and infrastructure that enable environmentally sound management of plastic waste and enhance waste management capacity, in light of current and expected waste generation levels; and]

[**c.** Incentivize behavioural changes throughout the value chain[;] and [raise [consumer][public] awareness [on sustainable consumption][about plastic waste prevention and minimization][and production, as well as the critical roles of all stakeholders in reducing plastic litter[waste] and supporting recycling][, taking into account the waste hierarchy].]

OP [6][5] c bis. Develop, identify, and/or strengthen markets for secondary plastics.

[7][6] The measures taken to implement the provisions of this article shall be reflected in the national plan [communicated pursuant to [Part IV.1 on national plans]]. [Where appropriate, Parties are encouraged to cooperate internationally or regionally to implement the provisions of this article.]

Provisions common for Options above Alt

3. Each Party is encouraged to adopt environmentally sound waste management practices.
4. Each Party shall take the necessary measures to prevent open dumping, ocean dumping, littering and open burning.
5. Parties are encouraged to take additional measures to:
    a. Promote investment in waste management systems and infrastructure that enable environmentally sound management of plastic waste;
    b. Encourage behavioural changes and raise consumer awareness.
6. The measures taken to implement the provisions of this article may be reflected in the national plan communicated.

Option 4

1. Each Party, as per its national plans and based upon national circumstances and capabilities and relevant national regulations, shall take measures on safe and environmentally sound waste management. The measures taken to implement this provision shall be reflected in the national plan communicated pursuant to [Part IV.1 on national plans].
2. The governing body* shall adopt at its first session, and subsequently update as needed, guidelines on safe and environmentally sound management of plastic waste, taking into account the other relevant international guidelines and guidance. A mechanism needs to be established to assess the infrastructural requirements and financial resources required for safe and environmentally sound management of plastic waste.
3. Parties may, as per their national plan and based upon national circumstances and capabilities, take additional measures to:
    a. Invest in waste management systems and infrastructure that enable environmentally sound management of plastic waste;
    b. Promote investment and mobilize resources from all sources to cover financing gaps for waste management systems and infrastructure that enable environmentally sound management of plastic waste and enhance waste management capacity, in light of current and expected waste generation levels; and
    c. Incentivize behavioural changes throughout the value chain and raise consumer awareness on sustainable consumption.
4. The measures taken to implement the provisions of this article shall be reflected in the national plan communicated pursuant to [Part IV.1 on national plans].

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