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Addressing the challenge of Marine Plastic Litter using Circular Economy methods

Relevant considerations

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Executive summary

Plastics are versatile materials, being inexpensive, light, easily shaped and durable and have brought immeasurable benefits to many areas of life. They are used in numerous industrial sectors, including packaging, health care, construction, automotive, aviation, agriculture, logistics and storage, consumer goods, clothing and many more. Primarily made from fossil-fuels, plastic materials are valuable and embody our world's limited natural material resources (in addition to oil, a lot of energy, mostly of the non-renewable kind, and water) and come with sunk investment costs that may be reused to create fresh economic value.

Plastics production and waste generation

In 2015, global production of primary, or virgin, plastics was 407 million metric tons (Mt) and expected to double by 2030 and to double again by 2050, excluding bio-based plastics production that was approximately 1% of total annual production of fossil fuel-based plastics.

In 2015, 302 Mt of plastic waste was generated, amounting to 74% of the total primary plastics production in the same year, including secondary (recycled) plastics. In the same year, plastic waste generated as a proportion of plastics produced for use in sectors such as plastic packaging, plastic consumer and institutional goods, and synthetic textiles were 97%, 88%, and 71%, respectively.

As of 2015, approximately 6,300 Mt stock of plastic waste had been generated, around 9% of which had been recycled, 12% was incinerated, and 79% was accumulated in landfills or the natural environment; a huge loss in economic terms and alarming with respect to potential harm that this could mean to humans, animals and plants and our ecosystems.

State of marine plastic litter in oceans

The global community, particularly G20 members have mobilized to put a stop to the global marine plastic litter challenge. This challenge comprises of an estimated stock of 83 Mt of plastic waste that has already accumulated in oceans and an estimated 8 Mt of additional, mismanaged plastic waste entering oceans annually, at least 80% of which originates directly from land-based sources. In 2017, the G20 Leaders' Summit in Hamburg agreed on a G20 Action Plan on Marine Litter and discussions continued at the G20 2018 in Argentina. The Japan Presidency for G20 2019 has prioritized the global marine litter challenge and aims for an implementation framework for concerted action.

There is hardly any global, regional, national report and research study on marine plastic litter that does not point out the role of plastic packaging, single-use or short-lived and fast-moving consumer products, personal care products containing microbeads, synthetic clothing and microfibers, and fishing gear lost at sea.

Circular economy practices for addressing the marine plastic litter challenge

The problem of marine plastic litter can be addressed inter alia through implementing circular economy practices. This, in conjunction with optimizing landfill management, will help to substantially reduce the amount of those plastics most likely to end up as marine plastic litter. Together with measures to tighten the management of marine based sources of marine litter, and with clean-up operations where feasible, increased plastic pollution of oceans may be stemmed and eventually prevented.

In the **product design stage**, the following might be considered: a) scrutinizing the necessity of packaging altogether, including of plastics, b) selection of renewable, bio-degradable and compostable materials and additives that are not or less toxic for essential plastic packaging or single-use plastic products; c) designing for less material use to decrease waste; d) designing packaging and products that use a single or small number of polymers that are easy to separate during recycling.

Policy measures to incentivize circular economy practices in design could consist of supporting implementation of innovations in design of existing and new products, and support to innovations and start-ups in particular related to new, biodegradable and compostable plastics. A number of initiatives could trigger both supply side motivation for circular product designs and preference for such products on the demand side, such as; measures for creating markets for recycled plastics and improving markets for bio-based plastics; differentiated taxes on virgin and recycled plastics; introduction of standards for recycled content; improving information on recycled content in products in combination with educational campaigns for consumers. Furthermore, support for development of effective infrastructure for collection and separation of waste streams and empowering local authorities with sufficient financial and technical resources could induce product designs for ease of recyclability.

In the **production stage**, strengthening management of plastic raw materials to eliminate material losses into wastewater streams, and improving resource productivity of manufacturing by implementing resource efficient cleaner production methods could prevent leakages of plastic raw materials and industrial plastic waste into the environment. In the **service sectors**, tourism and retail businesses and industrial laundries may be encouraged to implement circular economy practices to: replace single use packaging with durable and reusable packaging; substitute materials for packaging with renewable ones; implement new business models that eliminate the need for packaging and single-use plastic products; and reduce and eliminate shedding of microfibers and microbeads into waste and waste water management systems. Policy responses supporting the above measures could go a long way by extending their adoption by enterprises from micro to large; these could include the development of information and knowledge platforms on good practices and emerging regulatory requirements and support programmes for their implementation.

In the **use stage**, suppliers as well as customers should be led towards choices supporting circular economy practices, in particular opting out of single-use plastic products, and supporting waste management systems that can collect, sort, separate and effectively recycle plastics. This can be achieved through means such as the enforcement of bans for some and levies for other plastic products, enforcement and fees in cases of non-compliance, and deposit return schemes for reducing single-use or short-lived plastic product use.

Furthermore, consumers could be encouraged to shift to business models based on product-as-service or sharing to extend lifetime of plastic products consumed; and to reject products containing microbeads or that shed microfibers; also, retrofits to e.g. household washer/driers could filter out microbeads/microfibers. Bulk consumers could deploy their purchasing power along circular use patterns. Policies facilitating the proposed changes should be complemented by consumer education that starts at early ages for a future without plastic litter.

At the **end of the first life**, products should have various directions to follow before becoming waste: reuse with or without repairs or refurbishment, recycling for secondary materials either for the same type of use; up-cycled to higher value uses or down-cycled to an alternative use. In a circular economy, options are or should be the same for plastic packaging and short-lived, fast moving plastic product.

Consequently, plastic waste of short-lived products, including packaging should find their way into effective waste management and recycling systems. It should be an aim to make recycling of plastics competitive to the tipping fees for landfilling; these fees are frequently considered to currently not reflect all externalities. It also appears meaningful to provide support for innovation towards technology improvements in mechanical and, in particular, chemical recycling to help production of recyclates of high quality for new products.

Extending and further developing producer responsibility schemes supports both greener product designs for recyclability, as well as collection and consolidation of waste streams for recycling operations. Easily understandable labelling schemes can help consumers to participate effectively in waste management. Regulating use of certain, in particular the hazardous materials in products have also brought about many effective outcomes.

Support for international cooperation within the G20 and, beyond, with relevant developing countries will allow to share best practices on successes recorded by G20 members. This might include but should not be limited to: transfer of recycling technologies and knowledge sharing; technical assistance for integration of informal sector waste operators into waste management systems; and capacity building in developing countries on circular economy practices. Finally, seeking and supporting innovations for measures to clean-up plastics from shores and water columns and open oceans would need to continue, in particular where economically feasible (ocean surface, coasts, ports, ...).

With today's technologies, it is almost impossible not to have a waste fraction that requires **final disposal**, including for short-lived, fast moving plastic products and packaging. Options would be safe landfilling or elimination, particularly of hazardous material containing plastic fractions under controlled incineration conditions. An additional option might be to encapsulate residual plastics in other materials, such as in paving mixes in road construction, as long as it could be ascertained that leakage of plastic particulate matter and some of the hazardous additives they contain into the environment is assured.

In **summary**, designing out waste to retain plastics within the economy; regaining the value embodied in plastics that leaked out of the economy as waste; and continuing efforts for recovering plastics already in oceans, in particular in services, on beaches, ports and coastal waters emerge as strategies worthwhile to consider on the way to a circular plastics economy and an end to the global marine plastic litter challenge.

In this working paper

This Executive Summary (Chapter 1) precedes a short background on the interest of G20 in the marine plastic litter given in the Introduction (Chapter 2), which is followed by a discussion on the application of Circular Economy practices to the short-lived, fast moving plastic products and packaging (Chapter 3). In Chapter 4, the state of plastics today is reviewed. Chapter 5 scopes the scale of the marine plastic litter challenge and briefly describes how plastics move from the economy to the environment. Chapter 6, the by far largest chapter, discusses how circular economy practices could be applied through the product design, production, use, end-of-first-life and disposal stages to short-lived and fast-moving plastic products and packaging and offers some policy responses based on experiences of G20 members. Chapter 7 contains a summary of strategies proposed and some final thoughts on how loops could be closed in a circular plastics economy.

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2 Introduction

Annually, 8 million tons of plastic waste enter the oceans. As of 2015, it is estimated that of the huge stocks of plastic waste already generated, about 9% had been recycled, 12% was incinerated, and 79% was accumulated in landfills or the natural environment.

Marine plastic litter is recognized as a challenge that has to be tackled holistically along the plastics value chain at the global, regional and national levels. In 2017, António Guterres, the UN Secretary General called for concerted and concrete action:

“Now we need concrete steps, from expanding marine protected areas, to the management of fisheries; from reducing pollution, to cleaning up plastic waste. I call for a step change, from local and national initiatives to an urgent, coordinated international effort.” Guterres said.¹

The ‘Our Ocean, Our Future: Call for Action’² declaration of the 2017 UN Ocean Conference stated commitments of all member states of the United Nations to address marine plastic pollution through individual and collective measures ranging from investments in infrastructure to protection regimes for the coastal areas, from education to support of research and development. The member states, foundations, research organizations, NGOs, international organizations made 300 commitments in addition to their commitments along a number of international and regional conventions that support actions against marine plastic pollution (Annex C).

In 2017, at the G20 Meeting in Hamburg, the G20 representatives recognized “the urgent need for action to prevent and reduce marine litter in order to preserve human health and marine and coastal ecosystems and mitigate marine litter’s economic costs and impacts” (G20 Action Plan on Marine Litter 2017). The action is a significant move as it aims at collective initiatives to prevent and reduce marine litter. G20 discussions in Argentina in 2018 emphasized critical importance of stakeholder engagement and effective exchange of information and good practices among G20 member states.



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