IBC Training Programme on the Green Transition

Webinar on Plastics

Green Transitions Guidance Note
<Plastic pollution>

Prepared by: UNEP

Date: 07-12-2022

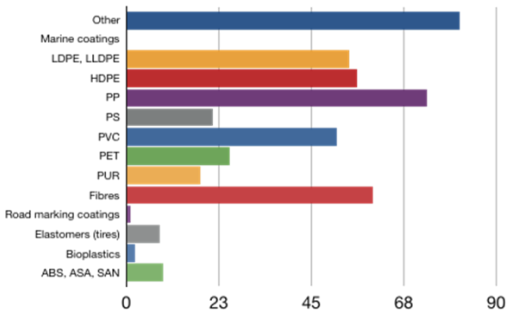
1. Trends in plastic production, waste generation and chemical use in manufacturing

Plastic production has been rising exponentially since the 1950s, mainly from fossil feedstocks. About one quarter of chemical additives designed to confer various properties to the final plastic are of potential concern for human health and safety. Current use of plastic and plastic products is mostly linear (take resources and make products and then waste them), with a very low rate of recycling back into the economy. The rate of change and uptake of recycled plastics will depend on decisions taken today.

Plastic production is forecast to triple by 2060. Annual global production of plastics doubled from 234 million metric tons in 2000 to 460 million metric tons in 2019. It is forecast to triple under a business-as-usual scenario to an estimated 1,231 million metric tons in 2060. Global plastic materials production in 2020 was dominated by the following regions: Asia (49 per cent), North America (19 per cent) and Europe (15 per cent).

Plastics are mainly used in packaging, followed by sectors such as building and construction, transportation and textiles. Up to 99% of plastics are made from polymers derived from non-renewable hydrocarbons. Some 86% of the global market is dominated by thermoplastics. Short-lived plastic products made up 66% of plastics use in 2019. Durable or long-lasting plastic products found in buildings and construction, transportation, electronics and machinery made up around 35% of plastic product use in 2019. Bio-based plastics are receiving growing attention.

Figure 1. Plastics use in 2019, by polymer and application (millions of metric tons)



2. Plastic pollution sources and pathways in the environment

Plastic pollution is forecast to grow alongside production and consumption. Mismanagement of waste is by far the biggest contributor to plastic pollution. By type of plastic product application, short-lived

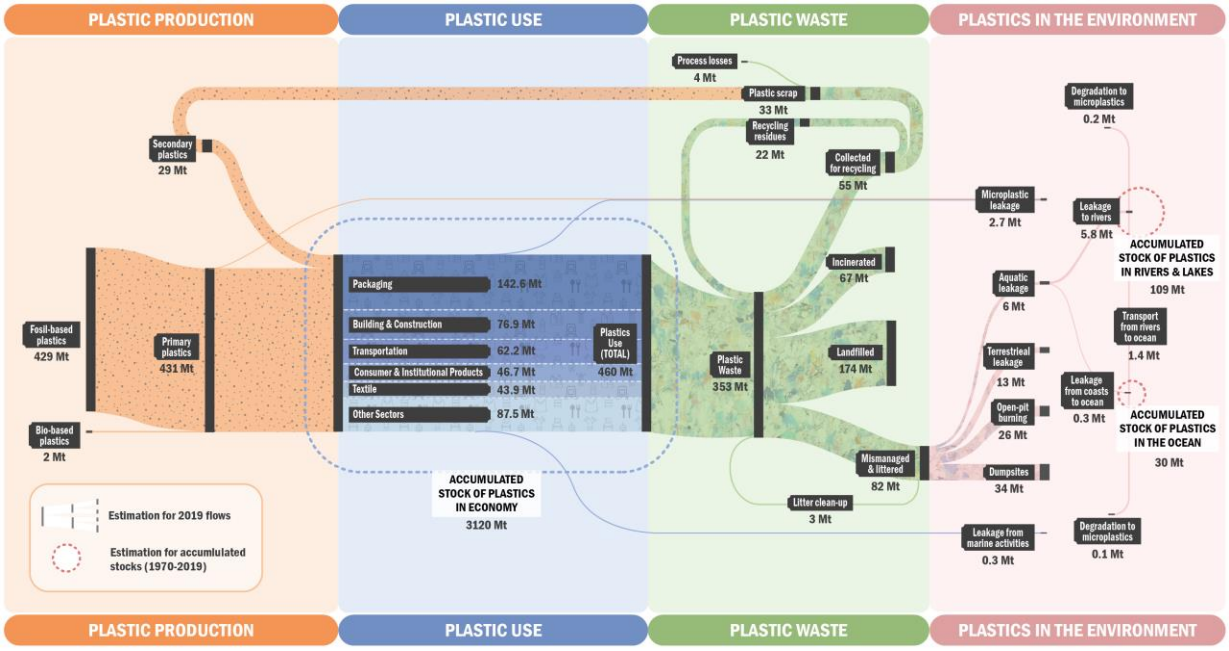
plastic products – dominated by plastic packaging and other single-use plastic products – represent the biggest source of plastic pollution. While fishing gear and agricultural plastics represent a smaller volume, their direct use in the environment is problematic.

Figure 2 depicts the major flows of plastic in the economy, showing the main sectors using plastics (estimated for 2019); the main sources of plastic leakage into the environment (in 2019) and stocks in the economy and the environment (1970–2019). The relative thickness of the flows shows clearly that the current plastics system is mainly linear, from virgin (fossil-based) plastic production to disposal and leakage into the environment, with very small circular flows cycled back (top flow of secondary plastic).

An estimated 60 to 99 million metric tons of mismanaged plastic waste were produced in 2015, with a 2.5-fold increase projected by 2040. An estimated 19 to 23 million metric tons – 11 per cent – of plastic waste generated globally in 2016 entered aquatic ecosystems. Plastic leakage to oceans was estimated at 11 million metric tons, with terrestrial leakage estimated at 31 million metric tons and open burning at 49 million metric tons in 2016. The size of these flows might be smaller, according to OECD. An estimated 23 to 37 million metric tons per year of plastic waste could enter the oceans by 2040 in a business-as-usual scenario.

Macroplastics accounted for 88 per cent of global plastic leakage to the environment in 2019. Fishing gear is particularly problematic, with high health and environmental risks. Agricultural plastics also deserve special attention for their use close to sensitive ecosystems. Secondary microplastics dominate microplastics leakage. Primary microplastics are also an important source. Microplastic leakage is projected to more than double globally from 2019 to 2060.

Figure 2 Flows of plastic in the global plastic life cycle, and losses to and accumulated stocks in the environment



3. Impacts of plastic pollution

There is increasing clarity regarding the links between plastic and human and environmental health. The links between plastic with its associated chemicals and plastic pollution with its detrimental effects on human health and the environment are increasingly clear, although plastic's contribution to the global burden of disease across its life cycle has not been yet well quantified.

Plastic pollution is lethal for many species. Plastic pollution in all forms causes lethal and sublethal effects in a wide array of organisms in marine, freshwater and terrestrial environments. Plastics can also alter global carbon cycling through their effect on plankton and primary production in marine, freshwater and terrestrial systems. A 1 per cent decline in annual marine ecosystem services could equate to an annual loss of $500 billion in global ecosystem benefits.

Throughout its life cycle, plastic also contributes to climate change. In 2019, plastics generated 1.8 billion metric tons of greenhouse gas emissions – 3.4 per cent of global emissions – with 90 per cent of those emissions coming from plastics production and conversion from fossil fuels.

4. Solutions

Circularity in the economy is a critical part of the solution. Science shows that by shifting the plastics economy to a comprehensive circular economy approach, most plastic pollution could be prevented. Benefits (compared to the scenario in 2040 if circular economy approaches are not applied) include a 25 per cent reduction in greenhouse gas emissions across the global plastic life cycle, while saving governments $70 billion over the period 2021–2040 and creating 700,000 additional jobs, mainly in the global South.

Four strategic goals can guide the transition to a circular economy. These goals are interlinked and need to be worked towards in an integrated way. The four strategic goals are:

(i) reduce the size of the problem by eliminating and substituting problematic and unnecessary plastic items, including hazardous additives;
(ii) ensure that plastic products are designed to be circular (reusable as a first priority, and recyclable or compostable after multiple uses at the end of their useful life);
(iii) close the loop of plastics in the economy by ensuring that plastic products are circulated in practice (reused, recycled or composted); and
(iv) manage plastics that cannot be reused or recycled (including existing pollution) in an environmentally responsible manner.

A comprehensive and integrated approach to solutions is needed. Importantly, scientific evidence shows the need for a comprehensive and integrated application of solutions across the life cycle of plastics. Solutions may include a combination of regulatory, economic, technological and behavioural instruments, as well as the use of trade policies. Following a life-cycle approach is critical. The best combination of policies across the life cycle will differ based on each Member State's needs. But following a life-cycle approach and applying policies in an integrated way can set the world on the path to a circular plastics economy.

Harmonized measures and legal obligations will be key. To support national actions, a harmonized set of measures and legal obligations agreed internationally will be key to creating a level playing field.

Systems change is possible, but this demands vision, targets, monitoring and reporting. Scientific literature shows that a systems change to achieve a safe, circular plastics economy is possible with the knowledge we have today. This requires a new, shared global vision where plastic pollution is not an option, coupled with the set of targets, policy instruments and mechanisms that will lead and enable the shift towards this vision. Strong monitoring of harmonized indicators and reporting will enable accountability and transparency. The international legally binding instrument on plastic pollution, including in the marine environment, required to achieve the vision can be built to allow flexibility to incorporate new evidence and solutions as they become available.

Further reading

1. **UNEP/PP/INC.1/7.** Plastics science. https://wedocs.unep.org/bitstream/handle/20.500.11822/40831/K2221533%20-%20%20UNEP-PP-INC.1-7%20-%20AMENDED%20ADVANCE%20-%2014.10.2022.pdf
2. **UNEP/PP/INC.1/11**. Priorities, needs, challenges and barriers relating to ending plastic pollution at the national level. https://wedocs.unep.org/bitstream/handle/20.500.11822/40721/K2221859%20-%20UNEP-PP-INC.1-11%20-%20ADVANCE.pdf
3. OECD, Global Plastics Outlook: Economic Drivers, Environmental Impacts and Policy Options (Paris, OECD Publishing, 2022)
4. UNEP, Drowning in Plastics: Marine Litter and Plastic Waste Vital Graphics (Nairobi, 2021).
5. UNEP, From Pollution to Solution: A Global Assessment of Marine Litter and Plastic Pollution (Nairobi, 2021).