

# Plastics, life cycle approaches and the law



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**Abstract:** The way we currently use plastics is both unsustainable and inherently harmful to human and planetary health because it assumes a linear, not circular, flow of materials. Even today most plastic products are manufactured from fossil fuels, used only briefly and then discarded, burned or landfilled as waste, each of which has an environmental cost. Innovative governance approaches will be needed to promote a systems-based approach grounded in industrial ecology which takes into account challenges at every stage of the plastic cycle, ensuring materials are retained within a circular economy.

Plastics are part of a worldwide problem stemming from the way we manage our economies based on linear flows of materials and products. This inevitably leads to waste and pollution. Here we argue for a plastics economy based instead on the retention of stocks within an economy, respecting a planet where resources are finite.

Plastics and plastic pollution pose direct threats to humans and the environment, with recent studies linking plastic exposure to health issues including cardiovascular disease and cognitive dysfunction (1). Life on earth is under threat and a radical new approach is required to change course. This involves transitioning from a system which prioritises the acquisition of material wealth for the few to one which promotes quality of life on earth for all. Achieving such a shift will require technological development and changes to infrastructure, supply systems and consumer culture, reducing demands on resources, preventing environmental damage, and creating a more sustainable economy and society. In addition to a significant overall reduction in the amount of plastic produced, the approach should be based on industrial ecology, taking a system view of the stocks and flows of materials and energy in the economy and the ways they are shaped by and impact on economic and social systems (2). Here we apply these principles to the wicked problem of plastics and discuss how law is instrumental in such change.



The plastic cycle can be usefully divided into upstream, midstream and downstream stages as illustrated by Figure 1. The upstream stage includes: the extraction of the materials for plastics feedstock; monomer production, polymer production, plastic conversion and trade of polymers. These materials move round the cycle to midstream, which includes the design, manufacture, trade and distribution of plastic products followed by their use, maintenance, service and potential reuse. The downstream phase includes repair, refurbishment, remanufacturing, segregation, collection, sorting, and recycling (the waste management process often including both formal and informal sectors), trade of plastic waste and disposal to incineration or landfill.<sup>2</sup>

The life cycle of plastics is global, with countries engaging in different activities along the value chain. Regulation at national level generally focuses on the downstream phase of the life cycle – waste management – with less focus on upstream and midstream issues, an approach which will not result in building stocks of plastics within the economy which can be reused or remanufactured and or reduce plastic pollution overall (5). For instance, according to the Organization for Economic Cooperation and Development (OECD), globally only 9% of plastic waste is recycled while 22% is mismanaged, so focusing on recycling will not, on its own, significantly reduce the downward flow of plastics.<sup>3</sup>

The challenge is to prioritize the reduction of the upstream sources of plastics pollution while keeping the stocks of plastic materials within the economy at the midstream and downstream phases through mechanisms such as introducing more sustainable packaging design, and models of reuse, repair and remanufacturing.

Each phase of the life cycle must be considered in terms of the challenges and barriers that must be overcome in order to transition to a stock-centred economy to identify which legal instruments will be required to deliver the reduction of plastics pollution anticipated by the draft Global Plastics Treaty. For example, a challenge related to the first step of the life cycle is how to reduce the production of plastics derived from hydrocarbons to limit the flow of natural resources from the environment into the economy. Application of the Paris Agreement<sup>4</sup> to significantly reduce greenhouse gas emissions globally requires countries to review their carbon footprints. This is particularly challenging for countries whose economies benefit significantly from plastic production, especially those who use fossil fuel and its by-products. The challenge is evidenced by the proliferation of litigation around the climate change impacts of plastic production itself. For example, ClientEarth, (a non-profit group of lawyers) together with 14

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2. UNEP/PP/INC.1/INF/8 Addendum document on priorities, needs, challenges and barriers to end plastic pollution at national level (UNEP/PP/INC.1/11).

3. OECD Global Plastic Outlook Database available at <https://doi.org/10.1787/c0821f81-en>.

4. Paris Agreement to the United Nations Framework Convention on Climate Change, December 12, 2015, T.I.A.S. No. 16-1104, 3156 U.N.T.S. 54113.

NGOs, have renewed their legal fight for the fourth time against plans by INEOS, one of the world's largest chemical producers and a significant player in the oil and gas market, to build Europe's largest plastics industrial installation in the Port of Antwerp in Belgium.

Globally, state aid and other financial incentives are still routinely being made available for plastic production plants which use virgin fossil fuels and their by-products. This artificial market then distorts the price of virgin plastics, making it cheaper than plastics made from recycle, which in turn undermines the recycled plastics market. Switching such economic aid from fossil fuel to alternative sources is not a straightforward process so achieving such a transition requires the driver of a legally binding instrument.

A flexible range of laws will be required to address the unique challenges found at each stage of the plastic life cycle. Laws such as operational licensing, planning and Environmental Impact Assessment procedures must be embedded in the implementation of the Global Plastics Treaty at national level to restrict the use of hydrocarbons. Criteria for permitting the construction of plastic manufacturing plants and granting licenses to run them must reflect the requirements of both the Paris Agreement and the Global Plastics Treaty. If the environmental impacts of plastics production are accounted for prior to land use planning approval being granted for the building of the plant then anticipatory and preventive approaches can be adopted.

At the midstream phase, ecodesign laws are needed to ensure manufacturers take into account the impacts of their products throughout the life cycle. Sustainable product policies which include such factors as ecodesign, recycled content targets, international standards against which plastics must be measured (content, materials, components), chemical and additive restrictions must be introduced, including a requirement for manufacturers to ensure the chemicals they use in products are tested and shown to be non-toxic, and restrictions on certain uses of plastics need to be implemented through regulation. Such regulatory approaches will create policy landscapes which promote alternative materials and business models to ensure that alternatives to linear models of use of plastics are both available and economically viable.

The forensic examination of the life cycle needs to involve applying a range of laws including bans on problematic and unnecessary types of plastic (e.g. microbeads), bans on the import, production and consumption of single-use plastic products, extended producer responsibility schemes specific to plastics or products containing plastics, taxes on packaging content, laws requiring all plastic packaging to be recyclable or compostable. An imaginative use of legal instruments around the life cycle demonstrated in Figure 1 is required to drive change in the way we produce and consume plastics and the pollution it generates.

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