TROUBLING TOXICS:

ELIMINATING HARMFUL PLASTIC CHEMICALS THROUGH THE PLASTICS TREATY

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Plastics contain many toxic chemicals that are not internationally regulated but move internationally in plastic materials. These hazardous chemicals in plastics threaten human health and the environment.

UNEA Resolution 5/14 mandates the negotiation of an international treaty to end plastic pollution. To fulfill the mandate from UNEA, a core obligation of the treaty will be to ban, phase out, and/or reduce the production, consumption, and use of hazardous chemicals, including monomers and polymers of concern.[1] Plastics are made of chemicals and many of the 13,000 chemicals known to be used in plastics are hazardous and have been proven to negatively impact human health and the environment.

This brief discusses possible approaches to establishing criteria for a negative list of toxic chemicals associated with the production, use and disposal of plastics.

PLASTICS POISON PEOPLE AND THE PLANET

Plastics production has skyrocketed since the 1950s and projections suggest that the production of plastics and plastic waste may double or even triple in the coming decades unless global measures are adopted to prevent this increase. Any strategy to eliminate the adverse impacts of plastics, including their toxic impact needs to be guided by the goal of reducing the production of plastics.

Plastics are a combination of chemicals and carbon. They contain chemical monomers, chemical polymers, chemical additives, and non-intentionally added substances (NIAS). For both fossil-fuel based plastics and biobased plastics many of these chemicals are released at different stages of the plastics life cycle. Chemical additives are often not bound to the plastics and may leach more readily, but other toxic or potentially toxic substances, such as monomers, can also leach from plastic polymers. In addition to chemicals that are used in plastics, toxic emissions also happen during feedstock extraction and plastic production, affecting workers and fenceline communities. Additionally, chemicals are known to be produced and released at other life stages of the plastics, for example from open burning or incineration of plastic waste.

Many chemicals released throughout the plastics life cycle are hazardous and have been shown to pose threats to human health and the environment. Evidence suggests that we are already seeing serious health and environmental problems from hazardous chemical exposures from plastics.[2]

1 See UNEP/PP/INC.2/4 Potential options for elements towards an international legally binding instrument, based on a comprehensive approach that addresses the full life cycle of plastics as called for by United Nations Environment Assembly resolution 5/14

2 For example, see https://www.ciel.org/the-toxic-impacts-of-plastic-across-its-lifecycle/

CHEMICALS IN PLASTICS ARE UNDER-REGULATED

Except for a few national and regional regulatory systems, most chemicals in plastics are not regulated. In fact, only 1% (128) of the chemicals used in plastics are currently regulated under international multilateral environmental agreements (MEAs)[3], even though more than 3,000 chemicals used in plastics have been identified as being of potential concern. Of these chemicals of concern, almost a thousand used in plastics are linked to cancer, DNA mutations, or harm to reproduction, and more than a thousand are known to be toxic to the aquatic environment. Even more concerning, there is no information on the hazards of around 6,000 chemicals used in plastics.[4]

HAZARDOUS CHEMICALS IN PLASTICS TAKE CENTER STAGE IN COUNTRIES' CONCERNS

The paper "Potential options for elements towards an international legally binding instrument" compiled the views expressed by States in their submissions to the Plastics Treaty INC. The paper summarizes the 67 submissions by governments or groups of governments (AOSIS, European Union, and a group of African countries)[5], and the statements from INC-1. Almost three-fourths of these submissions include the protection of human health as an objective of the instrument. The need to phase out chemicals of concern was highlighted by two-thirds of submissions. One-third of submissions highlighted the need to phase out polymers of concern[6]. Control measures included in the submissions and relevant to the control of chemicals include: reducing the supply of plastic polymers, transparency measures, eliminating chemicals, including polymers of concern, designing for circularity, and eliminating emissions.

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3 See BRS (2023). Global governance of plastics and associated chemicals. Secretariat of the Basel, Rotterdam and Stockholm conventions, United Nations Environment Programme, Geneva. Karen Raubenheimer, Niko Urho.

4 BRS 2023

5 All submission can be viewed on the INC2 website https://www.unep.org/events/conference/second-session-intergovernmental-negotiating-committee-develop-international/documents

6 Reference to the coalition analysis

BROAD CRITERIA TO IDENTIFY CHEMICALS OF CONCERN: LESSONS FROM THE STOCKHOLM CONVENTION

The Stockholm Convention regulates 100 of the 128 internationally regulated chemicals and could serve as an inspiration for how to formulate criteria for listing chemicals under a Plastics Treaty. The Stockholm Convention aims at protecting human health and the environment from persistent organic pollutants (POPs) and requires Parties to eliminate or restrict the production and use of chemicals listed in its Annexes. It uses a set of criteria to evaluate whether a chemical "is likely, as a consequence of its long-range environmental transport to lead to significant adverse human health and/or environmental effects, such that global action is warranted."

The following elements from the Stockholm Convention can be shared and adapted to the Plastics Treaty:

- **Specific criteria:** persistence, bioaccumulation, potential for long-range environmental transport, and evidence of adverse effects to human health or the environment.
- **Precautionary principle:** the Convention is informed by the precautionary principle in its objectives, and it includes explicit reference to an essential element of the precautionary principle that lack of full scientific certainty cannot prevent proposals for listing chemicals from proceeding.
- **Special considerations for vulnerable groups:** the Convention highlights the health concerns, especially in developing countries, for specific vulnerable groups such as women, future generations, and Indigenous communities as the contamination of their traditional foods is a public health issue.
- **Focus on elimination:** the Convention is focused on measures to eliminate the production, use, and transboundary movement of POPs, rather than focusing on allowing continued use by managing risks.
- **Adaptation to scientific knowledge:** the Convention initially identified a list of the twelve most problematic chemicals targeted for elimination (the "dirty dozen") but also included provisions for adding new chemicals. A process was established whereby a subsidiary scientific body reviews proposals for the identification of new POPs and recommends POPs for regulatory listing.

The experience of applying the Stockholm Convention for more than 20 years can also provide lessons on how to improve the identification and regulation of problematic chemicals under the Plastics Treaty, including:

- **Grouping chemicals:** although some chemicals are listed as groups (for example, PCBs, PFOA, SCCPs, and others), most chemicals listed for global elimination have been routinely substituted with chemicals for which the hazard characteristics are not known yet, or which are not yet regulated (so-called "regrettable substitution"). Assessing and identifying chemicals in groups of similar or related substances, rather than attempting to identify and regulate individual chemicals one at a time (a project that would take many decades to complete), would be an effective and efficient way to address the large number of chemicals associated with plastics.
- **Transparency:** after plastics are manufactured and turned into materials and products, it is extremely difficult to know what chemical additives and chemical polymers are contained in the plastics materials/products. Lack of information on the chemical content of plastics leads to mismanagement of plastics and toxic exposures for workers and consumers.
- **Stockpiles prevention:** phasing out hazardous chemicals and promoting alternative materials can avoid creating toxic stockpiles. The Stockholm Convention prohibits recycling of wastes containing POPs, thus the continued use of toxic chemicals in plastics creates large hazardous waste streams of contaminated plastics that are challenging to manage in an environmentally sound manner. Numerous studies have shown that when contaminated plastics are recycled, the toxic chemicals they contain are uncontrollably spread into new products.

As the Stockholm Convention focuses only on chemicals that are persistent and mobile, it cannot address a wide range of chemicals that are hazardous but not persistent, such as bisphenols, phthalates, and many others found in plastics. Therefore, it is important that the Plastics Treaty goes beyond the criteria of the Stockholm Convention. Building on the lessons from the Stockholm Convention, States could include in the Treaty elements that lead to better protection of human health and the environment.

SUSTAINABILITY CRITERIA FOR CHEMICALS IN PLASTICS

The future Plastics Treaty should include criteria to focus on relevant properties for chemicals used in plastics. The criteria would also need to recognize that short-term toxicity may be less relevant than long-term toxicity, especially for polymers. It is also important to recognize that some chemicals that are typically less persistent may be more long-lived when used in plastics, which are very persistent materials.

Criteria for identifying chemicals to be controlled under the Treaty could include the following:

a. Chemicals and classes of chemicals associated with plastics, either as plastic ingredients, processing aids, NIAS, and chemicals unintentionally produced during the plastics life cycle.
b. Chemicals for which there is no available toxicity data.
c. Chemicals that increase barriers to circularity of plastics.
d. Chemicals for which there is evidence of known or potential adverse effects for human health or the environment.

The criteria under (d) may include:

- Substances that are carcinogens, mutagens, or reproductive toxicants.
- Substances that are endocrine disruptors.
- Substances that affect the immune system, the neurological system, or a specific organ.
- Substances that are persistent, bioaccumulative, and toxic in the environment.
- Substances that are persistent, mobile, and toxic.

By reducing the amount of chemicals used to make plastics, and by replacing hazardous chemicals with safer alternatives, plastics can become simpler and safer.

PLASTIC TREATY PRIORITY 1: TACKLING TROUBLING TOXIC CHEMICALS

To eliminate the negative impacts of chemical pollutants in plastics throughout their life cycle, the Plastics Treaty should aim at systematically eliminating and substituting hazardous chemicals used in plastics (monomers, polymers, additives). Delays in eliminating hazardous chemicals will continue to create stockpiles of hazardous plastics which are not compatible with a circular economy and with safer material cycles.[7]

Just as the Stockholm Convention identified the "dirty dozen" chemicals for elimination, the Plastics Treaty should have the ambition to identify an initial list of chemicals based on the criteria listed above. There are thousands of chemicals currently used in plastics that have an unknown safety profile and these should be avoided until they are proven safe. But there is overwhelming evidence that the following groups are hazardous and should be included in a list of troubling toxic chemicals.

Brominated flame retardants (BFRs): BFRs are added to several types of plastics, especially electronics. They are linked with infertility and can disrupt male and female reproductive development, alter thyroid development, and affect neurodevelopment.

Chlorinated paraffins: Chlorinated paraffins are used as flame retardants and, in some products, to make plastics more flexible. They are endocrine disrupting chemicals (EDCs) and are suspected to cause cancer in humans. Studies have also shown that they affect the liver, kidneys, and the thyroid gland in humans.

Polyaromatic hydrocarbons (PAHs): Exist in certain plastics due to the use of specific additives or as non-intentionally added substances. Several PAHs are classified as carcinogenic, mutagenic or toxic for reproduction.

Alkylphenols: Alkylphenols are used as additives and intermediates in plastics. Several alkylphenols are endocrine disruptors and studies have linked exposure to alkylphenols to increased occurrence of several types of cancers, including endometrial and breast cancer.

Bisphenols: Bisphenols are used as chemical building blocks in hard polycarbonate plastics and in some epoxy resins. They are found in many common plastic products. Bisphenols are endocrine disruptors and have been associated with breast, prostate, ovarian, and endometrial cancers.

Phthalates: Phthalates, sometimes called "everywhere chemicals" due to their widespread use, are used as plasticizers, additives that make plastic products flexible. Phthalates are EDCs that can reduce testosterone and estrogen levels, block thyroid hormone action, and have been identified as reproductive toxicants.

Benzotriazole ultraviolet (UV) stabilizers: UV stabilizers are used to prevent the degradation of plastic products in sunlight. Several studies demonstrate that UV stabilizers are EDCs and can impede fertility and development.

Per- and polyfluoroalkyl substances (PFAS): PFAS are known as "forever chemicals" because they persist in the environment and accumulate in the bodies of wildlife and people. PFAS are used in the production of polymers including fluoropolymers, like polytetrafluoroethylene (PTFE). PFAS are metabolism-disrupting chemicals affecting the immune system, liver, and thyroid function. They alter puberty, raise breast cancer risk, and are associated with kidney, testicular, prostate, and ovarian cancers, and non-Hodgkin's lymphoma.

Brominated dioxins: Dioxins are byproducts of industrial and combustion processes and occur in the production of plastics with BFRs and when plastics are incinerated. There are no safe levels of dioxin exposures. Dioxins affect brain development, are associated with increased risk of multiple cancers, and can affect the immune system.

7 For more information on chemicals of concern in plastics see: https://ipen.org/documents/7-harmful-chemical-types-plastics

In addition to the above-mentioned chemical groups, there are individual chemicals that are important to address, including but not limited to polymers such as polystyrene, polyurethane and polyvinylchloride, as well as toxic metals, including lead, cadmium, and mercury. These chemicals and above-mentioned groups of chemicals should be prioritized for control measures and could be part of an initial list included in the Plastics Treaty.

TRANSPARENCY MEASURES FOR CHEMICALS USED IN PLASTICS

Scientific studies have repeatedly identified the lack of transparency as a major obstacle to identifying chemicals of concern in plastics, noting that approximately 6,000 plastic chemicals have been identified as having no publicly available hazard data.[8]

Transparency is a basic tool to understand what chemicals are used in plastics, to allow actors in the value chain to protect workers and consumers from potential risks, and to allow an efficient use of resources. Without knowing what chemicals are used in the plastics they receive, it is often impossible for actors in the waste chain to make informed decisions to protect themselves from toxic chemicals in plastics.

Some current frameworks require disclosure of information for chemicals used in some plastic materials:

- Under the Stockholm Convention, the use of chemicals identified for global elimination in some cases needs to be identified through labels or other means throughout their life cycle. For example, while listed for global elimination, use of hexabromocyclododecane was allowed for expanded polystyrene and extruded polystyrene in building materials that needed to be labeled to be easily identified and segregated.
- The Aarhus Convention requires that "Each Party shall develop mechanisms with a view to ensuring that sufficient product information is made available to the public in a manner which enables consumers to make informed environmental choices."[9]
- Under SAICM, a non-binding global agreement on the safe management of chemicals, information on "Chemicals in Products (CiP)" has been listed as an issue of concern since 2009, which has led to the creation of the UNEP Chemicals in Products (CiP) Programme focusing on many products relevant to plastic materials, including toys, textiles, and building materials.[10] Crucially, SAICM affirms that information on chemicals related to the health and safety of humans and the environment should not be regarded as confidential.

At the regional level, in the European Union under the REACH Regulation, companies have an obligation to provide information to the supply chain (including to consumers) on certain chemicals identified as "substances of very high concern" (SVHCs) if they are present in product components (articles). Also, companies need to provide information to a central database managed by the European Chemicals Agency on products containing such chemicals.

Various industry sectors, such as the electronics and automotive sectors, track information on thousands of chemicals in complex supply chains. The Global Automotive Declarable Substance List (GADSL), for example, is a voluntary initiative within the automotive supply chain in which substances of concern are tracked.[11]

The Treaty could approach tracking chemicals by requiring labeling or creating a database for material declarations, as well as ensuring that the information flows through the supply chain, including to workers, consumers, and the waste sector.[12]

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8 BRS 2023

9 Article 5(8) of the Convention on access to information, public participation in decision-making and access to justice in environmental matters.

10 UNEP Chemicals in Products (CiP) Programme available at: https://www.unep.org/resources/other-evaluation-reportsdocuments/chemicals-products-cip-programme

11 https://www.gadsl.org/

12 See the proposal for "Global Minimum Transparency Standard (GMTS)" at https://hej-support.org/global-plastics-treaty-transparency-requirement-for-chemical-constituents-in-plastic-is-a-must/?utm_source=rss&utm_medium=rss&utm_campaign=global-plastics-treaty-transparency-requirement-for-chemical-constituents-in-plastic-is-a-must .

REGULATING CHEMICALS IN THE TREATY

As chemicals emerge as a crucial component of plastic pollution, addressing them in the Treaty requires learning from the experience in implementation of other MEAs as well as national legislation. The need for a precautionary approach in the decision making on chemicals of concern and the need to regulate chemicals as groups will be crucial. Various approaches could be adopted such as positive lists, negative lists, and a combination of the two.[13]

However, it is important to note that creating a positive list may involve a considerable workload, because there are many gaps in the current knowledge on chemicals in plastics, and because there is very little data on some chemicals that have been identified as "of low concern" in recent lists, so these chemicals cannot be considered the same as safe chemicals. Therefore, it may be more suitable to combine a negative list with an approach that prohibits marketing chemicals when there is no available toxicity data.

Transparency will also be crucial as knowledge of the chemical components of various plastics materials is vital for replacing the most harmful ones and allowing better management of plastic materials, including circular economy approaches.

13 See BRS (2023)

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