Submission to the Intergovernmental Negotiating Committee to develop an international legally binding instrument to end plastic pollution, including in the marine environment

First session, November 2022

Determining the appropriate scope and approach to the work of the intergovernmental negotiating committee (INC) at the first meeting in November 2022 is critical to achieve the goal of reaching international agreement on a binding instrument to end plastic pollution within two years. The organisation of the work must enable appropriate controls and measures to be developed that will support a system-change in the ways plastic is produced, consumed and managed globally. Nothing short of a fundamental paradigm shift will be enough to address unsustainable levels of plastic production and consumption, address harms to people and the planet at all points of the plastics value chain, and end plastic pollution.

Minderoo Foundation makes the following comments and recommendations:

Recommendation 1: Harmonised globally binding obligations will be key for success.

UNEA Resolution 5/14 provided the INC with a mandate to develop an international instrument that addresses the full life cycle of plastics, which could include both binding and voluntary approaches (para 3). Given the scale of the plastic pollution crisis and the interconnected nature of the plastics value chain, binding common measures which provide means for harmonisation and integration internationally are essential.

International movement occurs via trade in plastic feedstocks, primary plastics, additives, intermediate plastic goods, final manufactured plastic goods and plastic waste.[i] In Minderoo Foundation's analysis, roughly half of all polymers are traded internationally[ii] and more than a third of all plastic packaging moves across borders.[iii] In addition to this, Minderoo Foundation estimates that approximately 5% of all global plastic waste was exported in 2021.[iv] The negative effects and emissions resulting from the production and consumption of plastic materials and products across their entire life cycle are not limited to the jurisdictions that produce primary plastics or products, the jurisdictions where those plastics or products are used and consumed, the jurisdictions where they are managed as waste, or the jurisdictions (and international zones) where leakage of waste and pollutants to the environment occurs.[v]

Binding and unifying international measures are essential to support a global response to a global problem. Binding international measures can address existing regulatory fragmentation and limited transparency across the plastics value chain and provide sufficient common ground for the development of more aligned and effective national action plans. Common binding measures can also offer greater certainty for business innovation in alternatives, and facilitate investment in the necessary infrastructure that will enable more effective circular material management and environmentally sound waste management. We recommend the INC secretariat be given a clear mandate to assess the broadest possible range of control measures early in the process.

Minderoo Foundation strongly recommends addressing the following areas in the binding and unifying obligations within the primary instrument:

- measures that address unsustainable levels of fossil fuel plastic production and consumption;
- measures that address the need for an urgent transition to circular plastic material management (based around re-use, recycling, and alternative bio-based and biodegradable polymers);
- measures that implement global precautionary standards for chemicals and additives, and eliminate hazardous chemicals and additives from plastic production. These measures could be complemented by measures that ensure the safety and sustainability of plastics through design criteria; and
- transparency and reporting obligations, including on plastic material composition, to enable effective management of plastics throughout the lifecycle.

Recommendation 2: The instrument must first and foremost aim to reduce total fossil-fuel plastic production and consumption and support an urgent transition to a circular plastics economy.

In 2019, annual plastic production was around 460 million metric tons, and single-use plastics – the primary source of plastic leakage into the environment – accounted for approximately 130 million metric tons, with 98 per cent made from fossil fuels.[vi] While this scale of production is daunting, fewer than 100 companies were the ultimate source of single-use plastic products.[vii]

In a business-as-usual scenario, plastic production figures are set to exponentially increase. Global plastic production is projected to triple to 1,231 million metric tonnes by 2060.[viii] Production capacity for virgin single-use plastic polymers could grow by 30% before 2025.[ix] The projected rate of growth in the supply of these polymers is in line with the historical rate of growth in demand for single-use plastics – which, without regulatory intervention, will likely keep new, circular models of production and re-use "out of the money".[x]

The mandate to "end plastic pollution" will not be achieved without addressing the plastic pollution problem at its source. The instrument must include measures which curb unsustainable levels of plastic production and consumption and address market failures that favour production of virgin fossil fuel plastics versus circular plastic material management (re-use, recycling and use of alternative non-fossil fuel materials).

Recommendation 3: The instrument should address all forms of plastic pollution, informed by a comprehensive understanding of "plastic".

Plastics are composite materials containing a carbon-based polymer matrix mixed with functional additives such as plasticisers, flame retardants, antioxidants, UV stabilisers, pigments, antioxidants, and fillers. Over 10,500 substances have been identified as used in plastics.[xi] These additives are usually not chemically bonded to the polymer and can leach out over time.[xii] In addition, plastics can contain intentionally added microplastics (primary micro-plastics), as well as processing agents and non-intentionally added substances (NIAS) such as impurities, by-products, breakdown products and contaminants which are difficult to identify.[xiii] Toxic plastic chemicals and their transformation products, particularly from e-waste, have been found as NIAS in recycled plastics.[xiv] Plastic materials also fragment over time to form microplastics (secondary micro-plastics).[xv]

To effectively address all forms of plastic pollution and leakage, it is important that the instrument to end plastic pollution includes within the scope of "plastic": polymers, additives, chemical

components, primary micro-plastics, as well as intermediate and final plastic products, and breakdown (including secondary micro-plastics) and transformation products. The proposed working definition of "plastic pollution" as "the negative effects and emissions resulting from the production and consumption of plastic materials and products across their entire life cycle"[xvi] must necessarily include GHG emissions across the life cycle, including in connection with production, trade, recycling and waste management.

Recommendation 4: The instrument must address human health impacts of plastics (and take a strongly precautionary approach where the full range of impacts remains unknown).

The environmental and human health impacts from plastics occur at every stage of the plastic life cycle. This includes exposure to plastic-related chemicals and micro- and nano-plastics from occupational hazards during the production stage, during everyday use and during disposal of products, as well as to climate-related risks driven by fossil fuel extraction, plastic production and waste management.[xvii]

While significant knowledge gaps remain as to the full scope of these impacts, including those posed by microfibres and micro- and nano-plastics,[xviii] there is increasing evidence of human health impacts related to plastic chemical exposure.[xix xx xxi xxii] UNEP notes that about one quarter of chemical additives used in plastic are of potential concern for human health and safety;[xxiii] in another study, over 2,400 of the approximately 10,500 substances used in plastics are identified as substances of potential concern.[xxiv]

We are exposed to plastic chemicals every day through use of household goods, food processing and packaging, construction materials, transport, personal care products, medical applications, incorporation into the food chain (both plant and animal), via release of plastic waste into the environment and even in dust. Plastic chemicals can enter the human body through ingestion, inhalation and/or skin absorption, as well as into the developing foetus through maternal blood supply.[xxv]

Plastic material can fragment during use or abrasion or simply over time to form microplastics (secondary microplastics).[xxvi] Some plastic also contains intentionally-added microplastics (primary microplastics), which are added to give the material certain properties. Microplastics have now been detected in human lung, liver, colon, blood and placenta. It is probable that even smaller particles, nanoplastics,[xxvii] are also entering the body, but accurate methods to identify plastic polymers within complex human tissue matrices still need to be developed.[xxviii] (The work is underway to do this).[xxix]

A recent study conducted by Minderoo Foundation in partnership with UNEP's Principles of Sustainable Insurance, law firm Clyde & Co., and risk analytics experts Praedicat, estimated that the global social costs from plastic-related pollution are already in the hundreds of billions of dollars each year.[xxx] Much of the estimated costs are driven by bodily harm from exposure to plastic chemicals. Certain harms – including the impacts from micro- and nano-plastic[xxxi] - are not fully understood but are potentially catastrophic in the long term.[xxxii]

Minderoo Foundation urges the creation of a **dedicated cross-cutting cluster of work focused on the human health impacts of plastics**, focused on considering the ways that the instrument to end plastic pollution can most effectively:

- manage and mitigate harms to human health from industrial chemicals in plastics, including those circulating in recycled products;
- adopt a precautionary approach where the full range of harms to human health remains unknown;

- prioritise research in areas where critical gaps remain; and
- ensure swift integration of emerging knowledge on the human health impacts of plastics.

Recommendation 5: A robust reporting framework that facilitates transparency across the plastic value chain is essential.

Effective implementation and monitoring of compliance with the instrument requires the creation of a robust reporting and monitoring mechanism that builds on existing reporting metrics and standards where available. UNEP/PP/INC.1/7 Plastics Science lists several reporting metrics which will be needed to set a baseline and monitor progress against a number of potential treaty objectives. Minderoo Foundation points in particular to the need for harmonised global reporting standards addressing plastic production that:

- measure total plastic and polymer production, broken down by polymer type and application;
- enable visibility on plastic material composition, including additives and other chemicals used to make plastics; and
- include metrics measuring recycled and/or re-used materials, including their composition (polymers, additives and other chemicals used to make plastic).

From a public health perspective, mandatory disclosure and transparency on plastic composition will enable more effective management of the risks associated with plastic chemicals throughout the lifecycle of plastics, as well as support the appropriate prioritisation of ongoing biomonitoring and human health research. Industry cooperation is essential to contribute to the development and implementation of disclosure schemes that facilitate transparency on plastic product composition and traceability of plastic chemicals, and to support the development of common, robust, reliable and practical methods for detecting and quantifying human exposure to all plastic chemicals that are available on-market and to which humans are exposed.

Recommendation 6: A strong and dedicated science-policy interface within the plastics treaty infrastructure is important given the significant knowledge gaps which remain in relation to plastic pollution, exposure and impacts in all their forms.

Due consideration must be given to the ways that the institutional framework for the instrument to end plastic pollution will interact with the Science Policy Panel on chemicals, waste and prevention of pollution to be established pursuant to UNEA Resolution 5/8 (Science Policy Panel). Given the broad mandate of the Science Policy Panel, Minderoo Foundation strongly recommends the creation of a dedicated technical body under the treaty instrument that can future-proof the treaty, and ensure that the instrument remains responsive to emerging research and policy needs as they relate specifically to plastic pollution, including plastic chemicals, and micro- and nano-plastics.

This dedicated body could prioritise resources to addressing critical knowledge gaps and needs highlighted by monitoring and reporting outputs, contribute to effectiveness evaluation of measures introduced under the instrument, and engage horizon scanning for issues of relevance to addressing plastic pollution in all its forms. Particularly considering that the full range of human health risks associated with plastic chemicals and micro- and nano-plastics remains unknown, the dedicated body could:

- support effective prioritisation of research into the human health impacts of plastics, and swift integration of emerging knowledge (for example, by making recommendations for reduction and/or elimination of certain polymers, chemicals or additives by decision); and
- conduct horizon scanning for emerging public health issues associated with plastics, making recommendations as to the associated precautionary measures required.

Approach to the work of the INC

To address the full scale and complexity of plastic pollution within the short negotiation period, the work of the INC could be structured along the different stages of the plastic life cycle, as many others have suggested, or alternatively around the four strategic objectives identified by UNEP in UNEP/PP/INC.1/7 Plastics Science:

1) "Reduce the size of the problem by eliminating and substituting problematic and unnecessary plastic items, including hazardous additives;
2) Ensure that plastic products are designed to be circular;
3) Close the loop of plastics in the economy by ensuring that plastic products are circulated in practice (reused, recycled or composted); and
4) Manage plastics that cannot be reused or recycled in an environmentally responsible manner."

Either approach could be supported by a cross-cutting cluster focused on the human health impacts of plastics, plastic-related chemicals and micro- and nano-plastics (as further discussed below).

Minderoo Foundation points to the following important actions and considerations, in addition to those identified by UNEP in Table 3:

- **Sustainable production and consumption (or, 'reducing the size of the problem')**:
    - Mechanisms to eliminate intentionally added primary micro-plastics (in addition to eliminating problematic or unnecessary polymers, additives and plastic products as identified by UNEP);
    - Mechanisms which limit production and consumption of non-recyclable plastics (including both fossil-fuel and bio-derived non-recyclable plastics) to essential applications only, where the composition which determines non-recyclability is necessary for the given application, with no viable alternatives;
    - Mechanisms to increase use of sustainable feedstocks/ plastic alternatives (relative to fossil fuel content) (in addition to substituting virgin inputs with recycled content as identified by UNEP);
    - Mechanisms to restrict or eliminate chemicals and additives with harmful associations for health in all high-risk or high-risk-of-leakage applications, including consumer goods and food contact materials and to manage phase outs from other non-essential applications; and
    - Mechanisms to monitor and report on the production of virgin plastic polymers, their composition (including chemical and additive components), associated greenhouse gas emissions (aligned with the Paris Agreement) and the use of recycled or bio-based materials.

→ *essential that measures result in an absolute reduction in global fossil fuel plastic production and consumption, that can be increased over time*.

- **Sustainable product design (or, ensuring that plastics are 'designed to be circular'):**
    - Development of robust global precautionary standards and controls for the use of chemicals and additives in plastics, recognising that the full range of human health risks associated with plastic chemicals are unknown;xxxiii and
    - Development of harmonised sustainable design standards to maximise plastic re-use, recycling and product safety. Standards should ensure plastics and plastic products that are compatible with a circular economy, and/or meet defined essentiality criteria. Standards should also reduce environmental leakage during use

(including to address micro- and nano-plastics released during use) and consider safe ultimate end-of-life management (including with respect to hazardous chemical loads).

→ *essential to develop harmonised design standards for plastic materials as well as plastic products, that promote circularity and safety, in tandem with limiting primary plastic production.*

- **Circularity, safety and sustainable consumption in practice (or, 'closing the loop')**
  - Transparency, reporting, and traceability for recycled and re-used plastics (as well as for chemicals associated with plastics, as highlighted by UNEP);
  - Measures targeting market failures that favour production of virgin fossil fuel plastics versus circular plastic material management (re-use, recycling and use of alternative non-fossil fuel materials). These measures could include regulatory mechanisms such as mandatory extended producer responsibility requirements and minimum recycled content requirements, trade measures, and fiscal mechanisms and incentives (e.g., levies, taxes or duties on virgin fossil fuel plastic production, market action on single use, short use and non-recyclable plastics, and subsidies for circular material management); and
  - Ensuring clear and consistent labelling and terms.

→ *essential to ensure that measures towards sustainable production, consumption, circularity and safety are effectively implemented in practice.*

- **Environmentally sound waste management**
  - Mechanisms that minimise and prevent leakage at each stage in the value chain, including chemical and microplastic leakage.
  - Mechanisms that address management of existing hazardous chemical loads in plastics.
  - Support for the improvement of waste management services in countries in transition; and
  - Coordination of national efforts to remove legacy plastic waste from the environment, including international collaboration and technology sharing to trace, prevent the loss and retrieve discarded fishing gear.

→ *essential that measures result in an absolute reduction in global plastic waste that is generated and that leakage to the environment is addressed at all stages in the value chain.*

To further prioritise the issues to be addressed by each cluster in the two-year negotiation timeline, the INC may identify and consider the characteristics (including leakage risks, pathways and potential harms to health and environment) of specific plastic materials and products. Minderoo Foundation calls for specific focus to be given to single-use plastics, plastics considered problematic or 'non-essential', plastic packaging, hazardous chemicals in plastics, micro- and nano-plastics and fishing equipment.

Dedicated cluster focusing on human health impacts

Given the complexity of the topic and the existing knowledge gaps, we emphasise the potential contribution of a dedicated cross-cutting cluster of work focused on the human health impacts of plastics. This cluster could focus on:

- mapping the human health risks of plastics at each step of the plastic life cycle;
- identifying priority areas for further scientific research;
- making recommendations to inform development of global precautionary standards for plastic chemicals and additives management;

- proposing transparency mechanisms that will enable more effective management of plastic chemicals and additives throughout the life cycle; and
- proposing policy measures to address and minimise shedding and leakage of micro- and nano-plastics that could be harmful to human health.

Addressing human health as part of a broader cluster (e.g. product design) risks health considerations only being addressed at certain points in the value chain, or de-prioritised in favour of other (less complex) issues in light of limited time and resources. The cluster focusing on human health impacts could be supported by a technical multi-stakeholder working group with balanced representation from the scientific community, the health community, industry and civil society.

About the Minderoo Foundation

The Minderoo Foundation is one of Australasia's largest philanthropic organisations, with AUD 2.6 billion committed to a range of initiatives which target intractable world challenges.

Minderoo Foundation's Plastics initiative seeks to eliminate the harm from plastic to people and the planet. Our vision is a world of no plastic waste, made possible by an absolute reduction in virgin fossil fuel plastic production and consumption, and a thriving circular plastics economy where safety is a priority.

To achieve this, we engage across the scientific, health, policy and regulatory, industry and civil society communities to pursue both regulatory and market-based solutions. Our projects span the entire plastics value chain, focusing on key issues such as transparency, human health impacts, safe redesign, and effective management of existing fossil-fuel plastic.

For further information, please contact Lizzie Fuller, Principal, Global Plastics Treaty, Minderoo Foundation: lfuller@minderoo.org.

[i] D Barrowclough, C Deere Birkbeck & J Christen, 'UNCTAD Research Paper No. 53 UNCTAD/SER.RP/2020/12: Global trade in plastics: insights from the first life-cycle trade database', UNCTAD, December 2020.

[ii] Roughly half of all the five polymers included in The Plastic Waste Makers Index were traded internationally in 2019 (more than 90 million metric tons exported); D Charles, L Kimman & N Saran, 'The Plastic Waste Makers Index', Minderoo Foundation, 2021.

[iii] D Charles, L Kimman & N Saran, 'The Plastic Waste Makers Index', Minderoo Foundation, 2021.

[iv] By reference to trade in Product 3915 (Waste, parings and scrap, of plastics), United Nations Comtrade Database, 2021.

[v] As discussed below, environmental and human health impacts from plastic occur along the entire value chain; UNEP/PP/INC.1/7 Plastics Science: Note by the Secretariat to Intergovernmental negotiating committee to develop an international legally binding instrument on plastic pollution, including in the marine environment, First session.

[vi] D Charles, L Kimman & N Saran, op cit.

[vii] ibid.

[viii] ibid.

[ix] ibid.

[x] ibid.

[xi] H Wiesinger, Z Wang, S Hellweg. 'Deep Dive into Plastic Monomers, Additives, and Processing Aids', *Environ Sci Technol.* 2021; 55(13): 9339-9351. doi: 10.1021/acs.est.1c00976.

[xii] JN Hahladakis, CA Velis, R Weber, E Iacovidou, P Purnell. 'An overview of chemical additives present in plastics: Migration, release, fate and environmental impact during their use, disposal and recycling'. *Hazard. Mater.* 2018;344: 179–99.

[xiii] LS Kato & CA Conte-Junior, 'Safety of Plastic Food Packaging. The Challenges about Non-Intentionally Added Substances (NIAS) Discovery, Identification and Risk Assessment'. *Polymers* 2021, 13(13), 2077; https://doi.org/10.3390/polym13132077.

[xiv] A Turner. 'Black plastics: Linear and circular economies, hazardous additives and marine pollution'. *Environment international*. 2018. 117. 308-318. 10.1016/j.envint.2018.04.036; Strakova, Jitka & Digangi, Joseph & Jensen, Génon & Petrlik, Jindrich & Bell, Lee. 'Toxic Loophole: Recycling Hazardous Waste into New Products'. IPEN, 2018. 10.13140/RG.2.2.21990.68164.

[xv] A Chamas, H Moon, J Zheng, Y Qiu, T Tabassum, JH Jang, M Abu-Omar, SL Scott, and S Suh, 'Degradation Rates of Plastics in the Environment'. *ACS Sustainable Chemistry & Engineering* 2020 8 (9), 3494-3511 DOI: 10.1021/acssuschemeng.9b06635.

[xvi] UNEP/PP/INC.1/7 Plastics Science: Note by the Secretariat to Intergovernmental negotiating committee to develop an international legally binding instrument on plastic pollution, including in the marine environment, First session.

[xvii] C Symeonides, M Brunner, Y Mulders, P Toshniwal, M Cantrell, L Mofflin, S Dunlop, 'Buy now, pay later: Hazards to human and planetary health from plastics production, use and waste', *Journal of Paediatric and Child Health 2021 57 (11), 1795-1804;* PJ Landrigan, H Raps, C Symeonides, T Chiles, M Cropper, J Enck, ME Hahn, R Hixson, P Kumar, A Mustapha, Y Park, M Spring, J Stegeman, RC Thompson, Z Wang, M Wolff, A Yousuf , S Dunlop, 'Announcing the Minderoo – Monaco Commission on Plastics and Human Health', *Annals of Global Health*, August 2022, 88(1), p.73. DOI: http://doi.org/10.5334/aogh.3916; UNEP/PP/INC.1/7 Plastics Science (Note by the Secretariat to Intergovernmental negotiating committee to develop an international legally binding instrument on plastic pollution, including in the marine environment, First session).

[xviii] UNEP, op cit.

[xix] D Lithner, A Larsson, G Dave. 'Environmental and health hazard ranking and assessment of plastic polymers based on chemical composition'. *Sci Total Environ*. 2011; 409(18):3309-3324. doi:10.1016/J.SCITOTENV.2011.04.038.

[xx] L Vandenberg, T Colborn, T Hayes, et al. 'Hormones and endocrine-disrupting chemicals: low-dose effects and nonmonotonic dose responses'. *Endocr Rev*. 2012;33(3):378-455. doi:10.1210/ER.2011-1050.

[xxi] BA Demeneix. 'Evidence for Prenatal Exposure to Thyroid Disruptors and Adverse Effects on Brain Development'. *Eur Thyroid J*. 2019;8(6):283-292. doi:10.1159/000504668.

[xxii] AD Vethaak, J Legler. 'Microplastics and human health'. *Science*. 2021;371(6530):672-674. doi:10.1126/SCIENCE.ABE5041.

[xxiii] UNEP, op cit.

[xxiv] Wiesinger, et al, op cit.

[xxv] Symeonides et al, op cit.

[xxvi] PL Corcoran, 'Degradation of Microplastics in the Environment' in: Rocha-Santos, T., Costa, M.F., Mouneyrac, C. (eds) *Handbook of Microplastics in the Environment*. Springer, Cham, 2022. https://doi.org/10.1007/978-3-030-39041-9_10.

[xxvii] K Kannan & K Vimalkumar, 'A review of human exposure to microplastics and insights into microplastics as obesogens'. *Frontiers in endocrinology*, 2021 12:724989. doi: 10.3389/fendo.2021.724989.

[xxviii] C Rauert, Y Pan, ED Okoffo, JW O'Brien, KV Thomas. 'Extraction and Pyrolysis-GC-MS analysis of polyethylene in samples with medium to high lipid content'. *J Environ Expo Assess* 2022;1:13. http://dx.doi.org/10.20517/jeea.2022.04.

[xxix] In collaboration with the University of Queensland, Minderoo Foundation has built the world's first plastics contamination-controlled laboratory and are developing robust methods to improve the detection of plastic chemicals in human urine, blood and solid tissue samples, including post-mortem brain, as well as developing reliable techniques to measure nano-plastic particles; Minderoo Foundation, Minderoo Lab to detect and measure tiny plastic particles in the human body, 11 March 2022.

[xxx] A Merkl & D Charles, 'The Price of Plastic Pollution: Social Costs and Corporate Liabilities', Minderoo Foundation, 2022.

[xxxi] ibid.

[xxxii] ibid.

[xxxiii] Minderoo Foundation notes that UNEP included "Develop international guidance, standards and controls on additives and chemicals of concern" as a potential action under Strategic Goal 2. Minderoo highlights the need for precautionary standards and controls which recognise the knowledge gaps in relation to the full scope of impacts to human health from plastic chemicals, additives and intentionally added microplastics.