International Science Council

Key Requirements for a Science-based International Legally Binding Instrument to End Plastic Pollution

High-level commentary on the Revised draft text ahead of the fourth session of the Intergovernmental Negotiating Committee on Plastic Pollution (INC-4)

To cite this document:
Title: "Key Requirements for a Science-based International Legally Binding Instrument to End Plastic Pollution. High-level commentary on the Revised draft text ahead of the fourth session of the Intergovernmental Negotiating Committee on plastic pollution (INC-4)."
URL: https://council.science/events/isc-plastic-pollution-inc4
Publisher: The International Science Council (ISC)
Date: April 2024

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SUMMARY & KEY MESSAGES

Plastic pollution pervades every corner of our planet, posing a threat to ecosystems and human health, alongside a range of socio-economic implications across the plastic life cycle. As scientific research continues to uncover emerging and rising risks, at a time when plastic production and consumption are escalating sharply, urgent global action is needed, informed by the latest independent scientific evidence from across the natural and social sciences, to mitigate its multidimensional impacts.

The current document is a high-level commentary on the Revised draft text of the international legally binding instrument on plastic pollution, including in the marine environment, referred to herein as 'the instrument'. This commentary, prepared by the International Science Council (ISC) expert group on plastic pollution, underscores a set of recommendations, grounded in current scientific evidence, aimed at ensuring an effective and robust regulatory instrument and implementation.

1

Scientific research reveals the extensive impacts of plastic pollution across the entire plastic life cycle. Its impacts extend beyond human health and environmental concerns, with additional implications for socio-economic development, intergenerational justice and human rights. <u>Addressing these complex challenges requires interventions at every stage of the plastic life cycle and a systemic approach to mitigate its multidimensional impacts</u>.

2

The recognition of plastic pollution as a 'threat multiplier', coupled with mounting scientific evidence of potential human health risks, such as heightened risks of heart attack and stroke due to microplastics, emphasizes the need for the instrument's development to be guided by the One Heath approach. <u>Ensuring human rights, including the right to health, across the plastic life cycle should be integral to the instrument's objectives.</u>

3

Current plastic production levels exceed sustainability thresholds, conflicting with the Paris Agreement goal to limit warming below 1.5°C as plastic production currently contributes 4.5% to global greenhouse gas emissions (GHG), and undermining several Sustainable Development Goals (SDGs) such as SDG 3 on good health and SDG 14 on life below water. Scientific evidence indicates that increasing recycling alone cannot tackle the projected growth in plastic production by 2050. <u>Therefore, effective measures are needed to address the key sources and drivers of plastic pollution, including a reduction in primary and problematic plastic production.</u>

4

The chemical complexity of plastics, with over 16,000 plastic chemicals, a quarter of which have harmful effects on human health and the environment, underscores the need to establish science-based, globally agreed criteria to assess plastics safety and sustainability. This is essential for enhancing the safety, durability, reusability and recyclability of plastic products by eliminating chemicals and polymers of concern. Such measures will enable the transition to a safe, toxic-free circular plastics economy and ensuring environmentally sound waste management practices.

5

Science-based safety and sustainability criteria should be applied to all alternative solutions, including bio-based, biodegradable and compostable plastics. Recent scientific findings indicate that some alternatives might lead to higher environmental impacts, such as increased land use and water consumption. Therefore, it is essential to assess their safety and environmental impacts throughout their life cycle to prevent new environmental risks.

6

The socio-economic costs of plastic pollution are disproportionately borne by marginalized communities in low-income countries, reflecting a significant disparity between those who benefit and those burdened. To address this, the instrument should incorporate robust just transitions measures to minimize burden and macroeconomic impacts on vulnerable communities and regions. Financial support for innovation and capacity building, particularly in low-income countries and Small Island Developing States (SIDS), is crucial.

7

Successful implementation of commitments to end plastic pollution hinges on sustained engagement of science and the establishment of a robust science-policy interface. This will be essential for informing systematic and integrated approaches and solutions that seek to balance environmental protection, public health, and socio-economic development. Financial resources for the instrument should also support a strong science-policy interface and related science and technology needs.

8

The ISC stands ready to leverage its extensive scientific knowledge, science-policy expertise, and regional networks, along with its partnerships and convening capabilities, to support the development of an effective instrument and a robust science-policy interface to curtail plastic pollution.

INTRODUCTION

Over recent decades, considerable scientific progress has been made in understanding the behaviour, persistence, and environmental consequences of plastic pollution. These advances have identified its widespread presence and impacts, affecting all natural environments from deep oceanic sediments to the atmosphere and agricultural soils, and threatening human health through the presence of plastics found in, for example, blood, the brain and breastmilk.

Moreover, increasing scientific evidence indicates potential human health risks from exposure to both primary and recycled plastics, along with the array of chemicals they contain. For instance, a recent three-year study concluded that people who had tiny plastic particles lodged in a main artery were more likely to experience a heart attack, stroke or death (Kozlov, 2024), while additional scientific evidence suggests a positive correlation between the concentration of microplastics in faeces and the severity of inflammatory bowel disease (Yan et al., 2022). Furthermore, research has gradually expanded to encompass broader concerns beyond environmental and public health implications, delving into economic, governance and societal dimensions, including intergenerational justice and human rights considerations (Stoett, 2022).

If current trends continue unabated, population growth and rising incomes will lead to a 70% increase in annual plastic use and waste generation in 2040 compared to 2020, with a 50% increase in annual leakage of (macro)plastics alone and a 60% increase in GHG emissions (OECD, 2023). Scientific evidence indicates that increasing recycling alone cannot address the projected growth in plastic production up to 2050 (Bachmann et al., 2023). Moreover, there are risks, notably to human health, in over-relying on recycling which is not a solution to detoxify the plastics value chain or to mitigate plastic pollution (O'Meara, 2023). Therefore, to effectively combat plastic pollution, the instrument should encompass a comprehensive range of measures, including legally binding elements targeting upstream, midstream and downstream aspects of the plastic life cycle. These should span from reducing and regulating primary and other problematic plastic production, including polymers and chemicals of concern, to establishing an enabling implementation framework with just transition measures and a robust financial mechanism. This will enable a transition that minimizes burdens and macroeconomic impacts on vulnerable communities and regions in low-income countries.

The global scale and far-reaching consequences of plastic pollution, affecting nearly all populations between production and disposal, underscore the need for a legally binding instrument on plastic pollution to incorporate measures that tackle the entire plastic life cycle comprehensively, while prioritizing integrated solutions that can address the interconnected nature of social, environmental and economic impacts.

PART I OF THE REVISED DRAFT

1. **Objectives and Scope: Agreeing on a comprehensive scope and objectives to end plastic pollution across the full life cycle of plastics will be key for achieving an effective instrument to end plastic pollution.**

Plastic pollution poses far-reaching consequences across the entire plastic life cycle, encompassing greenhouse gas emissions, environmental pollution, harm to ecosystems and wildlife, risks to human health and human rights, alongside economic and societal implications. Only a systems approach encompassing the entire life cycle of plastics can effectively mitigate these multidimensional impacts. Such an approach is also beneficial for limiting the costs associated with transitioning to more sustainable and responsible practices in plastic production and consumption.

The scope of the instrument (Part I/5) should therefore encompass the entire plastic life cycle as stated in UNEA Resolution 5/14, starting from the extraction of raw materials and petrochemical feedstocks, including alternatives such as bio-based feedstocks, through the design, production, use and disposal. It should cover all plastic types, including elastomers and synthetic rubbers derived from petrochemicals, components and sizes, including primary and secondary plastics originating from unexpected fragmentation. This includes materials, products, chemicals, additives, micro- and nanoplastics. Additionally, it should address the various pathways in which plastics can enter and contaminate natural ecosystems through emission, release and leakage. This entails fostering a comprehensive understanding of global supply chains and material flows, with a focus on understanding hotspots of plastic pollution. This emphasizes the need for thorough analysis of global material movements and identifying areas with high concentrations of plastics, which is crucial for effectively targeting interventions.

Addressing legacy plastic pollution is equally crucial to mitigate possible long-term health and ecological implications, as well as unequal impacts on already vulnerable areas and populations, such as the SIDS and coastal communities where existing legacy plastic waste in the ocean will continue to accumulate (Busch, 2022). Scientific evidence indicates the presence of large-scale accumulation regions of floating plastic debris in the ocean corresponding to each of the subtropical gyres located at either side of the Equator, potentially causing widespread, poorly reversible, and long-term impacts on marine ecosystems (Kaandorp et al., 2023). Moreover, the Mediterranean Sea has been recognized as the sixth-highest accumulation hotspot for marine litter (Cozar et al., 2015), supported by an observed rise in marine debris, alongside high concentrations of microplastics.

The instrument's objectives (Part I/2) should prioritize ending plastic pollution to safeguard both human and environmental health employing comprehensive legally binding and policy approaches and measures spanning the entire life cycle of plastic. This includes legally binding measures in priority areas to mitigate core environmental and health risks such as reducing and controlling production, eliminating unnecessary and problematic plastics of any size, including micro- and nanoplastics, and addressing chemicals and polymers of concern. Scientific evidence highlights the significant risks posed by plastics and associated chemicals, many of which are known human carcinogens, endocrine disruptors and neurotoxicants (Landrigan et al., 2023). Objectives should therefore promote sustainable plastic production and consumption practices and circular economy principles for plastics, alongside environmentally sound waste management.

2. Objectives and Principles: The potential of plastic pollution to exacerbate climate change, biodiversity loss and environmental pollution, along with its risks to human health and human rights, should inform the rigour and ambition of the goals and substance of the instrument.

The instrument's development, including its objectives (Part I/2) and principles (Part I/4), should be guided by the One Health[1] approach and related principles, which underscore the interconnection between human health with the environment. The overarching principle of "no harm for all living beings" should guide the development of the instrument, with a focus on actions geared towards protecting and restoring ecosystems. It is furthermore essential that the instrument's objectives and structure to safeguard human rights, particularly ensuring the right to health, the increasingly embedded right to a healthy environment, and the rights of children and indigenous communities worldwide (O'Meara, 2024). Environmental concerns, which encompass adverse impacts on human health and the ecosystem, should remain central, as it has been in past negotiations and implementation of previous Multilateral Environmental Agreements (MAEs) such as the Montreal Protocol and the Stockholm Convention (Aanesen et al., 2024).

Plastic pollution is acknowledged as a 'threat multiplier' (Ford et al., 2022), acting together with other stressors such as climate change, acidification, and biodiversity loss, thereby intensifying pressure on our planetary boundaries (Bachmann et al., 2023). Despite increasing scientific evidence indicating potential human health risks from exposure to both primary and recycled plastics throughout their life cycle, along with the wide range of chemicals they contain (Kozlov, 2024; Yan et al., 2022), this evidence is at risk of being disregarded in ongoing negotiations due to challenges from vested interests (Deeney et al., 2022). These challenges stem from the absence of large-scale epidemiological evidence linking microplastic and other plastic-related exposure to adverse health outcomes, as well as the lack of standardized international methods and difficulties to quantify these effects.

Amid rising concerns in the scientific community and governments regarding the human health risks posed by plastic pollution and exposure, uncertainties regarding such risks should not hinder ambitious action and the establishment of a robust regulatory instrument. Parties should adopt a hazard-based approach, seek scientific advice on the health impacts of plastic pollution and apply the precautionary principle while awaiting further research and the delivery of robust data. Addressing this issue necessitates implementing measures for monitoring, surveillance, and assessment within the instrument, along with coordinating efforts to develop standardized international methods

[1] WHO defines One Health as an 'integrated, unifying approach that aims to sustainably balance and optimize the health of people, animals and ecosystems'.

to assess exposure and risks and reduce uncertainties, thus enabling informed decision-making (EASAC, 2024).

PART II OF THE REVISED DRAFT

3. **Measures and Obligations: The instrument should mandate measures, including clear reduction targets and timelines, to reduce primary and other problematic plastic production, effectively ending plastic pollution while advancing human and environmental health, as well as climate and biodiversity objectives.**

The instrument should incorporate a mandate for measures to reduce and regulate primary (Part II/1) and other problematic plastic production, including production of polymers and chemicals of concern and problematic and avoidable plastic products. This is vital for reducing environmental degradation and pollution, along with harmful impacts on human health. Effective action requires setting global quantitative and time-bound goals**.** Scientific evidence and modelling underscore the urgent need to phase down current levels of plastic production and consumption, as the annual quantity produced exceeds sustainability thresholds and conflicts with objectives to end plastic pollution and achieve net-zero carbon emissions targets essential to keep warming below 1.5°C as per the Paris Agreement. A robust plastics instrument mandating substantial transformation of global plastic production is pivotal for climate action and reducing global GHG emissions. The contribution of the plastic life cycle to planetary greenhouse gas emissions is an ongoing area of scientific study and estimation, with the largest share estimated to be from production (GRID-Arendal, 2024; Karali et al., 2024). Plastic production presently accounts for 4.5% of global GHG emissions (Stegmann, 2022), with projections indicating a 60% increase in 2040 compared to 2020 levels (OECD, 2023). Phasing down current production levels can furthermore contribute to achieving certain 2030 targets of the 2022 Kunming-Montreal Global Biodiversity Framework (GBF), which aim to reduce threats to biodiversity and restore ecosystem functions and services. Moreover, it can bolster progress across various SDGs, including SDG2 by ensuring a safer and more sustainable food supply chain, SDG3 by mitigating health risks associated with plastics and promoting well-being, and SDG14 by reducing pollution sources and safeguarding marine biodiversity and habitats.

In Part II/2 and 3 of the proposed instrument, critical measures should focus on clarifying, reducing and phasing out polymers and chemicals of concern, and problematic and avoidable plastics, including single-use plastics and intentionally added microplastics, guided by science-based, globally agreed criteria. Measures may include banning certain single-use and short-lived plastics, currently accounting for 36% of the total plastic produced annually (Raubenheimer, 2024), and setting reduction and reuse targets for plastic packaging. Additionally, intentionally added micro- and nanoplastics in commercial products should be eliminated due to their harmful effects on ecosystems and human health (Jiang et al., 2020). Targeting plastics containing toxic chemicals such as polyvinyl chloride (PVC) and polystyrene (PS) is crucial, considering their widespread use and poor recyclability (Pereyra-Camacho and Pardo, 2024).

Identification of other problematic plastics and chemicals should be based on risk and potential exposure, especially for people living near processing and manufacturing plants incur significant health burdens (Owens and Conlon, 2021).

In addition, science-based approaches should be developed and deployed periodically to clarify problematic and avoidable plastics, as well as chemicals and polymers of concern, within the scope of the instrument. Clear definitions of these terms and plastic types are essential for effective implementation and enforcement of the instrument's provisions.

4. Criteria for Design and Evaluation of Safe and Sustainable Products and Substitutes: Incorporating science-based, globally agreed criteria to determine the safety and sustainability of plastic products and alternative solutions will be key for enabling a toxic-free circular plastics economy.

Numerous scientific studies underscore the chemical complexity of plastics, with recent findings revealing over 16,000 plastic chemicals (Wagner et al., 2024), including known human carcinogens such as acrylonitrile, perfluorinated and polyfluorinated substances, endocrine disruptors such as Bisphenol A, phthalates, neurotoxicants and persistent organic pollutants such as polybrominated diphenyl ethers. At least one-fourth of these chemicals pose risks to human health and the environment throughout their life cycle (Landrigan et al., 2023), undermining existing systems aimed at ensuring safe, toxic-free circular economy and environmentally sound waste management.

Thus, setting science-based, globally agreed criteria to assess the safety and sustainability of plastic products and alternative solutions is essential for creating the conditions for a toxic-free circular plastics economy. These criteria should inform all control measures and targets, including for regulating problematic and avoidable plastics, as well as polymers and chemicals of concern. The development of these criteria should involve independent scientific communities and consider the essential work of international scientific unions such as the International Union of Pure and Applied Chemistry (IUPAC) and the International Union of Toxicology (IUTOX) in developing global terminology and standards.

The instrument should include globally agreed, science-based criteria and standards for enabling sustainable and safe design of plastics (Part II/5a and Annex C/I). The instrument provides the opportunity to increase the safety, durability and reusability of plastic products, and establish standards for safer and better recyclability. This requires eliminating chemicals and polymers of concern, based on a set of criteria that consider their human and environmental health risks (Annex A/II). These criteria would also be useful in developing measures to address problematic and avoidable plastics. Grouping plastics according to their composition and environmental behaviour, alongside establishing global lists of polymers and chemicals of concern and of problematic and avoidable plastic products, can support coherent implementation. Additionally, design for reusability, can be based on existing Standards like PR3 2024 recommending a minimum of 10 reuse cycles for containers.

Science-based safety and sustainability criteria must apply to all alternative solutions and non-plastic products (Part II/5d), including bio-based, biodegradable and

compostable plastics. These considerations should be assessed across the product's entire life cycle, considering potential transformations such as the formation of micro- and nanoplastics through fragmentation and emissions released during production and recycling. This includes evaluating safety from product design, considering elements such as material choice and the sustainability of the manufacturing process. These considerations should be clearly outlined in the instrument with minimum requirements endorsed by all parties.

Furthermore, it is essential to define safety and sustainability parameters within the instrument. For instance, using bio-based materials for new bioplastic products does not automatically guarantee safety and sustainability. Recent scientific findings suggest that certain alternatives may incur higher environmental impacts during production and use due to their increased weight (Meng et al., 2024). Thus, while substitutes for plastics may alleviate sustainability concerns, they could also introduce new environmental risks such as higher environmental impacts (Tan et al., 2023) or increased land and water consumption (Brizga et al., 2020).

5. Transparency, Tracking, Monitoring and Labelling: Transparency and traceability throughout the plastic life cycle will be a critical element for an effective legally binding instrument, enabling its successful implementation at both global and national levels.

Transparency is essential for effectively managing risks to both human health and the environment throughout the product life cycle. Nevertheless, the current lack of transparency and insufficient information regarding the chemical composition of plastic products, coupled with inadequate labelling and a lack of traceability of materials across the life cycle, undermines the circular economy principles, hampers the evaluation of the risks and product safety, and has health implications. This lack of transparency can result in hazardous substances being inadvertently introduced into recycling streams during product recovery and recycling processes, thereby posing potential risks to health and the environment.

Therefore, it is imperative for the instrument to increase transparency in product composition, setting globally harmonized requirements for transparency and traceability of chemical information, along with labelling standards (Part II/13). Maintaining an updated record of newly introduced polymers and chemicals is crucial, ensuring safety and sustainability from production to disposal. Additionally, mandatory data sheets on all plastic products on the market detailing polymer properties and additives are necessary for enhanced transparency. Assessment frameworks should involve the scientific community to identify hazardous chemicals effectively.

In addition, developing harmonized and reliable methods for monitoring and tracking plastic waste and pollution at local, national and global levels, to ensure consistent and replicable data collection and to increase data coverage both spatially and temporally, is key. This could include establishing a global integrated monitoring system and monitoring guidelines to better identify and measure plastics leakage points and implement control measures to avert new accumulation in the environment. Proposed monitoring systems should be practical and effective across countries. Ensuring transparency is equally important for global plastics trade and for tracking illegal plastic waste shipments which is on the rise globally.

6. Just Transition: The instrument needs to contain effective measures to support a just transition to a plastic pollution-free future.

Effective global measures are urgently needed to counteract the ravaging effects of plastic pollution. Nevertheless, the global scale of the plastics market and of the informal labour force actively working with plastic wastes necessitates robust provisions to guide a just transition to a plastic pollution-free future. The socio-economic costs of plastic pollution already disproportionately affect marginalized communities in low-income countries, reflecting a significant disparity between those who benefit and those burdened (Karasik et al., 2023). While the transition to a circular economy for plastics can yield positive outcomes in terms of societal, health and environmental costs (Schröder, 2020), it necessitates a systemic transformation that should not disproportionately affect vulnerable populations reliant on the plastics value chain for their livelihoods (El Mekaoui et al., 2021). For instance, informal waste pickers and collectors, who play a crucial role in municipal waste collection, sorting and recycling in many low-income countries, are one of the key groups that may be at risk of being marginalized and seeing their livelihood endangered in the transition (IAWP, 2023) (Schröder, 2020), along with indigenous communities and other vulnerable communities.

Provisions ensuring a just transition (Part II/12) across the plastics value chain should be incorporated into the core measures of the instrument. These provisions should include a range of actions such as addressing potential employment implications in the petrochemical and plastics industry, facilitating the formalization of informal employment in sectors such as recycling and waste management, and building workers' capacity and developing new skills (Schröder, 2020). Additionally, they should entail establishing social protection schemes, providing financial assistance throughout the transition period, and implementing early retirement schemes. Equally, effective provisions aimed at supporting technical assistance, technology transfer and capacity building are crucial, along with a robust financial and technical support mechanism for effective implementation.

PARTS III-V OF THE REVISED DRAFT

7. Science Advice, Assessment, Subsidiary Body: Successful implementation of commitments to end plastic pollution hinges on sustained engagement of science and the establishment of a robust science-policy interface (SPI).

Scientific advancements and solutions are evolving in nature and must be considered if a global agreement is to effectively enable the development of robust solutions and informed strategies to tackle the plastic pollution crisis. A science-policy mechanism could ensure effective implementation of the global instrument - drawing on the most up-to-date and robust scientific evidence from all relevant disciplines across the natural and social sciences and engaging with communities and practitioners. Financial resources for the instrument should also support a strong science-policy interface and related science and technology needs.

The science-policy mechanism, presently recognized as a scientific, technical, and socio-economic body in the Revised draft text (Part V/2), should perform functions such as evaluating, synthesizing and serving as a repository for available scientific information and knowledge; facilitating knowledge generation on current and emerging issues; supporting policy advice, implementation and monitoring; and communicating useable knowledge and policy-relevant advice. The establishment of a scientific body should adhere to key principles such as independence and organizational autonomy, policy relevance, inclusivity and transdisciplinary, leveraging insights from a diverse range of disciplines and knowledge systems, including Indigenous knowledge. These functions should include the participation of relevant stakeholders in reviewing, testing and validating existing knowledge and solutions, supporting new research, and ensuring public outreach. Moreover, flexibility and adaptability are crucial characteristics for this mechanism to effectively respond to evolving scientific knowledge and emerging challenges posed by plastic pollution. This ensures its relevance and effectiveness in addressing the dynamic nature of plastic pollution and its associated impacts.

While the scientific body under the plastics instrument should closely collaborate with existing and emerging initiatives, such as the Basel, Rotterdam, and Stockholm Conventions, as well as the Science-Policy Panel on chemicals, waste, and pollution (SPP), to ensure coordination and avoid duplication, it is crucial not to overly rely on these entities or constrain the scientific body's scope. For instance, the Stockholm and Basel Conventions lack adequate scope to address the more than 16,000 plastic chemicals (Wagner et al., 2024), and plastic applications across the entire life cycle (Raubenheimer et al., 2018), while the SPP's broad mandate, encompassing the work of 25 bodies, may limit its capacity to tackle various scientific and technical needs (GRID-Arendal et al., 2023).

Developing an effective scientific mechanism requires engagement of SPI academics and practitioners, who can offer insights into operational challenges and draw lessons from existing mechanisms. For example, one potential model is represented by the Scientific Assessment Panel of the Montreal Protocol. Additionally, this agreement features other advisory bodies such as the Technology and Economic Assessment Panel, which serve as a mechanism bridging science, policy, and society.

The ISC stands ready to convene SPI experts once the instrument’s text is further refined at INC-4, to discuss key functions, effective governance arrangements, and potential models for consideration. Leveraging the vast knowledge and expertise within the ISC membership and affiliated bodies, along with recent analysis of SPI functions for the instrument, such as GRID-Arendal et al. (2023), would serve as valuable insights to inform the development of an effective science-policy mechanism to coordinate global scientific efforts in combating plastic pollution and fostering sustainable solutions.

8. **Global Cooperation and Financing: Solid international cooperation is vital in creating an enabling environment for the implementation of commitments, and should lead to a strong financial mechanism, particularly supporting implementation in low-income countries and SIDS.**

The transition to a circular plastics economy is expected to unlock new economic benefits and business opportunities, such as 700,000 new jobs and improved income for the informal labour force, along with reduced damage to human health and the environment avoiding USD 3.3 trillion of environmental and social costs between 2021 and 2040 (UNEP, 2023). However, the heavier burden and macroeconomic impacts will be placed on low-income countries and SIDS (OECD, 2023) due to limited waste management capacities, low levels of human resources, and heightened vulnerability to plastic pollution.

Enabling these nations to contribute effectively to the fight against global plastic pollution requires substantial investments totalling over 1 trillion USD over a 20-year period to improve and expand their waste management systems (OECD, 2023). Policy instruments grounded in the polluter-pays principle, such as Extended Producer Responsibility (EPR) schemes, have proven highly effective in reducing waste generation and enhancing resource efficiency. While some low-income countries have initiated EPR schemes, adoption in SIDS is still pending (Busch, 2023), highlighting the need for continued investment in infrastructure, capacity building, and enforcement mechanisms to ensure the effectiveness and sustainability of these initiatives. Additionally, investments will be required to support upstream measures to reduce avoidable and problematic plastics, including to implement reuse systems for packaging and products.

A strong financial mechanism (Part III/1) will be crucial to facilitate this transition, supporting innovation, capacity building, and technological transfer particularly in low-income countries and SIDS. Additionally, it should play a key role in improving data collection and monitoring, as well as supporting the scientific mechanisms under the instrument, along with transparent participation.

CONCLUSION

The urgent need for decisive, science-based action to combat plastic pollution cannot be overstated. The complexity of this global challenge requires a multifaceted approach rooted in multidisciplinary scientific evidence and bolstered international collaboration. The high-level commentary stresses that the effectiveness of the instrument hinges on the level of ambition of parties to embrace a comprehensive framework including measures across the entire plastic life cycle. Only a holistic approach encompassing the entire life cycle of plastics can effectively mitigate their multidimensional impacts and put an end to plastic pollution. Setting clear primary and other problematic plastic production reduction targets and timelines, combined with the promotion of circular economy principles based on globally agreed, science-based safety and sustainability criteria for both plastic products and alternative solutions, will be critical for achieving these goals. To ensure the instrument's successful implementation, globally harmonized requirements for transparency, traceability of chemical information, and labelling standards are essential.

These measures can facilitate the transition to a toxic-free circular economy. Furthermore, the development of reliable methods for monitoring and tracking plastic waste at all levels is crucial for preventing new accumulation in the environment. Additionally, establishing a robust financial mechanism particularly to support low-income countries and SIDS in their efforts to combat plastic pollution and fulfil their commitments is imperative.

The International Science Council stands ready to work with all parties. It is uniquely placed to convene extensive scientific knowledge and science-policy expertise, along with its regional networks and partnerships, in supporting the development of an effective instrument and a robust science-policy interface to curtail plastic pollution.

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