Reducing Plastic Production to Achieve Climate Goals

Key Considerations for the Plastics Treaty Negotiations

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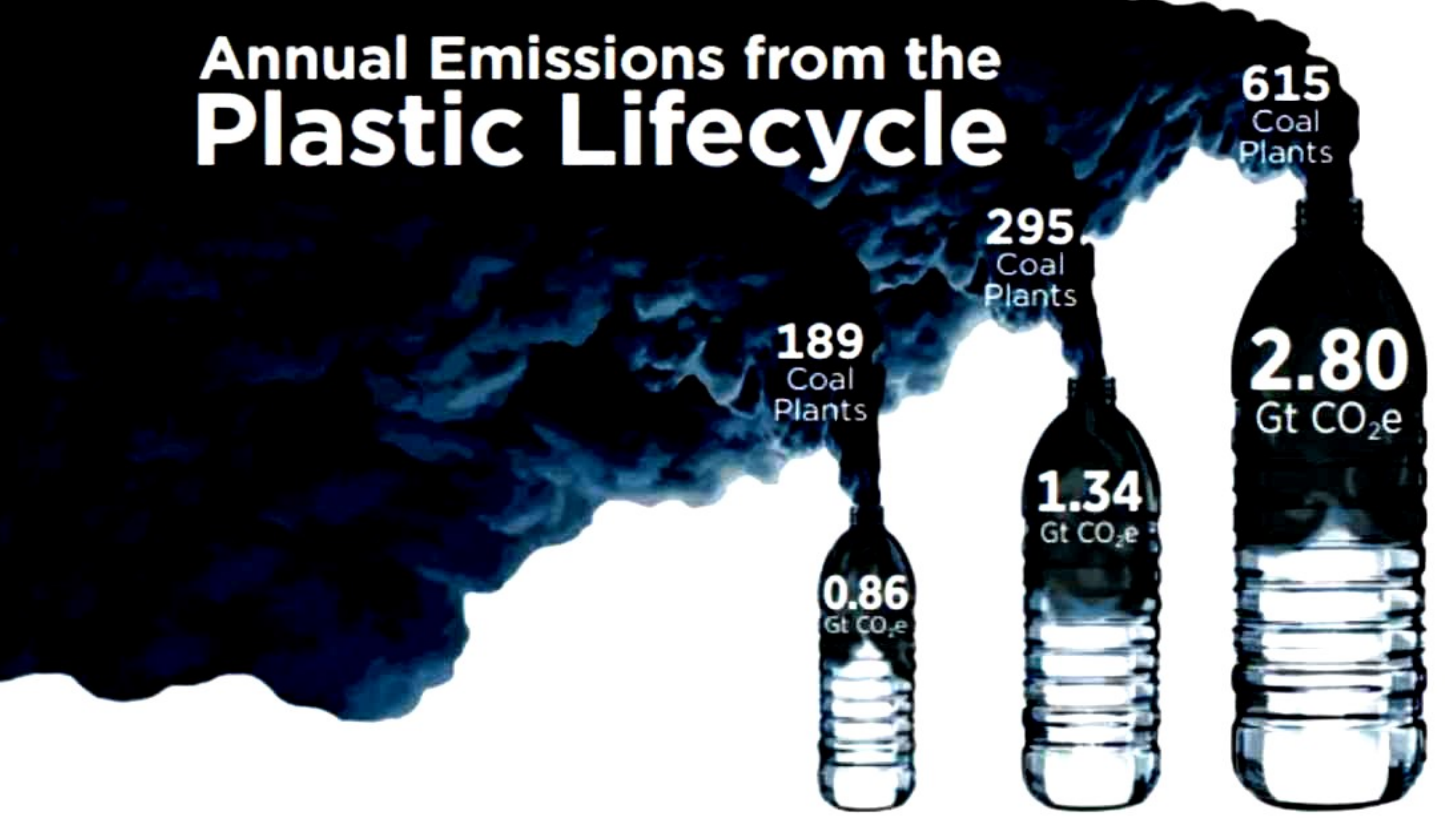


Introduction

Plastic production is currently on an upward trajectory and is projected to continue increasing exponentially. Global plastic polymer production doubled from 2000 to 2019, reaching 460 million tonnes (Mt) per year,[1] and it is anticipated to almost triple from 2019 levels by 2050.[2] This uncontrolled growth threatens the global climate, as well as human health, biodiversity, human rights, and environmental justice.

Greenhouse gas (GHG) emissions are released throughout the entire plastics lifecycle. Ninety nine percent (99%) of plastics are derived from fossil fuels, which are the primary driver of climate change and responsible for the overwhelming majority of planet-warming GHG emissions. As a July 2023 brief from the Scientists' Coalition for an Effective Plastics Treaty summarizes,[3] plastics already account for approximately 3% to 8% of current global GHG emissions.[4] This number is expected to increase significantly by 2050 if plans to exponentially increase production are realized, with plastics projected to consume 13% or more of Earth's remaining carbon budget to keep warming below 1.5°C.[5]

The world is already experiencing the devastating impacts of climate change, which will worsen with each fraction of a degree of warming. To minimize further temperature rise and avoid truly catastrophic climate change, GHG emissions must be reduced urgently anywhere that they can be effectively and rapidly cut. Scaling back plastic production represents one such area. The Paris Agreement, which makes no reference to fossil fuels or their petrochemical derivatives, does not ensure adequate action to address the climate impacts of plastics. It leaves the decision of where to curb emissions and by how much to States. Even if fully implemented, States' Nationally Determined Contributions (NDCs) under the Paris Agreement remain woefully inadequate to limit warming to 1.5°C.[6] The global plastics treaty thus must complement the efforts of this agreement to ensure a swift and effective reduction in emissions from plastics.

To effectively address the climate impacts of plastics, **the global plastics treaty needs to incorporate ambitious obligations that specifically target global plastic production.** Ninety percent (90%) of GHG emissions associated with plastics stem from the extraction of raw materials, including fossil fuels and bio-based feedstocks, and production processes, which encompass refining, steam cracking and gasification, and polymerization. Reducing emissions from plastics requires a significant reduction in plastic production.

Several Member States of the Intergovernmental Negotiating Committee (INC) to develop an international legally binding instrument on plastic pollution have already identified the need to tackle global plastic production to address the climate crisis. This brief aims to inform the ongoing plastics treaty negotiations by compiling the current evidence on how prevailing production trends are fundamentally incompatible with achieving planetary climate goals, and provides recommendations on how obligations to address plastic production could be incorporated in the treaty to support their achievement.

1. We must stop exponential growth in plastic production to have a chance of limiting warming to 1.5°C

Current growth trends for plastic production are incompatible with the Paris Agreement's goal of limiting global warming to 1.5°C. Studies and reports using the carbon budget framework demonstrate that the expected growth in plastic production in the coming decades would exceed any reasonable share of the remaining carbon budget, which represents the amount of GHGs that can be emitted while maintaining a chance of limiting warming to 1.5°C.

At a time when urgent action is needed to reduce global GHG emissions, plastics emit between 0.8 and 1.8 Gt of carbon dioxide equivalent (CO_2e)iv per year under recent production levels (460 Mt of plastic polymers per year in 2019).[8] This exceeds the current yearly emissions of 189 five-hundred-megawatt coal power plants, one of the most highly polluting industries. In some major-emitting countries, plastics are on a trajectory to exceed national emissions from coal in the next few years.[9] Moreover, these figures might be underestimating the full climate impacts of plastics, as they do not include, for example, the potentially significant impact of plastics on the carbon sequestration capacity of the ocean, which is the world's biggest carbon sink.[10] Current production levels are already compromising our chances to limit global warming to 1.5°C, and they also threaten human health, biodiversity, and human rights.

Despite these concerns, under business-as-usual scenarios, plastic production is projected to continue growing exponentially. The extraction of fossil fuel feedstocks and the production process of each additional tonne of plastic in the upcoming years will emit between 1.89 tonnes and 2.3 tonnes of CO_2e,v intensifying the climate crisis even further. Evidence suggests that this would lead to cumulative CO_2e emissions from the plastics sector reaching between 56 Gt and 129 Gt of CO_2e from 2020 to 2050.[12] This would represent between 10% and 32%, of the entire global carbon budget,[13] respectively. Under these projections, plastics would compromise our capacity to prevent the already observed and worsening impacts of climate change and will pose a significant challenge in keeping global temperature rise below 1.5°C.

Stopping the projected growth in plastic production is the first step towards reducing emissions from plastics and is essential to achieving climate targets. Multiple reports and peer-reviewed studies have emphasized this need,[14] which requires reversing the expected growth trends. This involves ensuring that global plastic production peaks and its growth stops before beginning to rapidly and significantly decline thereafter.

To stop this exponential growth, it will be imperative to halt the build-out of new plastic production facilities, particularly steam crackers and polymerization plants. Over the past few years, the plastics industry has made massive investments in new or expanded infrastructure for plastic production, including new steam crackers for production of plastic precursors (mostly ethylene monomers) and new polymerization plants.[15] Within the next five years (2023 to 2027), industry analysts project that more than 1,400 new petrochemical projects could begin operations, with the majority of these intended to produce plastic precursors or polymers [16] If built, this costly and long-term infrastructure[17] could lock-in increased plastic production for decades.[18]

Plastic production expansion will also lock-in new fossil fuel dependent infrastructure, undermining global efforts to urgently transition away from a fossil-based economy.[19] Once steam crackers and polymerization plants are built, their operations will use massive quantities of fossil fuels both as raw materials and as energy sources.[20] Due to the complexity of altering chemical processes post-construction, new and existing plants will continue to operate based on their original design, making it extremely difficult to decouple their functioning from fossil fuels.[21]

If expansion proceeds as planned, by 2028, the production of ethylene and propylene, the two most prominent plastic precursors, and the manufacture of plastic polymers is projected to create new sources of demand for fossil fuels in a context where such demand is expected to decrease for historic user sectors like energy and transport.[22] By 2030, the petrochemical industry will add to its existing natural gas consumption an amount equivalent to half of Canada's current total gas demand in 2018.[23] By 2050, projections estimate that plastic production and other petrochemical processes will account for half of global oil demand growth.[24] Efforts to increase production of coal-based plastics in some countries through coal-to-olefins processes would accelerate both the climate and plastics crisis.[25]

Although there is limited public data, evidence indicates that the expansion of plastic production infrastructure is subsidized by public financing.[26] This goes against the obligations of States under human rights and environmental law, including their responsibilities related to climate change. Subsidies support extraction of the main plastic feedstocks (oil and gas) in the form of government mediated loans or tax breaks.[27] Additionally, policies depress domestic prices for crude petroleum and natural gas,[28] reducing the price of fossil fuels used for feedstocks and energy, and making the production process artificially cheap. Consequently, subsidies increase the probability of, first, attaining returns on investments that would otherwise be unlikely, and second, generating apparent revenue growth in an artificially shortened period of time. Evidence also indicates that States subsidize the construction of steam crackers and polymerization plants through loans with beneficial interest rates via national development banks,[29] wealth fund investments,[30] preferential tax treatment,[31] and export credits,[32] among others. This flow of public finance into expanded plastic production also extends beyond borders, as national, bilateral, and multilateral development banks grant beneficial loans for the construction of these facilities overseas[33] to deliver on the global goals set by the Paris Agreement, phasing-out these subsidies is critical.

2. We need to rapidly phase down current levels of production to satisfy climate, human and environmental health, and human rights obligations

Stopping the planned growth in plastic production is the initial, crucial step, but it will not suffice to achieve the 1.5°C goal of the Paris Agreement. In a context in which evidence and research are still significantly limited, two models have suggested that plastic production must be reduced substantially from its present levels to align with climate requirements.[34] These two models are limited; their figures have not undergone a peer-reviewed process, and they only take into account partial climate considerations. To calculate the climate impacts of plastics, the two models only consider GHG emissions from extraction and production to end of life treatment ('disposal'). However, there are other fundamental ways in which plastics can affect the climate and contribute to warming past 1.5°C. Each tonne of plastic produced and put onto the market has the potential to affect the Earth's capacity to absorb GHG emissions. For example, an emerging but growing body of evidence suggests microplastics can potentially affect the carbon sequestration capacity of the ocean, which is the world's biggest carbon sink. Evidence suggests that microplastics can affect the ability of phytoplankton to absorb CO_2 through photosynthesis, and they can harm zooplankton, which transport phytoplankton and CO_2 to the deep ocean.[35]

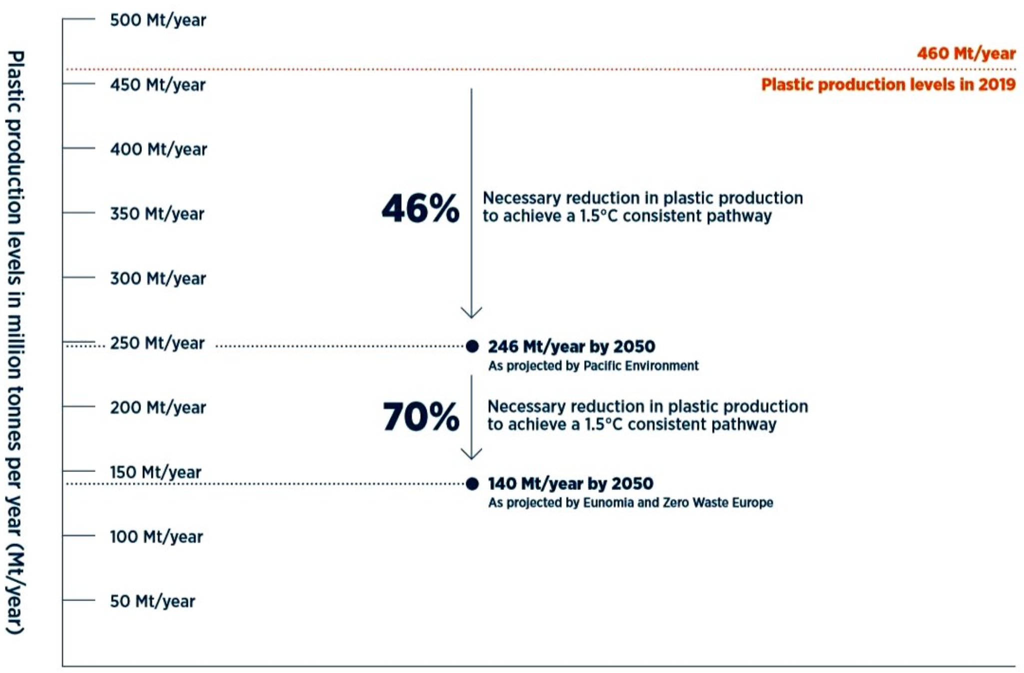
There are many perspectives to consider when addressing plastic production reduction, including: .other planetary boundaries (such as land system change, ocean acidification, novel entities, etc.), toxicity and human health, biodiversity loss, human rights and environmental justice, among others. To effectively address these aspects, the Scientists' Coalition for an Effective Plastics Treaty has recommended considering criteria of essentiality, safety, and sustainability in order to have a comprehensive and evidence-based approach when defining production phase down requirements.[36]

Even taking into account these limitations, one of the models, developed by Eunomia and Zero Waste Europe, suggests that for emissions from plastics to decline at a rate consistent with a 1.5°C pathway, plastic production should not surpass 140 Mt by 2050,[37] while the other model, developed by Pacific Environment, indicates that it should not exceed 246 Mt by the same year[38] Considering that in 2019, production reached 460 Mt per year, these numbers suggest that plastic production will need to be reduced by approximately 46% or as high as 70% from 2019 levels by 2050. Crucially, and as the report authors themselves note, the more cautious figure (46%) may be an underestimation because the model does not account for the climate impacts of super-polluting methane produced in the plastics lifecycle, and it relies on the deployment of technologies like green hydrogen feedstocks that remain unproven from technological, economic, and environmental perspectives. The more ambitious figure (70%) also depends, to some degree, on unproven and ineffective technologies, like carbon capture storage and use (CCUS). Therefore, both numbers should be interpreted as highly conservative.

The

Estimated reductions in plastic production by 2050 for a 1.5°C consistent pathway

Calculations considering limited climate factors indicate that plastic production should drop to 140 Mt or 246 Mt by 2050. These numbers suggest that production levels must decline by approximately 46% or as high as 70% from 2019 levels as a minimum.



Source: Data from reports by the Organisation for Economic Co-operation and Development (titled "Global Plastics Outlook"), Pacific Environment (titled "Stemming the Plastic-Climate Crisis"), and Eunomia and Zero Waste Europe (titled "Is Net Zero Enough for the Materials Production Sector?").

The variance between the estimated necessary reductions to stay within a 1.5°C compatible pathway may stem from differences in the assumptions and methodologies employed by the two models. Nevertheless, the disaggregated set of variables and data of the models, along with the limits of the methodologies, have not been entirely disclosed or included within the reports.

Even the most ambitious scenario, which considers only the climate factor and is based on a partial accounting of the climate impacts of plastics, **reflects only a minimum necessary reduction to effectively protect human and environmental health**. When taking into account other fundamental criteria including toxicity, human rights, biodiversity loss, and environmental justice, the necessary reductions will almost certainly be even greater.

Furthermore, a phasedown in production is also necessary **because it is not possible to fully decouple plastic production from GHG emissions**. Studies indicate that achieving the necessary GHG emissions reductions in the plastic production sector cannot be solely accomplished by electrification or by relying on problematic technologies with low potential and high risks (e.g., carbon capture and storage (CCS), and CCUS).[39] For instance, electrifying the production process in steam crackers and polymerization plants is technically challenging and offers limited potential for emissions cuts.[40] Instead, studies indicate that to effectively address the comprehensive climate impacts of plastic production, it is imperative to complement these measures with simultaneous reductions in both supply and demand.[41]

For similar reasons, merely substituting fossil-fuel feedstocks for a bio-based equivalent will also have limited climate benefits. The use and processing of bio-feedstocks may generate significant new GHG emissions from land disturbance, intensive agriculture, and transport, and therefore they may not outperform fossil-based plastics in terms of carbon intensity.[42] Moreover, substituting fossil-based for bio-based feedstocks in plastics production could contribute to greater production and use of fossil-based fertilizers and pesticides to grow bio-based feedstocks at an industrial scale.[43] This, in turn, could compromise any potential positive climate benefits gained from feedstock substitution.

3. Plastic production reduction obligations must be incorporated into the global plastics treaty

Current evidence demonstrates the urgent and undeniable need to dramatically reduce plastic production as an indispensable step in averting catastrophic climate change. Yet, addressing the climate crisis remains only one among many compelling reasons to reduce plastic production. Compelling evidence demonstrates that urgent reductions in plastic production are also needed to address the impacts of the plastic lifecycle on toxic pollution,[44] impacts on human health,[45] the negative interactions with other planetary boundaries,[46] plastics' many impacts on human rights,[47] and overall waste management capacity. While these aspects are not addressed in this brief, they are critical elements of the broader discussion, as included in the mandate to develop a global instrument to end plastic pollution adopted in the United Nations Environment Assembly (UNEA) Resolution 5/14,[48] and they should be considered when addressing holistic production reduction needs.

The following section explores how this reduction could be translated into specific provisions in the future plastics treaty, in particular to effectively ensure that this instrument is aligned with limiting global temperature rise to 1.5°C.

i. A global legally binding obligation to phase down the production of primary plastic polymers and precursors:[xi]

The obligation should require Parties to phase down the global levels of production of primary plastic polymers to an agreed target, with the long-term goal of completely eliminating the production of non-essential and/or unsafe plastics. To do this successfully requires addressing the entire production process, which includes the production of monomers and other chemicals used as precursors, and the polymerization process in which primary polymers are manufactured. The phasedown target should also lead to reductions in plastic precursors production, an integral component to the polymer production stage.

The phasedown target and specific schedules to meet it should be included in an Annex to the treaty, to allow regular review and updating from the governing body of the treaty. Since current information and evidence are limited, the treaty should include a mechanism to allow the future Conference of the Parties (COP) to amend and strengthen the Annex through an adjustment mechanism, with the aim of including the best scientific and evidence-based considerations on toxicity, human health, human rights, environmental justice, and planetary boundaries on the target and phasedown schedules. A reporting and transparency mechanism concerning the disclosure of disaggregated data on production and trade of polymers and precursors should be established to inform the development of the target and phasedown schedules included in the Annex and its further review.

The Annex in which the target is set should include the following elements:

a. A baseline: Parties are advised to establish a baseline, which will act as a reference point to inform the calculation of the production phasedown. This baseline can be expressed in terms of the production levels of primary plastic polymers manufactured in a specific year or a determined period of years (Mt per identified year or period of years). To define the baseline and critical phasedown requirements for precursors, it will be key to include requirements for the disclosure of disaggregated data by precursor through the reporting and transparency mechanisms mentioned above. Parties are advised to include an obligation that mandates the governing body of the treaty to define the baseline and phasedown requirements for precursors once such mechanisms are put in place.

The year or period should be based on past or present levels, rather than business-as-usual projections into the future. In all events, the production baseline should be established at a date no later than the adoption of the agreement text. This holds paramount importance for two key reasons. First, it helps prevent a rapid surge in production prior to initiating the phasedown schedules if a future baseline is selected. Second, it mitigates discrepancies arising from the numerous assumptions necessary for projecting a future baseline.

b. A freeze in the levels of production by a determined year: The initial stage of a phasedown should involve mandating Parties to freeze their production levels by a determined year, meaning that after that moment, their production levels (expressed in Mt per year) shall not increase. Previous multilateral environmental agreements present valuable precedents for how to establish a freeze in production levels, offering a possible reference. The Montreal Protocol establishes that the total production of specific substances depleting the ozone layer shall not exceed the calculated levels of production in 1986 (the year prior to that agreement's signing), with the exception that such levels may have increased by no more than ten percent of the baseline levels. Specifically, the Kigali Amendment to the protocol establishes a freeze on the production levels of hydrofluorocarbons (HFCs). The year in which the freeze takes place is differentiated for the specific groups of countries defined by Article 5 of the Protocol.

c. A phasedown schedule until reaching determined production levels: After selecting a specific year for the freeze, Parties should define a step-by-step plan for reducing production over time.[xiii] Each step will define a reduction percentage from baseline levels and a year by which to achieve it (e.g., by 2030, reduce production by 15% compared to the baseline). The reduction percentages defined for each step should become more ambitious over time (e.g., if a 15% reduction is established by 2030, the reduction percentage established by 2040 should be higher). These steps should be repeated until reaching production levels that align not only with climate requirements but also with other planetary boundaries (such as novel entities), while also considering toxicity, human rights, environmental justice, and human health. Once these production levels are attained, they should remain consistent over time, with the flexibility to adjust and be strengthened as new independent science is produced.

Current models propose that production levels must decline by between 46% and 70% from 2019 levels by 2050 to be consistent with the global emissions reductions needed under a 1.5°C pathway. However, these numbers should be interpreted as highly conservative, as they do not incorporate other crucial factors mentioned above. Thus, if used, even the most ambitious percentage must be read as a minimum reduction required, as it only considers certain climate factors among many more critical dimensions.

Even this higher percentage may not be sufficiently ambitious to curb plastics' myriad adverse impacts. Thus, other key considerations should inform reduction needs, and it is imperative that any figures included in the proposed Annex undergo a rigorous peer review and continuous strengthening processes led by independent scientists and experts.

The responsibility to reduce the production of primary plastic polymers and precursors should be accompanied by a financial mechanism that enables Parties to access the required resources and capacities to implement the phasedown schedules, including institutional strengthening and reporting and transparency mechanisms. This financial mechanism should include differentiated responsibilities in terms of contributions for possible donor and recipient countries. Additionally, the financial mechanism should enable a just transition for Parties to effectively implement the reduction needs.

The obligation to phase down production should not be approached from a nationally determined perspective. While States require the flexibility to adjust their internal regulations and policies to meet treaty obligations, the consideration of national circumstances should be embedded within the National Plans, that respond to global legally binding targets and obligations (for more information and suggestions on National Implementations Plans (NIPs) and National Action Plans (NAPs), please refer to CIEL's brief).[49]

Utilizing nationally determined targets as a framework for treaty obligations could jeopardize the efficacy of the treaty itself. The shortcomings of the Nationally Determined Contributions (NDC) model used in the Paris Agreement underscore this deficiency and risk.

ii. Provisions to halt the construction of new or expanded primary polymer and precursors production facilities and to immediately end public subsidies for plastic production:

Stopping the current massive buildout of steam crackers and polymerization plants is a necessary condition to ensure a freeze in production levels and its effective phasedown. The treaty should incorporate provisions for Parties to adopt legal and administrative measures into their national legislation to halt the increase in production capacity through the construction of new primary polymer and precursor production facilities, as well as through the expansion of existing ones. The treaty should also incorporate a global provision to end public subsidies for plastic production and its associated infrastructure.[xiv]

A ban on the growth of production capacity through new or expanded facilities will be key to achieve the objectives of the treaty and should be aligned with the freeze and phasedown requirements in production levels. The specific timelines and conditions for implementing this provision can be outlined in an Annex that can be reviewed and updated based on the best available science by the COPs. Crucially, the timeline when the ban takes effect should align with the established freeze dates included in the target for phasing-down production levels.

The inclusion of this provision is aligned with the 2022 recommendations of the UN Committee on the Elimination of Racial Discrimination. In their recommendations, the Committee mentioned the need to establish a moratorium "on the authorization of new heavy industry facilities and the expansion of existing ones, such as petrochemical plants."[50]

iii. A mechanism to allocate differentiated timelines per defined groups of countries:

In application of the principle of common but differentiated responsibilities (CBDR), Parties could establish differentiated timelines across groups of countries to fulfill the production freeze, the phasedown, and the halt in the construction of new and expanded production facilities. Previous multilateral environmental agreements have already implemented distinct timelines for developed and developing countries to fulfill specific obligations (for instance, the Kyoto Protocol and the Montreal Protocol). However, it is important to note that this differentiation has not always proven effective in achieving the objectives outlined in these agreements.

If Parties opt to implement a differentiated schedule for the production freeze, phasedown, and stop on new production capacity, they may consider complementary and additional criteria over time. For instance, they could contemplate factors like the distribution of production capacity in the established baseline years and the projected expansion in upcoming years. In addition, Parties should ensure coherence in any timelines and country groups established for these three matters.

iv. An obligation for plastic production and feedstock extraction to comply with requirements to protect human and environmental health and human rights:

The treaty should include provisions to guarantee that the production of plastic polymers, along with their feedstocks and precursors, adheres to defined criteria aimed at eliminating impacts on human rights, human health, and the environment. The adherence to these requirements should be put into place as early as possible, and it should endure even after the final reduction target is achieved. These criteria may be listed in an Annex, and they should include but not be limited to: rigorous assessments of human rights and environmental impacts, comprehensive due diligence plans with a specific focus on eliminating negative health and human rights impacts from plastic production on frontline communities and vulnerable populations; control measures designed to eradicate the environmental and health repercussions of feedstock extraction and precursor and polymer production; and stipulations ensuring that the utilization of bio-based feedstocks does not result in adverse effects on biodiversity, ecosystems, land, water usage, food security, Indigenous Peoples' rights, and the human rights of communities living near production sites.

v. A comprehensive set of measures that restrict the import and export of primary plastic polymers and its precursors between Parties and from Parties to non-Parties of the treaty:

Import and export restrictions (i.e., trade restrictions) are essential to ensure the coherence and efficiency of the future treaty. If the production of primary plastic polymers and their precursors is restricted or conditioned, Parties should also not be allowed to import or export such substances or should be subject to the application of equal conditionings. Thus, requiring the inclusion of (i) import and export restrictions, (ii) permit requirements, and (iii) declaration and monitoring obligations in the treaty is critical (see CIEL's brief on trade provisions in Multilateral Environmental Agreements).[51]

Additionally, to address the risks of free ridership, Parties should also consider adopting equal restrictions with regards to non-parties of the treaty. Non-party trade provisions set out how a Party should interact with 'non-party' States. These promote the ratification of the agreement and deal with the specific challenges presented by non-Parties. They do not confer rights or obligations to non-parties but oblige Parties to apply the same trade measures applicable between them with non-parties States. They are essential to prevent Parties from circumventing treaty obligations through import and export with non-parties, and incentivize non-parties to implement the treaty regime (see CIEL's brief on non-party trade provisions in Multilateral Environmental Agreements).[52]

Prima facie, trade measures are compatible with World Trade Organization (WTO) rules. WTO rules do not preclude or impede States from prohibiting, restricting, or conditioning trade within the context of the global plastics treaty (see CIEL's brief on WTO rules).[53]

Finally, to effectively include these obligations in the future treaty, the INC should develop a mandate for intersessional work focused on plastic production reduction. This work, among other topics, should focus on defining: baseline years and levels that inform the phasedown; production levels compatible not only with climate considerations but also with other planetary boundaries, as well as with human health, human rights, and environmental justice; timelines for a freeze; phasedown schedules; and reporting and transparency requirements concerning polymer production and trade, including its precursors.

The measures and provisions mentioned above will need to be considered within the broader framework of the plastics treaty as a whole and should be complemented with a strong compliance mechanism that ensures the effective attainment of the provisions proposed. For further information on trade, NIPs and NAPs, plastic production subsidies, and compliance with context of the plastic treaty, please see CIEL's webpage with more resources.[54]

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