Limits to Plastic Growth

Towards a global cap on primary plastics production

Bauer, Fredric; Holmberg, Karl; Olsen, Tara; Stripple, Johannes; Tilsted, Joachim Peter

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Limits to Plastic Growth: Towards a global cap on primary plastics production

FREDRIC BAUER, KARL HOLMBERG, TARA OLSEN, JOHANNES STRIPPLE, JOACHIM PETER TILSTED
LUND UNIVERSITY

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Executive Summary

KEY INSIGHTS

- Limiting the global production of primary plastics is necessary to curb greenhouse gas emissions as well as the environmental and health impacts of plastic pollution.
- A cap on primary plastic production is possible and has precedent in environmental and climate change law. One approach for implementing such a cap is through a cap-and-trade system, which involves the distribution of production allowances.
- Different approaches to allocating plastic production allowances vary in terms of their alignment with equity principles for distributive justice, either mitigating or reinforcing existing inequalities.
- The allocation and trade of allowances can facilitate redistribution and compensation between states. However, it is important to learn from past experience of cap-and-trade systems and be aware of potential shortcomings.

Since the mid-twentieth century, the world has seen a rapid growth in the production and consumption of plastics. This surge has led to large emissions of greenhouse gases and the proliferation of plastic pollution, with severe consequences for ecosystems around the world. A global cap on the production of primary plastics is needed to prevent further escalation of environmental pollution and greenhouse gas emissions. Such production restrictions could be implemented in different ways, either by bans, national commitments, or gradual phase-out, following precedent from previous multilateral environmental agreements restricting the production and use of environmentally harmful materials and substances. We suggest that a gradual phase-down of the primary production of commodity plastic polymers is a way forward to address overall plastic pollution. A phase-down could be implemented through a system of globally capped tradeable primary commodity plastic production allowances. The allocation of these allowances could be distributed in different ways, but it is imperative to align with principles for distributive justice when agreeing for the distribution mechanism.

This proposal acknowledges that capping primary plastic production will not solve plastic pollution on its own. It must be complemented by a portfolio of other policies and measures. These could range from initiatives aiming to phase out particularly problematic plastics, chemicals, and plastic products, to investments further downstream in the value chain to improve circularity. But putting a fair, internationally agreed cap on the primary production of commodity plastics will be an essential part of an effective, comprehensive strategy to address the plastic crisis.

While there are different options for determining what the cap on global plastic production should be, we proceed from the legal architecture that the global community of states has already agreed upon. There is strong precedent in international environmental law for an agreement to impose a cap on the production of specific products and substances known to cause significant negative environmental impacts. We find that international climate change law is the most suitable legal framework for defining a cap for primary plastics production, for three reasons. First, climate change law is a global agreement among countries to reach net zero emissions by 2050. Second, climate change law rests on an authoritative, now-well-established knowledge base about the drivers of climate change. Third, there is a direct connection between primary plastic production and greenhouse gas emissions. It follows that, in the transition to a net zero society, carbon emissions from the plastic sector need to be reduced to zero.

Assuming an intergovernmental consensus on the need to limit the global production of primary plastics, there are many questions to be resolved in terms of the design and implementation of a cap. Central questions for the design of an effective plastic cap system would be: (1) how to allocate production allowances under the cap; (2) how to manage reporting, monitoring, and verification of primary plastic production globally; (3) how to implement compliance mechanisms for producers; and (4) whether to allow for trade and in what sense, including how to establish an effective platform for the exchange of plastic production allowances. If phase-down commitments are implemented through a cap-and-trade system, it is critical to consider lessons learned from existing examples of cap-and-trade systems for greenhouse gas emissions.

We propose a global cap on primary production of commodity plastic polymers that distributes the right to produce between countries. This right could be operationalised by allocating "primary plastic production allowances" to the signatories of the global plastics treaty. Firms involved in the production or manufacture of plastics would need to acquire allowances, which effectively creates a "producer pays" system, distributing the proceeds amongst the parties to the treaty.

Our analysis identifies different approaches to allocating primary production allowances, each with their own assumptions and implications. An approach based on "past share" of production would largely conserve the existing inequality in patterns of primary plastics production. On the other hand, designing the new system with reference to the principle of "common but differentiated responsibilities and respective capabilities" would ensure adherence to the prime principle for distributive justice enshrined in international climate and environmental law. The allocation of production allowances could also be based on principles of "equal share" or "fair share" that align with different frameworks for burden sharing. It follows that arriving at a fair and workable plastic production cap will require nuanced consideration of distributive justice, extending beyond the issue of global phase-down.

Photo: Jan Dijkstra

Endorsements

"The case for the value and necessity of a global cap on the production of primary plastics is utterly convincing. Those seeking to rein in escalating plastic pollution will gain many insights from this astute, bold analysis."

– Peter Dauvergne, Professor of International Relations, University of British Columbia

"The triple planetary crisis demands that we pursue integrated solutions to the problems of plastic pollution and climate change. This timely new report sets out a convincing case of how negotiators of the new plastics treaty can effectively and fairly limit primary plastics production so as to support the achievement of the goals of the Paris Agreement."

– Harro van Asselt, professor of climate law, University of Cambridgea

"This report provides an important contribution to discussions underway on the need to reduce primary plastic production globally. Placing a cap on production is complex and this report provides clarity on options for such a mechanism. There is also broad support for ensuring the new plastics instrument is just and equitable, which the approach presented here would help achieve."

– Karen Raubenheimer, Senior Lecturer, University of Wollongong

1. The case for a limit on primary plastic production

Since modern plastics reached mass markets in the middle of the 20th century, their production and consumption have continued to grow rapidly. And although the very high growth rates of the 1960s and 1970s have diminished, the growth of plastics has remained higher than economic growth. In the past 30 years alone, global use has quadrupled. Growth has occurred across applications—from vehicles, which today comprise many different plastics in both exterior and interior elements; to textiles, of which a majority are now produced from synthetic (plastic) fibres; to packaging for all kinds of goods, including food, which are traded in the global economy. While this growth has recently mainly been driven by consumption in emerging economies, annual per capita consumption in regions such as Sub-Saharan Africa (~16kg/cap) and India (~22kg/cap) remains a fraction of the high consumption levels of Western Europe (~153kg/cap) and the US (~255kg/cap) (OECD, 2022a). If global plastic use converges to the level observed across high-income countries, plastic production would need to expand massively. On this basis, several reports project that business-as-usual (BAU) scenarios would entail that plastics production would more than double by 2050 (OECD, 2022a; The Pew Charitable Trusts and Systemiq, 2020). In such a scenario, Borelle et al. (2020) estimate that GHG emissions from production would double, and the same would be true of the rates of yearly plastic leakage into the environment.

With the increasing production of plastics, their use in various applications, and the disposal of plastic waste, a large number of negative environmental impacts associated with plastics have become obvious. Early reports of plastics polluting marine environments were published already in the 1970s (Carpenter et al., 1972; Colton et al., 1974) and this has since become a focal point for calls to mitigate plastic pollution. All stages of the value chain and lifecycle of plastics have since been identified as associated with many forms of pollution and negative environmental and health-related impacts. These include the large emissions of greenhouse gases, air pollutants, and pellets (Cabernard et al., 2021; Karlsson et al., 2018; Zheng and Suh, 2019); the toxic chemicals migrating from plastics during their use and disposal (Hahladakis et al., 2018); the large share of untested plastic-related chemicals; and the threat that the proliferation of plastics and other novel entities presents to ecosystems and ecosystem services (Persson et al., 2022). On this basis, plastics and chemical production are said to be at the centre of the triple planetary crises of pollution, climate, and biodiversity loss, requiring immediate and comprehensive action in an integrated transformation approach (Almroth et al., 2022; Tickner et al., 2021). Policy initiatives aiming to mitigate this plastic crisis have so far been fragmented and focused on plastic waste and its mismanagement instead of addressing the full lifecycle of plastics (Nielsen et al., 2020).

An increase in production in line with BAU projections of primary plastics and plastic products will not only worsen the multi-faceted environmental, climate, and toxic impacts from production but also lead to growing pressure on all downstream stages of the value chain. For each measure and intervention, growth in plastic production makes it more difficult to handle. This holds true regardless of the importance of improving waste collection, sorting, and treatment, as well as across pathways for climate change mitigation. For example, Lau et al. (2020) found that implementing all feasible downstream (post-consumption, such as collection and recycling) measures will offset BAU growth but not markedly reduce yearly plastic pollution from current levels. Minimising primary plastic production and use is therefore complementary to improved and increased recycling capacity.

Many analyses aiming to identify effective options for preventing plastic pollution point toward the reduction of primary plastics production as an essential and necessary contribution (Baztan et al., 2024; Lau et al., 2020; Meng et al., 2023; Systemiq, 2023) or, at the very least, the significant restriction of the growth of plastics production (OECD, 2022b). The early value chain stages of primary plastic production is extremely energy intensive and dependent on fossil fuel both as feedstock and as an energy carrier, which must be changed to reduce the climate impact of primary production (Posen et al., 2017; Zheng and Suh, 2019). There are thus strong synergies between actions and interventions for mitigating climate change and reducing plastic pollution (GRID-Arendal, 2024). Notwithstanding the climate burden from incineration, recycling, degradation, and other aspects of the impact pathway of plastics, the greenhouse gas (GHG) emissions from primary plastic production alone is equivalent to 3.5% to 5.3% of global GHG emissions (Cabernard et al., 2021; Karali et al., 2024). Restricting and reducing production is therefore identified as one of the central measures that synergistically contributes to reducing both GHG emissions and plastic pollution (OECD, 2023). With limited production, mitigation requires less energy, less

alternative feedstocks, and has a lower risk of environmental problem shifting (Meng et al., 2023). At the same time, reducing production increases the value of plastics, encouraging circularity and disincentivising wasteful use. In short, restricting production of primary plastics is associated with a range of positive effects that will help address the triple planetary crisis.

Given the dynamics along the whole value chain that are locked into a market model of producing and using cheap fossil-based primary plastics (Bauer et al., 2022b), managed reduction of production requires international agreement and collaboration. Identifying an effective and equitable way to ensure that primary plastics production does not exceed sustainable levels has therefore been recognised as a central objective for an international agreement aiming to eliminate plastic pollution (Bergmann et al., 2022; Simon et al., 2021). The UNEA resolution 5/14 End plastic pollution: Towards an international legally binding instrument (UNEA, 2022) which initiated the ongoing negotiations for a new treaty, emphasises the need for a "comprehensive approach that addresses the full lifecycle of plastic". With this strong mandate, a globally agreed-upon restriction on primary plastic production is now within the realm of the possible.

In this report, we explore the possibility of operationalising a global limit to primary production of commodity plastics in a way that aligns with existing commitments to mitigate the worst effects of climate change, which—similar to plastic pollution—disproportionately affect poor countries with limited plastic production and consumption as well as overall GHG emissions. We review models for phasing out environmentally harmful materials and substances in earlier multilateral environmental agreements, and propose a cap-and-trade (CAT) scheme for primary plastic production allowances with allocation of these allowances to the countries that are parties to the treaty. The approach suggested in this report builds on previous international experiences of restricting production and opens the discussion on burden sharing in the context of a global plastics cap. Importantly, this suggestion is complementary to, but in no way a stand-in for, other interventions to end plastic pollution and reduce negative environmental and health impacts along the lifecycle. This is because a wide range of measures— including economic, regulatory, and soft types of interventions—are needed to drive an effective shift towards tackling plastic pollution throughout plastic value chains and lifecycles. Nevertheless, a cap would be a central intervention in the mix of measures comprising a global agreement in order to effectively address the full lifecycle of plastics and its contribution to plastic pollution.

The report is structured as follows. First, we map the support among UN member states for a global agreement to include measures addressing primary plastic production, showing that there is broad support for such measures, including the possibility of a cap. We then present the opportunity and precedent for capping as an intervention in international environmental and climate change law, referencing the Montreal Protocol and various CAT systems for GHG emissions. The fourth chapter presents an approach for defining the cap for future primary plastic production, using international climate targets as a boundary framework. Following this, we outline and discuss different approaches for distributing the right to primary plastics production. To do this, we go through the elements of a CAT system, mapping out possible allocation principles and discussing them in the context of primary plastics production. Finally, we discuss some of the remaining issues that need to be resolved for the effective implementation of a CAT system, including matters relating to transparency, trust, and trade.

> *"Parties shall set a global target to keep the production and consumption of plastic polymers at sustainable levels."*
>
> – Colombia, pre-INC 2 submission

Photo: Pixabay

2. Support for measures addressing plastic production among UN member states

Since the adoption of the UNEA resolution 5/14, the Intergovernmental Negotiating Committee (INC) has convened for four sessions. Ahead of the second (INC-2) and third sessions (INC-3), member states were asked for pre-session submissions to gain an overview of state positions on potential options and measures in order to create a Zero Draft text, which was used as the basis for negotiations at INC-3. There were 68 submissions ahead of INC-2, counting both individual state submissions and coalition submissions, and another 64 submissions for INC-3. During INC-3 and INC-4, member states could also make in-session submissions summarising their views on specific provisions within the Zero Draft. By the end of INC-3, 33 in-session submissions were made regarding Part II.1 of the Zero Draft, which concerns primary plastic polymers and outlines three different options for potentially reducing or restricting their production and supply. By the end of INC-4, there were 15 in-session submissions relating to Part II.1 of the revised Zero Draft. Additionally, 33 countries signed a declaration named "Bridge to Busan" which outlines that signatories "agree to a global objective regarding the sustainable production of primary plastic polymers. This may include production freezes at specified levels, production reductions against agreed baselines, or other agreed constraints to prevent the unsustainable production of primary plastic polymers." We collected and analysed all relevant submissions from 165 United Nations member states and 3 non-full members (Cook Islands, Niue, and Palestine). For an extensive review of the member state submissions throughout the plastics value chain, please see Dreyer et al. (2024).

The analysis identified four categories of responses to capping or otherwise restricting primary plastic production: those in favour overall of a production reduction, in one way or another (dark green); those in favour of reduction of a specific type of plastic, e.g. single-use plastics (green); those stating support for a more 'sustainable production' (light green); and those stating their opposition against measures that could reduce production (pink). Countries for which there are no data are grey. Figure 1 provides an overview of the support for addressing primary plastic production in the treaty.

Overall, 117 states have indicated through their submissions that the new UN Plastics Treaty should in some form include a provision on the reduction of plastic production (dark green in Figure 1). Many of the suggestions made by the states come in the form of general statements, such as "restricting and reducing the overall production and use of plastics" (Cambodia, INC-2). A few states specifically mention the need for a CAT system, or similar. Ghana proposed a "global plastic pollution fee (GPPF)" within its INC-2 pre-session submission, which would work as a price-based measure to incentivise the reduction of plastic production and consumption (Ghana, INC-2). Ecuador has also mentioned being in favour of "any provisions that seek to reduce the supply of plastics (e.g. volume targets/caps) and/or to reduce demand (e.g. global/fee or tax)" (Ecuador, INC-2). During the INC-3 in-session submissions, Cameroon and the African Group submissions specified the need to implement measures relating to the production of primary plastic polymers on

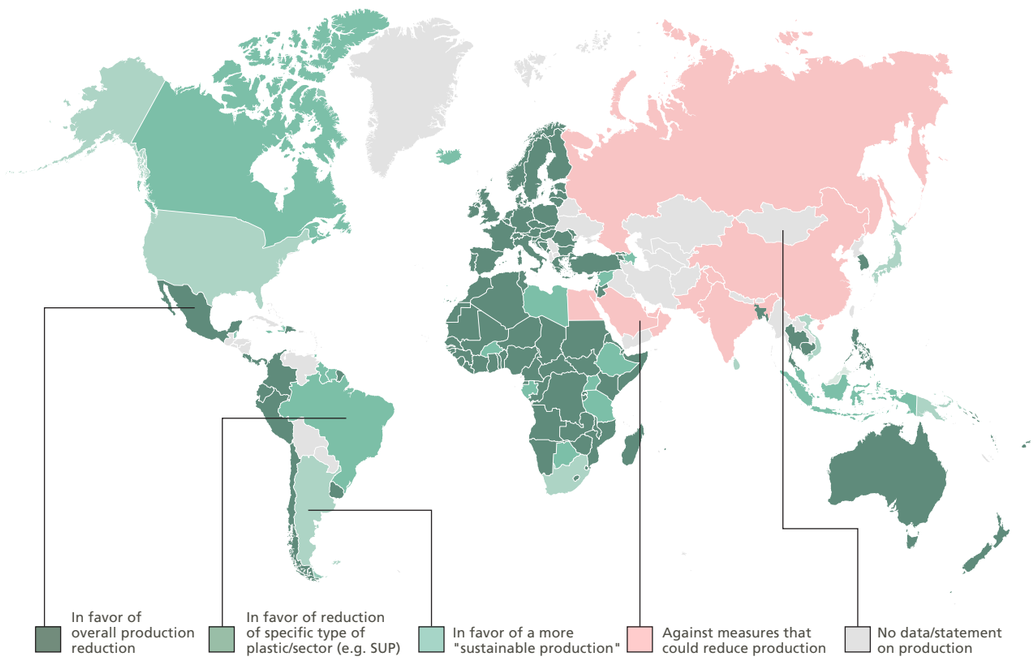

Figure 1. Support for regulation of plastic production. Based on member state submission ahead of INC-2, INC-3, and in-session INC-3 submissions. Note: Dark green indicates support for a provision on the reduction of plastic production, green for reducing specific types of plastic, light green for more 'sustainable' production, and blue indications opposition to measures that could reduce production.

the basis of common but differentiated responsibilities (CBDR) (Cameroon, INC-3 in-session; The African Group, INC-3 in-session).

Next, there were 26 states that indicated a support for reducing specific types of plastics (green in Figure 1). Here, states mainly refer to being in favour of restricting, banning, or phasing out specific types of plastics; namely single-use plastics, unnecessary or problematic plastics, or toxic plastics. Nine states expressed their support for more 'sustainable production' (light green in Figure 1). Since the term 'sustainable production' has not been defined so far within the treaty negotiations process, it is hard to understand how states perceive it. For example, Papua New Guinea states that "the core obligations and control measures of the plastics instrument will be centred around sustainable production and consumption" (Papua New Guinea, INC-2). Many of the other submissions refer to circularity, and that restrictions can only be viable once a suitable alternative or substitute has been found. South Africa and Sri Lanka explicitly refer to the UN Sustainable Development Goal 12 on ensuring sustainable consumption and production and its relationship to plastics. Lastly, the United States mainly proposes voluntary measures throughout its submissions, making it clear that they do not support the implementation of strong upstream measures, but on the other hand they are not in favour of fully excluding them from the treaty.

Lastly, 16 states explicitly reject measures that could lead to the forced reduction of production of primary plastic polymers (pink in Figure 1). These states are Bahrain, China, Cuba, Egypt, India, Iran, Kazakhstan, Kuwait, Malaysia, Oman, Pakistan, Qatar, the Russian Federation, Saudi Arabia, United Arab Emirates, and Viet Nam.

To conclude, there is a large support for measures that reduce or restrict overall production of plastics, with nearly 2/3 of UN member states stipulating a support of such measures. This support has been highlighted as one of the key requirements for the treaty to be effective, as emphasised by the global independent Scientists' Coalition for an Effective Plastics Treaty, and is a demand of civil society organisations and business leaders (Break Free From Plastic, n.d.; Business Coalition for a Global Plastics Treaty, 2022).

3. Models for limiting primary plastic production

3.1 PRECEDENT IN EARLIER MULTILATERAL ENVIRONMENTAL AGREEMENTS

In general, three different approaches to limiting the production and use of environmentally harmful substances to reach internationally agreed upon targets have precedent in international environmental law, namely i) elimination and restriction, ii) phase-down, and iii) voluntary contributions. As an example of the first approach, the Stockholm Convention on Persistent Organic Pollutants aims to protect human health and the environment from persistent organic pollutants (POPs) by eliminating the production and use of most POPs listed by the convention and significantly restricting the production and use of a few others for which suitable substitutes have been difficult to identify. Annexes to the convention identifies the compounds identified as POPs to be covered by the convention and the very few exceptions that allows for their use, and so only if proper notification has been announced beforehand. The access to these exceptions is also progressively phased out aiming to reach full elimination of the production and use of listed POPs. This approach is effective as the convention covers a limited number of chemical compounds that can be identified and tracked through the global economy as their use is most often limited to highly specialised applications. While commodity plastic polymers are limited in number, they are notoriously difficult to track as they are used in uncountable applications in the economy. A full elimination of primary plastic polymer production is not within the mandate of the resolution initiating the negotiations for the global plastics treaty, although it may fully phase out particular polymers and chemicals of concern. Therefore, we argue that the Stockholm convention is unsuitable as a model for limiting primary plastic polymer production.

Exemplary of the second approach, the Montreal Protocol on Substances That Deplete the Ozone Layer aims to protect the global ozone layer by gradually phasing out the production and use of man-made chemicals that deplete it. It has been described as the single most successful international environmental agreement (Gonzalez et al., 2015) and is therefore a strong precedent for an international treaty aiming to limit the production and use of specific products identified as having significant negative impacts on the environment. However, the products regulated by the Montreal protocol (and products later added to it through amendments) were all chemicals relevant for specific applications in which they could be substituted with alternatives. In contrast, plastics today are ubiquitous in society in a way that complicates simple substitution. Moreover, a recent report found that over 16000 chemicals can be found within plastics and its related products, with varying harm caused to the environment and humans, making it extremely complex to regulate (Wagner et al., 2024). Replacing all fossil-based plastics with alternative materials one to one is not sustainable, and introduces other problems for human and environmental health (Carney Almroth et al., 2023; Gündoğdu et al., 2022). Further, following a Montreal protocol-style phase-down of existing production would lock in all profits from future primary plastic production to the few countries and companies that have already invested in such primary production facilities, which would be a great injustice given that the consequences of pollution are also borne by others. Thus, there are good reasons to not simply copy the approach of the Montreal protocol (Kirk, 2020). Still, there are important elements of the Montreal protocol that should serve as inspiration, such as the "start and strengthen" approach that has enabled it to become increasingly powerful over time.

Finally, the Paris agreement between the parties of the UN Framework Convention on Climate Change defines an outcome target for global warming and obliges the parties to report their plans for how they will contribute to reaching the target. Thus, while submitting the nationally determined contributions is mandatory, the agreement builds on voluntary contributions defined by each country based on their respective capabilities. The lack of international coordination as well as different ambitions, capabilities to engage in climate change mitigation, and domestic factors lead to a high risk of the nationally determined contributions not actually not aligning with the target of the agreement (Peterson et al., 2023). The global value chains of plastics and the diffuse nature of sources of plastic pollution makes international coordination and coherence an imperative for the plastics treaty and thus the Paris agreement with its voluntary contributions is not a suitable model.

To conclude, it is clear that there is precedent for limiting the production of products and materials that have significant, negative environmental effects. As both the Stockholm Convention and Montreal Protocol aim for the elimination of production, these are likely better suited as models for phasing out specific plastics and chemicals of concern than limiting global primary plastic production. Moreover, the voluntary nature of the contributions under the Paris Agreement means that it is not a suitable model for the ambition of the plastic treaty either. Instead, we propose

Photo: Gaz_Chapp, Pixabay

that restricting primary plastic polymer production could be done by agreeing on a binding global cap on production, which could be changed over time as more knowledge is developed—drawing on the dynamic approach of the Montreal Protocol.

However, we suggest that the right to produce primary plastics should not be bestowed on the basis of existing production, as would be the case if all producers were subject to a generalised phase-out rate, and emphasise the need to reflect on issues of distributive justice. To not simply allow the largest producers the largest share of the future profits from plastic production and grant the biggest polluters the right to pollute in the future, the right to produce primary plastics under a cap should be distributed differently. To not incentivize new investments in production capacity in all countries, the allowances should be tradeable. In this way, small and low-income countries that do not have primary plastic production facilities would still receive parts of the revenue from primary plastic production. This proposal can, if designed right, carry a redistributive element through its trade system.

3.2 CAPPING INTERNATIONAL PRODUCTION

Caps can be implemented in different ways, and in the past few decades policy interventions, including CAT systems, have emerged as a response to the need to address different types of environmental pollution – e.g. emissions to air and water. The concept originally emerged in the US in the 1960s and 70s as a market-based strategy for policy intervention to reduce emissions of sulphur from power plants, where the US Acid Rain Program (1990) was one of the first large-scale CAT systems implemented in the world, but the approach has since spread to many countries and regions in the world (Schmalensee and Stavins, 2017). In CAT policies, the system limits (i.e. puts a cap on) the total volume that is allowed to be produced of a particular pollutant. This total volume is divided into production allowances of incremental units, e.g. one ton, which are allocated (for free or through auctioning) to the actors that contribute to the pollution. Those actors who do not need the allowances allocated to them can then trade their excess allowances to those who exceeds their caps. As a pollution control mechanism, the system ideally ensures that the overall volume of pollution identified as acceptable is not exceeded and that the reduction of pollution is conducted in a flexible, cost-effective, and market-driven manner (Ellerman et al., 2000).

Since the 1990s, CAT policies have become one of the leading approaches to abate GHG emissions, particularly CO2 emissions. On the international level, the Kyoto Protocol under the UNFCCC included an emission trading system based on CAT in article 17. The article allows countries that have emission units to spare to sell this excess capacity to countries that are over their allocation. The EU launched its Emission Trading System (EU ETS) in 2005, which sets a cap on GHG emissions from power generation and industry and allows entities to trade emission allowances. Since then, many other countries and regions have followed and there are now 36 CAT policies implemented around the world, covering almost 18% of global GHG emissions (The World Bank, 2023).

It is important to acknowledge that many of these CAT policies have not only been successful. Problems have over time become apparent around aspects such as instruments for offsetting emissions, free-riding, overallocation, and the additionality or equivalence of overlapping CAT policies (Flachsland et al., 2009; McAllister, 2009; Weitzman, 2019). The shortfalls of the aim of reducing environmentally harmful substances is not unique to CAT policies, but CAT policies present some unique challenges. In the case of CAT policies it is not the allowances and the following trading of the same allowances that lead to a reduction. Rather it is the cap and its definition that to large degree creates the conditions for the CAT policy. The allowances and their trade, on the other hand, provide the distributive mechanism. The cap in CAT scheme for primary plastic production should be a hard limit that does not include mechanisms for offsetting or generating production credits from other activities such as plastic recycling as such mechanisms risk interfering with the integrity and ambition of the cap. There are many other context-specific questions to consider when implementing a CAT policy and a few central issues that therefore must be resolved. We foresee that the following five issues are central in moving towards a CAT policy for primary plastics.

1. **Defining a cap:** The cap must be defined by some authority to limit the total amount of plastic production allowed. For an international or even global cap, this cap would have to be agreed upon multilaterally as part of the agreement to end plastic pollution, or in a subsequent process defined in the agreement. Key issues to agree upon for such a cap are the scope (i.e. which types of primary plastics would be covered by the cap and the timeframe for updating it (e.g. every single, third, or fifth year.)).

2. **Allocating allowances:** : Once the production cap is defined and established, the production allowances under this cap can be distributed in a number of different ways; e.g. they can be auctioned off or handed out directly. The recipients would be countries that are parties to the agreement, and these allocated allowances would then have to be acquired by the companies and organisations producing primary plastics.

3. **Monitoring, reporting, and verification:** A central aspect of all interventions aiming to restrict specific activities is transparency through effective monitoring, reporting and verification system by all relevant actors. The producers of primary plastics would therefore need to strictly monitor their production and report it to the authority managing the CAT system. This would be a crucial difference from the current situation, as primary plastic production today is not reported consistently anywhere internationally and is thus probably the t necessary step in the staged process outlined in the agreement.

4. **Compliance:** Producers of primary plastics will need to demonstrate to the body managing the system that they hold production allowances equal to their reported production for each cycle, which could be annual or otherwise defined. If the allowances they received or acquired initially were insufficient to cover their production, they would have to purchase allowances from a business, organisation, or country that has leftover allowances to sell. Penalties for non-compliance would also have to be agreed upon as part of the CAT system; e.g. in the form of a significant fee or custom.

5. **Platform:** For a capping system that allows for trade of allowances, the design, implementation, and operation of a platform for secondary trade of allowances is a central component. The platform needs to be trusted by the actors included in the intervention and liquid enough to be effective.

This short report primarily addresses the first two aspects regarding defining the cap and allocating production allowances, whereas it only touches upon the three latter aspects regarding transparency, trust, and trade. Taking the whole lifecycle approach seriously means production must also be addressed, and questions about justice between and within regions and countries are of key importance to enable an effective instrument in the first place. The two aspects which we delve into in more depth in this report are only the starting point. A prerequisite to addressing production in the first place will be increased transparency around plastic and chemical production. Schemes surrounding verification and compliance and a trusted auctioning platform would also be required for a CAT system to come into effect. A cap on production could be an important step to address the one of the main issues associated with plastics – its increasing quantities, however, as we have pointed out a CAT policy is no silver bullet intended to manage all problems associated with primary production. Much more will be needed to address issues associated with plastic production such as toxicity, GHG emissions, and leakages. A production cap can therefore only be a partial solution to the plastic crisis.

"The total volume of global plastic production shall be reduced/controlled since the current total volume far exceeds the global waste management capacity. [...] Hence, it is crucial to address the root cause of the problem, by controlling and minimizing the total production of plastic materials/products"

– Cambodia, pre-INC 3 submission

Photo: Gin Patin

4. Defining a cap on primary plastic production aligned with net zero

4.1 CLIMATE CHANGE AS A BOUNDARY CONDITION FOR PLASTIC PRODUCTION

To set the frame for limiting and downscaling plastic production, we start from a scenario of plastic and chemical production that aligns with global climate targets. In this way, we use climate change as a boundary condition for primary plastic production. That is, we illustrate a global production pathway that develop in accordance with what parties have committed to in the context of the multilateral climate regime. Notwithstanding the outcome of the negotiations for a global plastics treaty, the scenario that we introduce here is therefore a necessary limit to future primary plastics production.

Because the production, use, and handling of plastics have multiple harmful impacts on environmental and human health beyond the emission of greenhouse gases, there are many other important impacts to consider when restricting plastic production. These impacts occur mostly on a local and regional scale, where people and ecosystems suffer from the consequences of toxic pollution. Because these impact categories are mostly local and regional in nature, they are hard to meaningfully aggregate on a global scale. In the efforts to assess planetary-scale impacts, Persson et al. (2022) assessed chemicals and plastic pollution within the planetary boundary framework, concluding that the boundary for plastics and chemicals (so called novel entities) has been breached and that the resilience of the Earth system is at risk. In making this assessment, however, Persson et al. proposed not one but several control variables because of the complexity of making such assessment globally. In contrast, climate change is arguably the most well-defined domain for defining a global boundary condition for primary plastics production. Four main justifications for this choice stand out:

i. The global nature of climate change (recognising its uneven and diverse impacts) means that it lends itself well to defining a global production cap.

ii. The climate impact of plastics is directly connected to primary plastics production, which accounts for a clear majority of the quantified climate impact of plastics. Cabernard et al. (2021), for example, estimate that production is associated with 96% of total GHG emissions from the plastics lifecycle.

iii. There is a strong and quantified knowledge base on the drivers of climate change and the landscape of global GHG emissions, including emissions from primary plastics production.

iv. There is clear agreement among parties to reach net zero emissions by 2050 in the international policy domain through the UNFCCC and the subsequent Paris Agreement. Hence, there is already an established political commitment in place associated with the elimination of the climate change impacts of plastics production.

Keeping in mind the multi-facetted nature of plastic pollution, a scenario for primary plastic production that accounts for climate impact is thus a relevant starting point for the proposition outlined in this report. This boundary condition may be complemented with other considerations regarding human and environmental health as knowledge develops.

4.2 CHOOSING A SCENARIO FOR PLASTIC PRODUCTION AND NET ZERO EMISSIONS BY 2050

The selection of scenario(s) to inform the capping of plastic production is crucial. Many different pathways that align with global climate targets exist, and these vary in a range of dimensions; one of which being sectoral coverage. For example, both peer-reviewed and grey literature contain several different scenarios focusing solely on chemical and plastic production (see Bauer et al., 2022a for a recent review; cf. Meng et al., 2023). For the analysis in this report, however, we wish to account for inter-sectoral interactions and constraints, ensuring alignment across sectors. As such, scenarios that are global in scope and multi-sectoral are of particular relevance. We therefore choose to rely on the Net Zero Emissions scenario generated by the comprehensive model of the International Energy Agency (IEA) as our starting point for future primary plastic production levels (International Energy Agency, 2023a). This scenario also aligns well with the scope of the proposal, as it focuses on commodity plastics; i.e. the polymers which comprise 75%–80% of primary plastics (Geyer et al., 2017; OECD, 2022a) and are used in a multitude of applications and domains.

The IEA is an intergovernmental organisation focused on the global energy sector with a long history of analysis, forecasting, and scenarios of energy use and emissions. While historically focused on the markets for fossil fuels, IEA has,

in recent decades, become one of the most impactful and cited sources for understanding the energy transition and its implications for related markets such as chemicals and other industrial commodities. IEA has also in their policy recommendations repeatedly called for stronger interventions to accelerate the energy transition and reduce GHG emissions. The Net Zero Emissions scenario relies, as do other global climate change mitigation pathways, on renewable energy as a key solution. At the same time, the IEA specifies how industrial sectors with complex patterns of energy flows and emissions must reduce their fossil fuel dependence and eliminate so-called process emissions—both of which are prominent in primary plastics production.

4.3 PLASTIC PRODUCTION MOVING TOWARDS 2050

To have a chance of reaching established climate targets, the IEA Net Zero Emission scenario points to the absolute necessity of breaking with the BAU trends of accelerating growth in primary plastics and primary chemicals production. More specifically, primary chemicals, as well as primary plastics production, must peak and decrease well before 2050 to meet net zero targets (see Figure 2). This outlook and the necessity of limiting global production levels is related to the use of fossil fuels as feedstock for primary plastics production, which the IEA identifies as a major source of increasing oil demand (IEA, 2023). To reach net zero, primary plastic production cannot grow to substitute falling demand for transportation fuels by increasing the share of extracted hydrocarbons for chemicals—a strategy that many vertically integrated oil, gas, and petrochemical firms have seemingly otherwise been aiming to follow (Bauer and Fontenit, 2021; Tilsted et al., 2023). While the IEA scenario does not reduce global primary production from current levels by 2050, it should be noted that with current population growth forecasts, the scenario implies a significant reduction of per capita use of primary commodity plastics.

While the IEA Net Zero scenario is consistent with reducing greenhouse gas emissions, vast amounts of plastics remain in the Net Zero scenario. This relatively high level of production reflects how and why climate change is a boundary condition, a level that defines the scope within negotiations can occur. There are however good reasons for further limiting global production levels, as Figure 2 reflects. Three general areas of concern stand out. First, the relatively high production levels relate only to climate change. Thus, the level of plastic production implied by the scenario does not account for nor does anything to remedy the many other environmental and health-related consequences of plastics production (Almroth et al., 2022; Landrigan et al., 2023). As noted above, climate change is a starting point and not an endpoint for the issue of limiting and restriction plastic production.

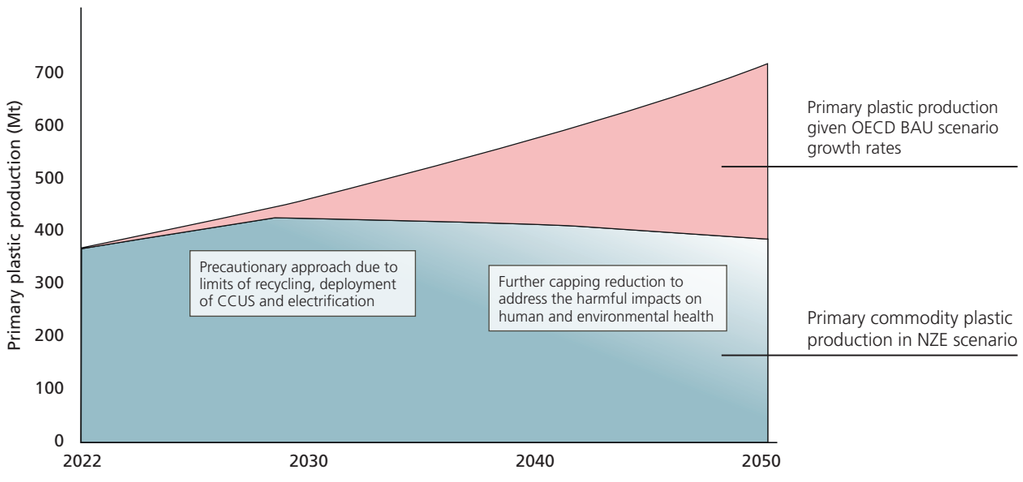

Figure 2. Primary plastic production in the IEA Net Zero Emissions scenario compared to development in line with OECD BAU scenario growth rates in primary commodity plastic production. Based on data from IEA (International Energy Agency, 2023a, 2023b) and OECD (OECD, 2022b). The shading indicates that climate change is a boundary condition and that additional considerations both with regard to scenario assumptions and other impacts of production imply the importance of a stricter cap.

Secondly, modelling global net zero emission scenarios necessitates a host of assumptions. Techno-economic pathways include simplified sector representations and lack granularity, and technologies that are easily modelled might not be easily implemented and scaled. There is therefore a risk that what is modelled will not materialise. In particular, the IEA Net Zero scenario rely on carbon capture, utilization, and storage, which together with hydrogen-related mitigation measures account for around 15% of total emission reductions in the period 2022-2050 (International Energy Agency, 2023a). Research shows that relying on technologies such as carbon capture and storage might is risky and can, if favoured over other measures, obstruct alternative climate interventions (Carton et al., 2023).

Concerns about being overly optimistic in terms of technological solution also applies to the aspiration of very high recycling rates. Although improved circularity of plastic products is key to reducing the demand for primary plastics, there are thermodynamic limitations to recycling. These limitations mean that approaching very high circularity is impossible for real-world recycling of materials (Cullen, 2017). To pre-empt such risks, a stronger and separate emphasis on demand reduction is needed (Palm et al., 2024). Finally, net zero scenarios and their implied emission pathways raise the issues of temperature overshoot and residual emissions. These are critical issues that come with their own set of risks and technological, economic, political, and moral dilemmas, including the distribution of residual emissions (Buck et al., 2023).

The proposal of limiting primary plastic production raises the issue of which purposes synthetic materials should serve. Here, a guiding principle can be that of decent living, focusing on the fulfilment of human needs (Rao and Min, 2018). In the context of the treaty negotiations, this is known as the concept of 'essential use,' which was also applied in the Montreal protocol (Scientists' Coalition for an Effective Plastics Treaty, 2024). In some application domains, plastics are not easily eliminated or substituted without negative effects on other desired outcomes. Modern energy systems with renewable energy production technologies, energy storage units, and transmission and distribution grids require plastics for specific parts, such as transparent protective layers on PV cells, battery membranes, and cable insulation. Other types of modern infrastructure – e.g. for water and sanitation – also use plastics with high demands placed on long lifetimes and low risk of contamination. Plastic production for such purposes and specific application domains is, however, undeniably much smaller than the anticipated volumes of primary plastic production in BAU scenarios.

In several of the currently largest application domains, there are great possibilities for reducing the demand for plastics and limit use. Such options include, e.g. adopting re-use packaging systems for certain types of products, using alternative materials with higher recycling rates for less sensitive products, increasing the lifetime of products, and reducing the oversupply of short-lived products such as fast-fashion apparel (Drewniok et al., 2023). Demand reduction strategies are therefore crucial for the prospects of climate change and plastic pollution mitigation and also play a crucial role in recent research modelling sector-specific climate change mitigation pathways (Meng et al., 2023). Thus, the importance of plastics in some applications should not serve as a justification for increasing production and dismissing a production cap. Doing so arguably amounts to a form of 'whataboutism', i.e. strategically redirecting attention away from the issue at hand to delay or obstruct policy (Tilsted et al., 2022).

Taken together, the scenario presented here underlines the importance of peaking and reducing production well before 2050. The most effective way to achieve this outcome is through a global agreement on a production cap for primary plastics, which raises questions of distributive justice.

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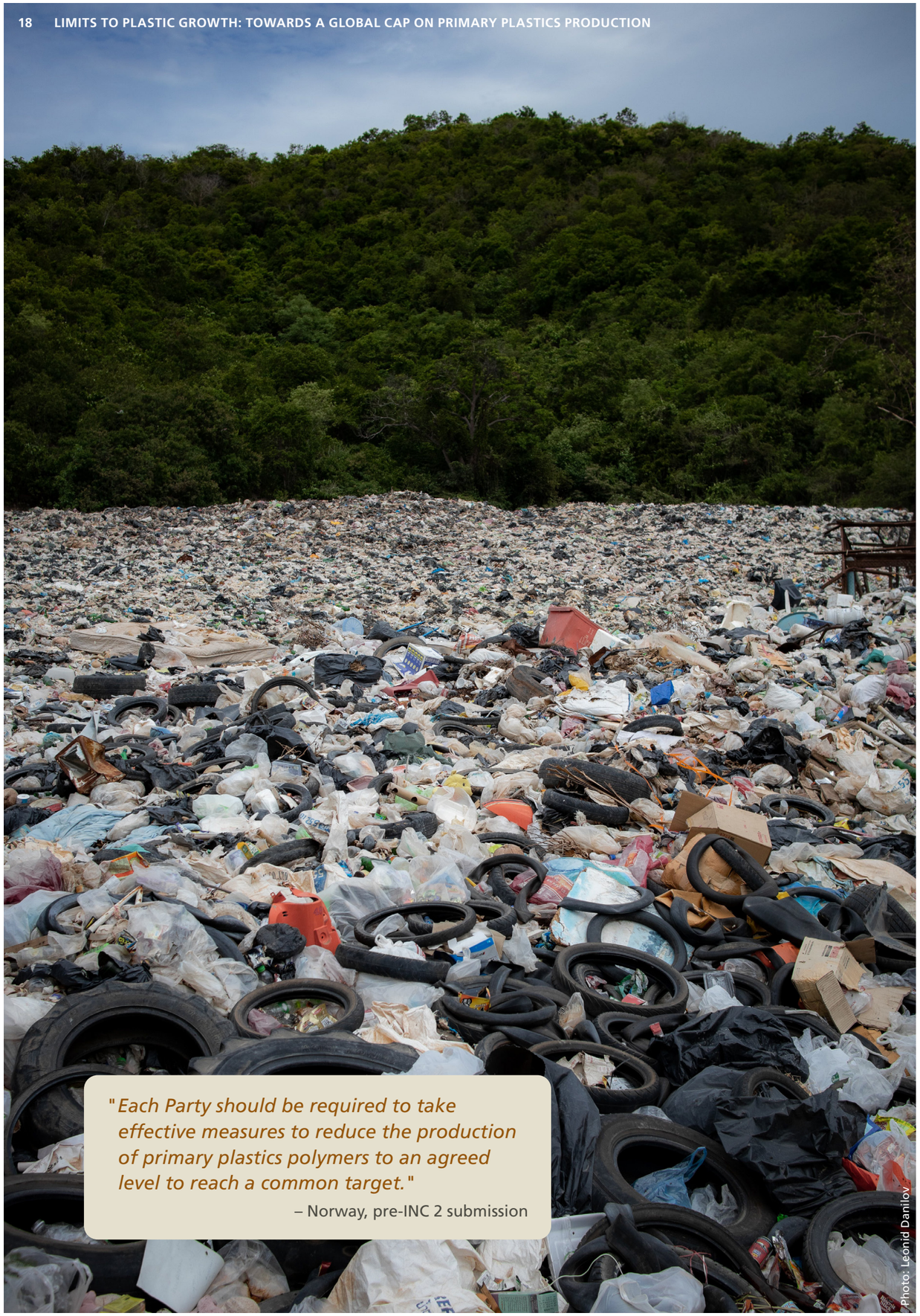


> *"Each Party should be required to take effective measures to reduce the production of primary plastics polymers to an agreed level to reach a common target."*
>
> – Norway, pre-INC 2 submission

Photo: Leonid Danilov

5. Approaches to allocating primary plastic production allowances

Given that the global production of primary plastics in a net zero scenario must be limited and that this is most effectively managed through an agreed-upon cap on primary plastics production, we might usefully speak of a remaining global primary plastic production budget to be shared and allocated. Inspired by earlier established CAT systems discussed previously, we therefore propose that production allocation under the cap is operationalised with tradable production allowances for plastics.

To inform the question of allocation we draw from the extensive literature on burden sharing in the climate regime. This literature invokes a number of equity principles and discusses various frameworks for allocating the responsibilities of different actors. A central aspect of equity in the climate regime has been the principle of common but differentiated responsibilities and respective capabilities (CBDR-RC) under the United Nations Framework Convention for Climate Change. The principle of common but differentiated responsibilities has also been identified as an important part of a global plastics treaty (Stöfen-O'Brien, 2022). With many member states calling for a treaty guided by CBDR-RC, however, care must also be taken so that the principles do not become a tool for states desiring unambitious rules and actions (Dauvergne, 2023). Equity principles directly address distributive justice and can therefore be applied to design or classify burden-sharing frameworks (Fleurbaey et al., 2014; Höhne et al., 2014). In the same vein, we can evaluate the relevance of various burden-sharing frameworks for seeking distributive justice on the basis of whether they align with various equity principles.

Frameworks for burden sharing, however, do not necessarily need be informed by principles of equity. For example, the approach referred to as grandfathering, which allocates allowances on the basis of already existing distributions, has been advocated with reference to feasibility and the potential to obtain 'buy-in' from stakeholders, despite rewarding polluters (Damon et al., 2019). Consequently, grandfathering has been used as the core modelling principle for EU ETS. Other examples include immediate per capita convergence (allocation based on population per capita) and per capita convergence (allocation based on both current production and population per capita) over time, combining grandfathering with an equal per capita approach (van den Berg et al., 2020).

To map the scope for allocating primary production allowances, we rely on three overall approaches to burden sharing namely past share, equal share, and fair share (see Table 1). The former is informed by grandfathering or legacy entitlement, the equal share by an equal per capita approach, and the latter by equity principles (for more on equity principles for just distributions see section 5.3). Below, we elaborate on each of these approaches.

Approach	Informed by	Description
Past share	Grandfathering	Allocation of national primary plastic production allowances based on current production shares
Equal share	Equal per capita allocation	Allocation of national primary plastic production allowances based on population shares
Fair share	Equity principles and plastic sufficientarianism	Allocation of national primary plastic production allowances based on need for future plastic to safety human needs

Table 1. Different approaches for allocation of primary plastic production.

5.1 THREE DIFFERENT APPROACHES FOR PRIMARY PLASTIC PRODUCTION ALLOWANCE ALLOCATION

5.1.1 Past share

The first approach to allocating production allowances we outline in this report is to base the distribution on past production shares following a grandfathering framework. While this approach arguably rewards vested interests and therefore has been criticised on moral grounds, it has been one of the most commonly used approaches in established CAT schemes (Damon et al., 2019). A past share principle was, for example, used for establishment of the EU ETS. Although this approach arbitrarily provides more leeway to already established interests, a past share approach has been one of the most successful strategies to get polluters to sign up and could arguably be advocated for on the basis of the paramount significance of an effective treaty. Hence, a past share approach for primary plastic production could be described as a strategic pathway that to a higher degree benefits countries with relatively high production volumes of fossil-based plastics and therefore lacks a clear moral justification.

While grandfathering comes in different forms, depending on the extent to which considerations other than historical usage are taken into account (see Knight, 2013), the past share approach suggested here entails phasing down future production based on historic production and existing capacity. In this scheme, the current producers would thus all receive allowances for future production according to their share of global production in a baseline, which could either be a specific year, such as 2019 (before the global economy was hit by the COVID-19 pandemic), and for which there is reliable data, or the average of a few years.

5.1.2 Equal share

The second suggested approach is that of an equal share, based on an equal-per-capita allocation. This approach has been associated with egalitarianism (Ryberg et al., 2020) but arguably remains a 'narrow' interpretation of equality given that it does not account for unequal positions between actors (Dooley et al., 2021; Tilsted and Bjørn, 2023).

The equal share approach allocates primary plastic production allowances based on population shares. In this way, each individual is, in principle, granted the right to equivalent amounts of primary plastics through the initial allocation (although on a national level) from this point onwards. As such, this is a forward-looking approach. To account for future demographic changes, the equal share approach can take expectations of population growth into account and allocate production allowances on the basis of current and projected future population shares, with revisions to allocation scheduled to occur every few years.

5.1.3 Fair share

The third approach outline here is dubbed 'fair share' to recognise that this approach is explicitly informed by principles of equity for distributive justice. Recognising the range of relevant equity principles, a range of different approaches are relevant to evaluate what constitutes a fair allocation when it comes to phasing down primary plastic production (we take up and discuss this issue further in Section 5.3).

Given the ambition to end plastic pollution while recognising some essential uses of plastic, a fair share approach could take a notion of plastic sufficientarianism (cf. Duus-Otterstrom, 2024) as a starting point, recognising the importance fulfilling human needs. This approach would follow the rationale of the need principle applied in the literature on distributive climate justice (see also section 5.3) and start from requirements for decent living standards. For example, inspired by Steininger et al. (2022), the fair share approach could be based on estimates for decent living gaps (Kikstra et al., 2021; Millward-Hopkins et al., 2020). In a first step of allocation, this approach would grant priority to parties based on the number of people living below decent living thresholds to bridge these gaps and enable the development of modern infrastructure; e.g. for water, sanitation, and electricity, which will require some volume of plastic. In a second step, remaining primary plastic production allowances would be allocated following the equal share approach.

5.2 COMPARING APPROACHES

Figure 3 illustrates how the different approaches would allocate primary production allowances in an agreement between four countries of equal population size. Country A is currently the largest producer, with well-developed infrastructure and a small share of the population experiencing decent living gaps. Country B has a medium–large production with moderately developed infrastructure and a relatively small share of the population (but still larger than A) not meeting the prerequisites for decent living. Country C has a medium–small production moderately developed infrastructure and a substantial share of the population living below thresholds for decent living. Country D currently has no production and a significant need to develop infrastructure, with the (relatively) highest share of the population living below the standards for decent living. Using the past share approach the distribution of production allowances would follow current patterns, with country A receiving the largest share of allowances, followed by countries B and then C. If the equal share approach was implemented all four countries would receive equal allocation of production allowances. Under the fair share approach country D would instead receive the largest share of production allowances

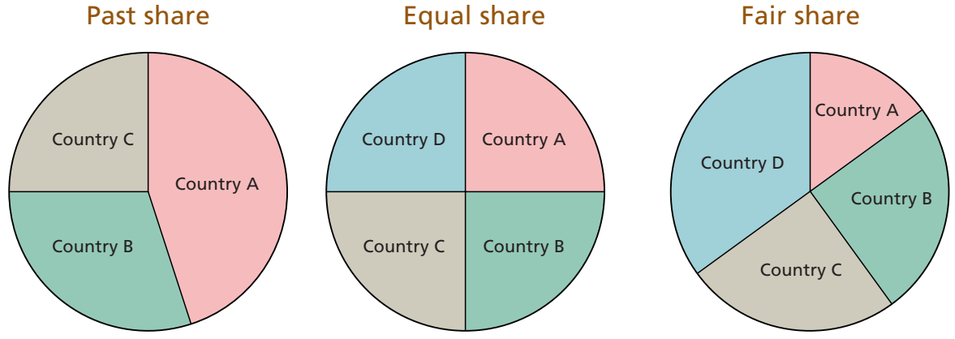


Figure 3. Illustration of allocation of primary production allowances using the different approaches. Countries A–D are, for illustrative purposes, assumed to have similar populations. The three approaches outlined above differ in the extent to which they align with principles of equity and the notion of CBDR-RC. Moreover, they are by no means exhaustive in terms of burden sharing frameworks. Therefore, to unfold the scope of relevant equity principles that could inform such framework, we review common equity principles that could be invoked when operationalising a cap on primary plastic production.

in recognition of its need to develop its infrastructure and improve living standards. Countries B and C would both receive a medium share of the allowances and Country A would receive the smallest share of allowances, in recognition of its already high living standards. Under a CAT scheme, the equal share and the fair share approach imply a degree of redistribution, since allowances do not match existing production and producers would therefore need to buy allowances from non-producers.

5.3 EQUITY PRINCIPLES FOR DISTRIBUTIVE JUSTICE

Building on the literature on distributive climate justice, Dooley et al. (2021) identify four central equity principles that resonate in part with CBDR-RC. Below, we briefly elaborate on each of these in turn. For a more extensive review of the climate justice literature see, e.g. Caney (2021) or Fleurbaey et al. (2014).

Responsibility

The 'responsibility' principle holds that obligations follow from actions, aligning with the 'polluter pays' principle but extending it by centring the concern on the harm inflicted by historical pollution (Neumayer, 2000; Shue, 1999). Responsibility is fundamental to the issue of climate change (Fleurbaey et al., 2014), and scholars have invoked the notion of a climate debt to conceptualise responsibility for historical emissions (Pickering and Barry, 2012).

In the context of the global plastics treaty, the responsibility principle asks who is currently and who has historically been contributing to the plastic crisis, or plastic–generated GHG emissions. Given that plastic pollution and its GHG emissions accumulates in the natural environment, we might speak of a plastic pollution or plastics–generated GHG debt. Quantifying such a debt, regardless whether it is based on climate change impacts or pollution impacts, is complicated by difficulties in defining ecological limits for plastics (Persson et al., 2022; Richardson et al., 2023). An open question is whether to attribute responsibility on the basis of a production-based or a consumption-based perspective, and distinguishing between different forms of plastics according to their importance in fulfilling human needs (see the 'need' principle below), as has been discussed in the context of climate change (Fleurbaey et al., 2014).

Capacity

As an equity principle for distributive justice, 'capacity' stipulates that obligations follow from the ability to act, aligning with the Respective Capabilities (RC) principle in CBDR-RC and the 'ability to pay' principle (Fleurbaey et al., 2014). Capability arguably also aligns with prioritarianism (Ryberg et al., 2020); i.e. the perspective that benefits should accrue to those who are worst off (Holtug, 2017). Capacity can be operationalised in a variety of ways. Often it has been interpreted as wealth (taking the form of 'ability to pay'), but capacity also includes technological, institutional and educational capacity. Accordingly, studies have used proxies such as gross domestic product or the human development index to quantify capacity (Fleurbaey et al., 2014). In contrast with responsibility, capacity is forward-looking, taking into account the ability of actors to act in the future (Dooley et al., 2021).

For the global plastics treaty, capacity orients the focus to the capability of actors to end plastic pollution. Regarding the allocation of primary plastic production allowances, this principle would hold that polluting parties that are well-po-

sitioned to limit their primary plastic production have the obligation to do so. For example, capacity should arguably consider not only wealth and ability to pay but also waste management infrastructure.

Sufficiency

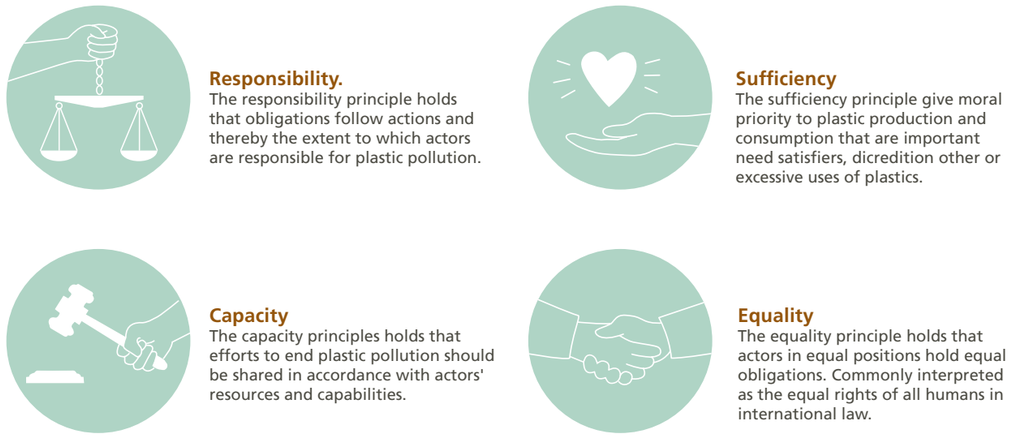
The 'sufficiency' principle holds that human needs have a moral priority, and that distributive justice should therefore be concerned with ensuring the fulfilment of basic needs. The principle is reflected in many different positions and, as pointed out by Dooley et al. (2021), is therefore supported by utilitarian, egalitarian, sufficientarian, rights-based, and social contract arguments. The principle is also related to the notion of a right to development stipulated in international law (Fleurbaey et al., 2014).

Research that aligns with sufficiency as an equity principle consider thresholds for decent living energy (Kikstra et al., 2021; Millward-Hopkins et al., 2020), material conditions for human well-being (Rao and Min, 2018), and sufficiency (IPCC, 2022) giving moral priority to those below these levels. Scholars therefore argue that in the context of climate change, GHG emissions should be classified in accordance to whether they help fulfil human needs, e.g. distinguishing between "decent living" and "luxury" emissions (Rao and Baer, 2012; Shue, 1993). Complementing a suffiicitarian perspective is the notion of limitarianism, the notion that excessiveness is not morally permissible and that nobody should have too much—perspectives that justify production and consumption 'corridors', i.e. floors and ceilings that align with a safe operating space for humanity (Bärnthaler and Gough, 2023; Gough, 2020; Robeyns, 2019). In terms of allocation, if there is additional environmental carrying capacity after having provided the basis for need fulfilment for all, any such 'surplus' can be distributed equally amongst parties (Steininger et al., 2022; Williges et al., 2022).

The principle holds important implications for distributive justice in relation to the global plastics treaty. In particular, we might speak of 'plastic sufficientarianism', distinguishing between different applications for plastics to give priority to applications that are important need satisfiers (Max-Neef, 1991). Such standpoints are what the fair share approach suggested above rests on.

Equality

As a principle that resonates with egalitarianism, equality, in international law, is interpreted to mean the equal worth and, thereby, the equal rights of all humans (Fleurbaey et al., 2014). Based on this interpretation, an equal per capital allocation of production allowances carries a simple yet ethical force (Beckerman and Pasek, 1995). Given an equal share, redistribution would also be implicit, as producers would need to buy allowances from non-producers, given that the allowances are tradable. However, given that preconditions vary greatly, Dooley et al. (2021) suggest that in the context of distributive justice, the principle implies that actors in unequal positions carry different obligations. Hence, differentiating obligations according to, e.g. the dimensions of need, responsibility, and capacity, to reflect the unequal positions. For example, Steininger et al. (2022) suggest a need-based interpretation of the equality principle, distributing emission allowances equally only once a critical threshold for well-being is met by all.



Different equity principles for distributive justice can be applied to the allocation of plastic production allowances.

Framework	Application	Effect
Cap and trade	Use equity principles to inform allocation of allowances	Countries that do not have plastic production but suffer from pollution benefit from auction revenues
Two-tier approach	Use equity principles to inform and differentiate phase-down within a grandfathering framework	Global North countries phase-out production faster than Global South countries
Combining principles and additional measures	Additional restorative measures for distributive justice	Financial and technology transfer, compensation for loss and damage of legacy plastic pollution

Table 2. Overview of different ways to apply equity principles for distributive justice suggested in this report.

5.3.1 Principles of equity and plastic justice

The four equity principles introduced above can be operationalised in specific burden sharing frameworks to allocate allowances (Steininger et al., 2022; Tilsted and Bjørn, 2023; van den Berg et al., 2020). To illustrate, responsibility and equality can be operationalised as equal cumulative per capita allowances, considering historical developments, while need has been operationalised as allocation to ensure need fulfilment. Burden sharing frameworks can also be informed by a variety of principles and combined into a single framework, e.g. by attributing different weights to different approaches, or, as in the case of grandfathering and a 'past share' approach, by strategic considerations in light of political dynamics and vested interests.

It is also possible to use the different burden sharing frameworks in a two-step approach (Hjalsted et al., 2021). For example, in a first step, an approach is to only consider the gradual phase-down or phase-out of existing production, implicitly accepting grandfathering or past share approach. In a second step, the phase-down of primary commodity plastic production for specific parties could be differentiated on the basis of other burden sharing frameworks. Combining grandfathering with capacity, for example, implies differentiating the reduction of primary plastic production in accordance with indicators for capability such as wealth and waste management infrastructure. In addition, capacity suggests to complement differentiated rated with technology and financial transfer, which are critical to successful green industrial policy (see e.g. Bradlow and Kentikelenis, 2024). Table 2 contains an overview of the suggestions in this section for how to operationalise equity principles for distributive justice.

What is clear in light of the range of equity principles is that the "fair share" approach that we suggest above does not address the full scope of equity considerations for distributive justice. In particular, we foreground need and equality while putting less emphasis on capacity and responsibility, not factoring in, e.g. responsibility for legacy plastic pollution or ability to pay. These are legitimate aspects that could be invoked in relation to allocation allowances under a global cap, and so our choices could clearly have been different. Given the different principles for distributive justice, there is hardly one 'truly fair' way to allocate. However, to arrive at a cap that resonates with notions of fairness, these principles should play a role. Moreover, these principles justify additional measures to address distributive justice (see Table 2).

Allocating allowances or differentiating phase-down under a global cap is just one dimension of a much broader range of issues that relate to justice in the context of the treaty (Dauvergne, 2023). These include other pillars than distributive justice, i.e. procedural, recognition, and intergenerational justice, as well as other issues than allocation, for example, concerns pertaining to financing, technology transfer, and the consequences of plastic pollution. Plastic justice also clearly relates to other justice domains, including climate justice. For example, the IEA Net Zero scenario we reference to justify a cap on global production (see Section 4) comes with its own justice implications. This scenario relies on cost-minimization to distribute mitigation efforts and residual emissions, leading to unequal and differentiated burdens while leaving out the question of financing. And if mitigation efforts fall behind what is modelled in the scenario, maintaining plastic production at the specified levels would further exacerbate climate injustices. Fully addressing justice in the context of the plastics treaty thus goes much beyond what we consider in this report.

Photo: VP68, Pixabay

6. Transparency, trust, and trade

To limit plastic production through implementing a cap, we presented three central issues outside of defining the maximum global production level and allocation allowances, namely i) reporting and monitoring (transparency), ii) compliance mechanisms, and iii) the setup of an auctioning platform. While an in-depth analysis and treatment of these elements are outside the scope of this short report, this section briefly outlines some of the most critical concerns.

A critical aspect of interventions aiming to restrict specific activities is transparency. Transparency requires effective monitoring and reporting by all relevant actors, as well as a verification system run be the responsible authority. Under a production cap in the form suggested in this report, producers would need to strictly monitor their primary production of commodity plastics and report it to the authority managing the CAT system. A prerequisite for implementing a cap on primary plastics production is therefore to ensure that there is capacity and procedures for monitoring and reporting, similar to the framework established by the Vienna Convention which later enabled the adoption of the Montreal protocol. Today, such prerequisites are not in place. Plastic production is not reported consistently on an international level, and transparency regarding the activity and development of plastic production remains very low. For this reason, parties have called for increased transparency in the context of the global plastics treaty (see Box 1).

Available UN datasets illustrate the extremely inconsistent reporting of data pertaining to the primary production of plastics. On a macro level, only 35 countries reported the output of production of primary plastics and synthetic rubber (ISIC 2013) to the Industrial Statistics Database (INDSTAT) managed by the UN Industrial Development Organisation (UNIDO) for the latest available year (2020), of which three reported no production. On a more detailed level, only 30 countries reported the output of their primary production of HDPE—one of the most important commodity plastics—to the Industrial Commodity Statistics Database (ICSD) managed by the UN Statistics Division (UNSD) for the latest available year (2016), of which 15 reported no production. Moreover, a CAT system would incentive businesses to not underestimate their production levels, as that would result in them receiving lower amounts of allowances. Thus, a CAT system can be an effective tool in ensuring more transparently reported data, resulting in an overall better understanding of the total amount of plastic being production globally.

While the allowances would be allocated to parties to the treaty—i.e. countries—they would subsequently have to be matched with production by individual firms. In practice, such allocation could take place on a common auction platform, where the proceeds from the auctions would be distributed to countries on the basis of the agreed-upon allocation. Thus, in a fair-share or equal-share model, countries that suffer from the consequences of but do not have any significant primary plastic production would obtain a source of revenue and share of the profits stemming from primary plastic production. In contrast, a past share allocation, i.e. grandfathering, would not result in any additional benefits for plastic importing countries outside of limiting plastic pollution. Ensuring that this setup does not allow for loopholes requires careful design of an auctioning platform and a registry to show that actors are complying with the requirement of having allowances that cover their production.

Box 1: Calls for transparency in the INC

Transparency is also an issue that has been recognised by many member states during the Plastics Treaty negotiations. Most coalitions have stressed the need for the implementation of transparency and reporting frameworks within the new Plastics Treaty. For example, the African Group calls for transparency "on types and volumes of plastic feedstocks [and] polymers" (The African Group, INC-2). AOSIS similarly calls for a periodic reporting of "national sources and levels of plastics being produced, exported, imported and recycled" (AOSIS, INC-2). The High Ambition Coalition also calls for further transparency, proposing that each state needs to "report on the quantities and type of plastic polymers produced as well as the quantities and type of chemicals applied in production" (HAC, INC-2). Parties who, on the other hand, have not clearly backed-up calls for transparency have also categorically opposed the implementation of measures restricting production within the new treaty. In this sense, the issue of transparency is divided by established fault lines.

In terms of compliance, producers of primary plastics will need to show to the body managing the system that they hold production allowances equal to their reported production for each cycle, which could be annual or otherwise defined. If the allowances they received or acquired initially were insufficient to cover their production, they would have to purchase allowances from new auction rounds or another holder of production credits. Penalties for non-compliance would also have to be agreed upon as part of the CAT system; e.g. in the form of a significant fee or customs. The penalty needs to be high enough to ensure compliance, decidedly outweighing the potential proceeds from production so as to not induce opportunistic behaviour. Given that many state-owned enterprises are involved in the production of plastics, fees or customs for non-compliance will need to go to a third-party actor, either as a treaty obligation by third country to impose customs on non-complied primary commodity plastics, or as a fee to the enforcing international agency of the CAT system to be distributed to negatively impacted third countries.

Regarding a platform, a capping system that allows for the transfer of allowances requires the design, implementation, and operation of a platform for secondary trade. The platform needs to be trusted by the actors included in the intervention and liquid enough to be effective. Trade could be bilateral or conduced on an open auctioning platform facilitated by the authority managing and overseeing the CAT system. To avoid the financialization and trading of allowances as a form of financial speculation, the transferability of production allowances could be restricted. For example, in the case of the Inflation Reduction Act, tax credits can only be sold once with no subsequent transfers (Hill, 2024). Such a model could be replicated in the context of plastic production allowances.

7. Conclusions

This report highlights the pressing need for an international instrument aiming to eliminate plastic pollution across its lifecycle to address the central question of limiting the growth of primary plastics production. Limiting growth is most effectively managed through an agreement to cap global primary production of commodity plastics. There is strong precedent for an international agreement to impose a cap on the production of specific products and substances known to cause significant negative environmental impacts. The negative environmental, human, and climate impacts of plastics are well-established, not least those pertaining to the primary production stage.

Our approach acknowledges that capping primary plastics production is no silver bullet to eliminating plastic pollution but must be complemented with a portfolio of policies and measures. These could range from initiatives aiming to phase out particularly problematic plastics, additives, and plastic products as well as investments downstream in the value chain to improve circularity. However, placing a fair and global cap on the primary production of commodity plastics is an essential supply-side component of a comprehensive strategy for addressing the plastic crisis.

The synergies between an instrument to eliminate plastic pollution with pre-existing agreements and commitments to mitigate climate change by reaching net zero GHG emissions in the global economy by 2050 highlights the necessity of including a cap on primary production in the instrument. On this basis, we find that climate change constitutes a suitable boundary condition for defining a global cap for primary production of commodity plastics. The reasons here are threefold and concern the direct connection between primary plastic production and greenhouse gas emissions, the authoritative and quantified knowledge base of the drivers of climate change, and the global agreement among countries to reach net zero emissions by 2050. Drawing on the internationally recognised Net Zero scenario analysis produced by the IEA, this implies that primary commodity plastics production should peak around 2030 and then be phased down under a global cap.

Following an agreement to cap primary plastic production to align with climate targets introduces the issue of how to operationalise and implement such a cap. We analyse the implementation of a global cap on primary commodity plastics production of commodity plastics through a system of transferable production allowances. Firms involved in the production or manufacturing of plastics need to acquire allowances, thereby effectively enforcing a 'producer pays' principle. Implementation should seek to account for the many relevant critiques of cap-and-trade systems for emission reductions, and draw on the useful lessons from how those systems have been implemented in practice. Central questions for a new system would concern: (1) the allocation of production allowances under the cap; (2) reporting, monitoring, and verification of primary plastic production globally; (3) implementing compliance mechanisms for producers; and (4) establishing an auctioning platform for the exchange of plastic production allowances. For each of these issues, crucial design questions remain, but we stress the importance on enforcing a hard cap with no potential for offsetting or generation of new allowances, the option of restricting transferability, and the necessity of transparency.

This analysis identified different approaches for allocating primary production allowances, each with their own implications. Aligning the allocation of allowances in a CAT system with burden sharing frameworks for distributive justice is a way to make sure it follows the principle of common but differentiated responsibilities and respective capabilities (CBDR-RC), a core principle in international environmental and climate change law. Respect for the CBDR-RC principle has also been emphasised by many countries during the ongoing negotiations. It will therefore be important to agree to an implementation of a global cap and trade system based on CBDR-RC, as it plays a central role in how we currently govern international environmental crises. Acknowledging issues of distributive justice in the context of a global cap, such as through an equal or fair share in the allocation of primary plastics production allowances, would ensure a fairer and more equitable approach to phasing down primary plastic production. While an approach based on past production shares would largely follow precedent, such an approach is less aligned with equity principles for distributive justice and CBDR-RC than approaches based on equal share or fair share. Questions of plastic justice, however, extend far beyond the question of who gets to produce plastic in the future, highlighting the importance of additional and complementary measures in the context of the global treaty.

"Each Party should be required to adopt legal and administrative measures into national legislation to reduce the production, consumption and use of virgin polymers to agreed-upon schedules."

– Rwanda, pre-INC-2 submission

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Tel 046-222 00 00
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