NDC ASPECTS

Policy Brief

A Climate Club for the Plastic Industry

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Key Messages

- In order to achieve the Paris Agreement's objectives, a fundamental transformation of the global plastics industry is required. Four complementary strategies will be necessary to achieve climate neutrality in the sector: 1. Utilizing renewable and low-carbon energy inputs, 2. Increasing recycling, 3. Using alternative feedstocks, and 4. Reducing demand.
- The existing global governance landscape for plastic hardly addresses greenhouse gas emissions explicitly. Overall, the global governance remains patchy and insufficient. Governance institutions related to the use of renewable energy and demand reductions are lacking in particular. Ongoing negotiations of the global plastic pollution treaty might remedy some but not all of the identified gaps.
- An international plastics climate club could foster climate neutrality in the sector. It could provide guidance and signal through specific targets. It could set rules for collective action, e.g., through standards for green polymers, leverage trade measures to incentivize trade in more recycling-friendly staple plastics. It could create a transparency framework to establish a more robust information base for future, more far-reaching commitments. It could leverage means of implementation especially for developing countries, e.g., through a packaging and single-use plastic fund that is fed through a surcharge on such plastic products and funds their mechanical or chemical recycling. And finally, the club could create knowledge and learning by systematically evaluating policy instruments and acting as a policy learning accelerator.
- A plastic climate club must not compete with the ongoing negotiations for the plastic pollution treaty. Club members could form a bargaining club to strengthen climate change mitigation within the treaty negotiations and other existing environmental agreements. The club should be seen as complementary to the ongoing negotiations for the plastic pollution treaty and a potential backstop against their failure.

Introduction

To meet the goals of the Paris Agreement, the global plastic industry needs to undergo a fundamental transformation. Overall, the plastic sector accounted for 3.8% – 4.5% of global GHG emissions in 2015. Both emissions and output have been growing strongly over the past decades and this trend is projected to continue at least until 2050. To achieve the required transformation in due time, international cooperation is necessary. Global governance arrangements can help create an enabling environment that facilitates low-carbon innovation and supports companies to invest in alternative technologies and practices that align with the ambitious decarbonization pathways required to limit global warming to well below 2°C.

In this policy brief we address three main questions:

- How can the global plastic industry be transformed towards a sustainable and low-carbon production system and which strategies exist to achieve this transformation?
- Which global governance institutions exist that address the aforementioned decarbonization strategies and which governance gaps persist?
- How could a plastic climate club close the identified governance gap and complement the existing governance landscape?

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Four Strategies for Transformation

There is no clear and dominant techno-economic pathway available that could plausibly describe the transformation of the plastics industry. The academic literature proposes four broad and complementary strategies for achieving climate neutrality in the plastic sector (see figure 1): (1) transitioning energy inputs for plastic production and manufacturing to renewable and low-carbon sources, (2) increasing and improving recycling, (3) introducing low-emission alternative feedstocks for plastic production, and (4) reducing the overall demand for plastics.

Plastic production requires large amounts of heat. To date, this energy is mostly supplied in the form of oil, gas and also coal. **Electrifying heat supply** can already achieve significant emission reductions. Electric steam crackers are currently under development to replace the current fossil fuelled ones that are used to break down hydrocarbon chains for further processing. While reducing CO_2 emissions from fossil energy inputs, it still relies on fossil feedstock and does not eliminate CO_2 emissions at the end of the product life cycle. An alternative approach utilizes green hydrogen and CO_2 derived from direct air capture or other industrial facilities with carbon capture technology (e.g., cement industry) as a primary resource in process called **methanol-to-olefins (MtO).** Ethylene and other bulk olefins can then be processed from methanol.

The recycling of plastics can substitute fossil fuel-based virgin plastics. To achieve this, enhancing both the quantity of recycling (recycling rates) and the quality of recycling is required as otherwise recycled materials deteriorate with each cycle until they eventually can no longer be used as a material. It is useful to **distinguish mechanical and chemical recycling.** The former is the

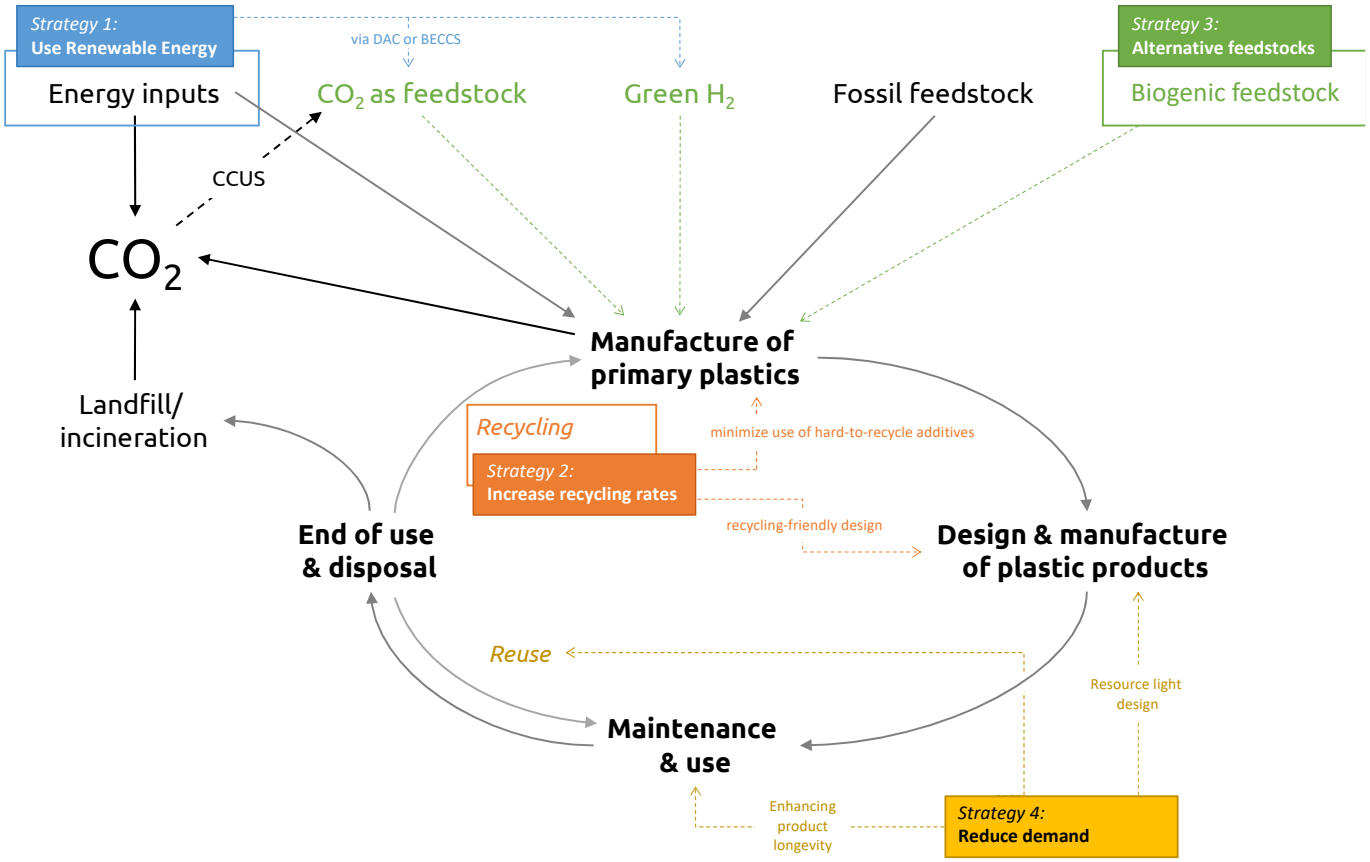

Figure 1 The plastic lifecycle and four key strategies for decarbonization.

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most commonly established one. It involves physically sorting waste by polymer type and processing it into recycled pellets suitable for established applications. The potential for mechanical recycling is limited by plastic type and potential contamination issues. The issue of deteriorating material qualities is particularly relevant for mechanical recycling. Chemical recycling involves breaking down plastics into their molecular components, enabling a wider range of plastic types to be recycled. While chemical recycling offers flexibility and higher recycling rates, it requires large amounts of energy, is currently often associated with large GHG emissions, and is not yet financially viable under current political and economic circumstances while the technologies are not yet commercially available.

Apart from recycled plastics, fossil fuels can also be replaced as a **feedstock from alternative raw materials** including bio-based feedstocks, such as corn and sugarcane. Bio-based plastic substitutes already exist for nearly every conventional plastic type and there is a vast technical potential for substituting of conventional polymers. But due to the increased use of bioenergy resource, this strategy has significant implications for land use which may compromise the carbon benefits associated with bio-based plastics.

Global demand for plastics is expected to grow at least by 3.5% annually, effectively doubling current production by 2035. Given this massive growth, it is impossible to achieve long-term sustainability within planetary boundaries for the plastics industry even when all other mitigation strategies are fully implemented. **Reducing overall demand** is therefore a necessary fourth mitigation strategy. For instance, repairability of products needs to be considered already at the product design stage. Packaging can be also reduced by utilizing reusable plastic products, for example of containers and bottles in service delivery. However, reducing plastic demand should not be pursued at all cost. In many cases, plastics can be a better option compared to even more energy and carbon-intensive alternatives.

The four strategies differ in their structure in that the first three focus primarily on technological solutions while the fourth one is not. Historically, the plastic industry has emphasized technological fixes to fend off demand reductions as this would essentially erase any prospects of growth for the industry as a whole and potentially undermine the industry's social license to operate. However, the scientific literature is clear in that we cannot forego any of those strategies completely. Albeit, their relative importance, interplay, potential trade-offs and synergies remain unclear.

The existing governance landscape

Surveying the global environmental governance landscape for the plastics industry we find that there is increasing attention to plastics, albeit with limited focus on climate change mitigation. Existing international regimes rarely address the sector decarbonization directly. There is a lack of institutions and initiatives addressing the substitution of equipment for less emission-intensive plastic manufacturing processes and the replacement of fossil fuels with renewable energy inputs. Recycling is the most affected strategy, but it is only addressed indirectly by institutions focusing on safe chemicals, some of which may impede recycling or safe handling and disposal of waste. Some initiatives are exploring alternative feedstocks for plastic production.

Specifically, we find three types of institutions governing (1) the use and handling of harmful substances, (2) addressing end-of-life safe disposal of substances, and (3) overarching institutions that cover the plastics as part of a much wider general mandate such as the G7/G20, the UNFCCC with its Paris Agreement, and the Sustainable Development Goals (SDGs). The first group of institutions and agreements

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includes for instance the Stockholm Convention on persistent organic pollutants and the Rotterdam Convention on international trade of hazardous chemicals. These institutions are relevant for the transformation of the plastic industry in that they may govern some of the additives that impede effective high-quality plastic recycling. Perhaps the most relevant example of institutions governing safe disposal of substances is the Basel Convention on (hazardous) waste and its transboundary movement. All of the institutions in the second category govern the waste sector, they are relevant again for improved recycling, albeit only indirectly. Finally, the last category of overarching institutions provides a generic signal towards decarbonization, but do not contain any sector-specific provisions. In theory, they could address all four strategies, but it in reality they do so only tangentially. For instance, the Paris Agreement does not expressly address the phase-out of fossil fuels. At the recent COP27, Parties debated whether to include a reference to "phasing down all fossil fuels" but this was ultimately not adopted.

In March 2022, the UN Environment Assembly adopted a resolution that mandated the negotiation of a "legally binding instrument on plastic pollution (...) based on a comprehensive approach that addresses the full life cycle of plastic, …". This **global plastic pollution treaty** will be a major addition to the governance landscape and may close some of the governance gaps. However, treaty negotiations do not explicitly include discussions on greenhouse gas emissions in the plastic sector, but some actors have advocated the interlinkages between the two issues. However, the mandate of the treaty negotiations is on plastic pollution and not decarbonization. Within the negotiations it has yet to be defined what a pollutant is and specifically whether GHG emissions should be considered one. Climate change mitigation clearly is not the primary objective of the negotiations and depending on the question of which pollutants ought to be included, may end up as a side effect, at best. But even if it is successful in this regard, the plastic pollution treaty will only be relevant for three of the four decarbonization strategies: increasing recycling rates, utilising alternative feedstocks, and limiting demand for plastic and plastic products. The decarbonization of energy inputs has not been part of the negotiations.

A climate club to complement the plastic pollution treaty

Climate clubs have been proposed as a governance innovation by economists and political scientists. The former often placed their hopes in clubs as a vehicle to coordinate and harmonize carbon pricing policies. The latter see them as a potential exit from the stalling climate negotiations. A club could unite a smaller subset of forerunners and provide a legally binding foundation for international cooperation on climate action, avoiding the cumbersome consensus-based decision making at the UNFCCC.

But climate clubs are also already a political reality, whether as "bargaining clubs" that facilitate negotiations of common objectives or even as tangible political initiatives. The most prominent example may be the climate club that was established as a result of the 2022 G7 summit in Germany. The club is scheduled to be launched as a multilateral forum with cooperation on industrial transformation as one of its priority areas at COP28 in late 2023.

The concept of climate clubs has received substantial interest both in academia and more recently also in international diplomacy. Especially when focused on specific sectoral themes, it promises to be a vehicle for circumventing gridlock in large governance regimes and enabling narrow and deep cooperation to advance

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climate action overall. But is a climate club the right tool for the job to close remaining governance gaps in the plastic industry? The sector meets two conditions in this regard. Firstly, the plastic industry is highly concentrated with a relatively small number of actors companies and countries contributing a major share of global production. This makes it comparably easy to achieve a critical mass of club members to actually affect the transformation of the sector. And secondly, the sector is highly trade-exposed which makes it much more difficult to implement transformative policies unilaterally.

But how could a plastic climate club foster sectoral transformation in practice? In theory, international governance institutions can perform five governance functions. They can provide **guidance & signal** through setting ambitious targets that demonstrate the resolve of treaty members or Parties; establish common **rules & standards** such as coordinated or even integrated national policies or setting common definitions (e.g., for green materials); create **transparency & accountability** to build trust and support compliance of set rules and standards; provide **means of implementation** in terms of capacity building, technology transfer, and financial support, especially for developing countries; and facilitate the creation of **knowledge & learning** e.g., through coordinated research and development activities. Following these governance functions, we propose the following design elements for a club:

- Ambitious long-term and interim policy targets are required to set expectations of investors and policy makers at national and subnational level. This would include a goal to **achieve climate neutrality in line with the objectives of the Paris Agreement (e.g., in year 2050)** and a **consensus on the gradual phase out of unabated conventional steam crackers.** This could be accompanied by specific goals to achieve high recycling rates (e.g., 75% in 2030, near universal recycling in 2050) and goals to reduce demand (in developed countries) and limit demand growth (in developing countries).
- These targets could be substantiated through concrete rules and standards such as a moratorium on investments and public funding in new conventional fossil-based and unabated production facilities, or common definitions for green polymers to enable the creation of lead markets e.g., via public procurement. Preferential tariffs for selected staple plastics could set incentives to focus on more easily recyclable polymers instead of creating ever more specialty plastic variants.
- A systematic **monitoring, reporting, and verification framework** is required to close the information gap that still hampers more ambitious international cooperation.
- Means of implementation are required to implement the transformation. This relates to human capacity, technologies, and, crucially, financial means. A **packaging and single-use plastics fund** could be established with a surcharge on all producers and importers of corresponding plastic products and the revenues used to finance more effective recycling.
- Systematic R&D and knowledge brokering would help to accelerate technological and policy learning which is essential in a transformation that can only succeed in a learning-by-doing mode.

A key remaining question is how a plastic climate club would position itself vis-a-vis the existing institutions and in particular vis-a-vis the plastic pollution treaty. Any plastic club initiative that would position itself in competition to the ongoing treaty negotiations would risk derailing the diplomatic process. Parties not involved in the club process would strongly oppose the club and decry that the club would pre-empt the results of the more inclusive discussions of the plastic pollution treaty. So, any Party that is interested in a strong plastic pollution treaty would have to be extremely careful to

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position the climate club as a complementary and not a competing instrument.

We strongly believe that there is sufficient scope and several meaningful vantage points for just that. First of all, the ongoing treaty negotiations cover aspects related to three of the four key decarbonization strategies. Using renewable energy inputs is not covered. So, this area would be a natural starting point for a plastics climate club. In its initial phase the plastic club could therefore prioritize goal-setting. Moreover, dedicated R&D activities and knowledge brokering activities to support the uptake of renewable and low carbon energy in the sector could be an early focus.

That is not to say that the other decarbonization strategies need to lie bare for the duration of the treaty negotiations. Instead, the plastic club could act as a bargaining club and form a negotiation alliance with the objective to achieve an ambitious plastic pollution treaty not only in its core objective to reduce pollution but also with respect to climate change mitigation side effects. Embedding such a bargaining alliance inside a formal climate club could also strengthen the negotiation position of the club members as they would be able to credibly argue that they revert to regulating within the club those aspects that are insufficiently addressed in the plastic pollution treaty. The club would effectively become a backstop for the treaty negotiations.

But where to start? The Climate Club established at the G7 meeting in Germany could provide a forum to develop more concrete governance arrangements for the plastic industry. The club has an express objective of supporting industrial transformation. However, as it currently stands, it is set up as a multilateral forum and lacks the institutional rigidity to implement many if not most of the design options proposed above. However, the club could well serve as an umbrella for developing more concrete and more binding governance arrangements.

A MORE DETAILED VERSION OF THIS ANALYSIS CAN BE FOUND IN:

Hermwille, L., & Diek, A. (2023). Contours of an International Plastics Climate Club. NDC ASPECTS Policy Paper. *https://www.ndc-aspects.eu/sites/default/files/2023-10/20230929_NDC%20ASPECTS_Plastic%20Club_final_1.pdf*

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Suggestions for further reading

Bashmakov, I. A., Nilsson, L. J., Acquaye, A., Bataille, C., de la Rue du Can, S., Fischedick, M., Geng, Y., & Tanaka, K. (2022). Industry. In *IPCC, 2022: Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [P.R. Shukla, J. Skea, R. Slade, A. Al Khourdajie, R. van Diemen, D. McCollum, M. Pathak, S. Some, P. Vyas, R. Fradera, M. Belkacemi, A. Hasija, G. Lisboa, S. Luz, J. Malley, (eds.)]* (p. 84). Cambridge University Press.

Bauer, F., Tilsted, J. P., Deere Birkbeck, C., Skovgaard, J., Rootzén, J., Karltorp, K., Åhman, M., Finkill, G. D., Cortat, L., & Nyberg, T. (2023). *Petrochemicals and climate change: Powerful fossil fuel lock-ins and interventions for transformative change*.

Falkner, R., Nasritousi, N., & Reischl, G. (2022). Climate clubs: Politically feasible and desirable? *Climate Policy*, *22*. https://doi.org/10.1080/14693062.2021.1967717

OECD. (2022a). *Global Plastics Outlook: Economic Drivers, Environmental Impacts and Policy Options*. Organisation for Economic Co-operation and Development. https://www.oecd-ilibrary.org/environment/global-plastics-outlook_de747aef-en

Raubenheimer, K., & Urho, N. (2022). *Global governance of plastics and associated chemicals. Secretariat of the Basel, Rotterdam and Stockholm conventions, United Nations Environment Programme.* Secretariat of the Basel, Rotterdam and Stockholm conventions. https://www.basel.int/Implementation/Plasticwaste/Callforinformation/Globalgovernanceofplasticsandassociatedchemicals/tabid/9378/Default.aspx

Stegmann, P., Daloglou, V., Londo, M., van Vuuren, D. P., & Junginger, M. (2022). Plastic futures and their CO2 emissions. *Nature*, *Vol 612*. https://doi.org/10.1038/s41586-022-05422-5

Zheng, J., & Suh, S. (2019). Strategies to reduce the global carbon footprint. *Nature Climate Change*, *9*, 374–378.

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POLICY PAPER

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