

# THE POLYMER PREMIUM:

**A Fee on Plastic Pollution**

Closing the financing gap for implementing an ambitious global plastics treaty.

# ACKNOWLEDGEMENTS



## Minderoo Foundation

Established by Dr Andrew Forrest AO and Nicola Forrest AO in 2001, Minderoo Foundation is a proudly Australian philanthropy that forges a fair future and seeks effective, scalable solutions to dismantle the systems that entrench inequality. We incubate ideas, advocate for change and accelerate impact. We uplift communities, advance gender equality, protect the oceans and respond to emerging challenges. One of our key programs is to stop plastic pollution by adopting a comprehensive life-cycle approach to plastic management.

## Analytical Contributors

**Systemiq** is the world's only "pure play" climate and systems change company. Its mission is to accelerate the transition to a net-zero, nature-positive and more inclusive economy. The analysis included in this report draws on an independent system model and scenario analysis carried out by Systemiq for *Plastic Treaty Futures*. The full methodology, approach and data assumptions in the *Plastic Treaty Futures* project were validated by an independent expert panel. *Plastic Treaty Futures* models multiple policy scenarios, and reference to the analysis in this white paper does not indicate a scenario recommendation by Systemiq or Plastic Treaty Futures expert panel members. The Systemiq team comprised Yoni Shiran, Felix Cornehl, Shajeeshan Lingeswaran, Astha Singh and Ben Hext.

**Wood Mackenzie** is an energy research consultancy that empowers strategic decision-making in global natural resources with quality data, analysis and advice. For this report, it supported the analyses of primary plastic production.



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Polluted water and plastic wastes claim many sea turtles lives and other marine species in Hatay, Türkiye. Sea turtles play critical roles in the marine environment but plastic waste destroys natural life and harms the life cycle of this species. In the Mediterranean Sea, 95 per cent of the waste consists of plastic materials. At least 10 turtles die every year due to fishing activities and ghost nets, according to Sea Turtles Research Rescue and Rehabilitation Center (Dekamer). (Photo by Sebnem Coskun/ Anadolu Agency via Getty Images)



# FOREWORDS



## Dr Andrew Forrest AO

Chairman, Munderoo Foundation

**Plastic pollution, in both its visible and more deadly invisible forms, from sprawling waste to nanoplastics and toxic chemical additives, wreaks havoc on human health and the sanctity of our natural environments.**

Now for the first time we have tracked the preliminary attack nanoplastics has on the human brain and biology. As the science improves to its predictable and inexorable conclusion, massive litigations will be launched if it is clear that corporations continued to unleash millions of tones of product, knowing it will immediately become poisonous to human.

The time for action is immediate. The time for those business leaders unburdened by self-awareness, selflessness, and feelings of responsibility for the future of their company and its shareholders is over. Directors' responsibility will return to haunt those who deliberately choose to do nothing.

That is before the judgement of their own children who's polluting environment they will share with the judgement of their own peers.

Today, as the world convenes to negotiate a global plastics treaty, we are presented with a monumental opportunity – not merely to stem the tide of pollution but to turn it. However, as this landmark report shows, raising the financial resources needed will require bringing the era of environmental and human health free-riding that has plagued our societies and ecosystems to an end.

Plastic producers and distributors are all aware of the consequences of their actions and the necessity of demonstrating to the public and future litigants that they stepped up to avoid the worst damage by participating in a sensible plastic fee that is shared by all.

Encouragingly, leaders in the consumer goods sector acknowledge their role and embrace the responsibility that comes with it, supporting mechanisms like extended producer responsibility (EPR) schemes to manage the aftermath of their products. However, as this report shows, such initiatives, while necessary, are insufficient to cover the sprawling costs of plastic pollution, especially in the nations least equipped to combat it.

Producers of primary or virgin plastic polymers, the originators of all plastics pollution, can share the burden with general consumers. This report argues for a modest fee on primary polymers – a fee so minimal that the industry or consumers would scarcely feel it, yet so impactful that it could catalyse the transition to a globally managed, circular plastics economy. This nominal contribution, less than ten cents on a kilogram of polymer, holds the power to underwrite comprehensive waste management systems, support a just transition for waste workers, remediate legacy pollution, and mitigate the dire human health impacts of this crisis.

This is not a punitive measure but a call to action, a call to responsibility. It is the price of maintaining a social licence to operate in a world that no longer tolerates the externalisation of environmental costs. As we stand on the precipice of change, this fee represents a beacon of hope and a tangible step towards a sustainable, equitable future.

The Polymer Premium is not just a recommendation; it is a necessity, a moral imperative for anyone who believes in the rights of future generations to a clean, thriving planet.



## Oliver Boachie

Special Advisor to the Minister of Environment, Science, Technology & Innovation, Republic of Ghana

**In June 2015, the Central Business District of Accra was submerged beneath floodwaters – not due to nature's fury, but because of the plastic waste clogging our waterways and drains. It transformed streets into rivers and homes into islands. This calamity spurred outbreaks of malaria and cholera, painting a harrowing picture of the repercussions of neglected waste management. Unfortunately, this is a scenario that has become painfully familiar to almost all Ghanaians.**

The entire fabric of Ghana's waste management infrastructure is being unravelled by the sheer volume of plastic waste. Of the close to a million tonnes of plastic waste generated in Ghana each year, more than half is mismanaged, accumulating in the environment, choking our rivers, littering our landscapes and threatening our very livelihoods.

In this pivotal moment, Ghana stands firmly in support of the Global Plastics Treaty, viewing it as not just a framework, but as a crucial lifeline to eradicate the blight of plastic pollution. However, our collective journey through various Multilateral Environmental Agreements (MEAs) reminds us of a recurring narrative: ambition undermined by a lack of resources for implementation—a narrative not unique to Ghana, but one that echoes across the developing world.

The aspirations of the treaty and the ambition to end plastic pollution hinge not just on establishing strong control measures, but crucially securing the mechanisms

for their implementation. Central to this, and pivotal for garnering the commitment of developing and developed nations to bold and binding agreements, is the resolution of the financing puzzle.

This report shines a bright light on the magnitude of the challenge and the financial commitments required to address it. It soberly concludes that the costs of ending plastic pollution will inevitably outstrip the resources developing countries will have at their disposal, even when considering potential private sector contributions, as well as contributions from Extended Producer Responsibility (EPR) schemes.

Ghana's proposal for a Fee on primary polymer production originates from our lived experience and understanding of what is fair, straightforward and effective. This report validates our stance, illustrating that a fee as modest as US\$60 to \$90 per tonne of polymer can seamlessly bridge the daunting financial chasm we face imperceptible to businesses and consumers alike, yet monumental in its potential to pivot the global narrative on plastic pollution from despair to hope.

As we stand on the cusp of a historical consensus to end plastic pollution, this proposal of a modest Fee emerges not as an additional burden, but as a pragmatic tool in our collective struggle. It's a testament to our shared resolve to not only dream of a future free from plastic pollution, but to finance the journey towards realising it.

As nations converge on the global stage to sculpt the contours of the plastics treaty, let this report, and the lessons drawn from Ghana's experience, guide our path. It is incumbent upon us, stewards of the earth for future generations, to seize this unprecedented opportunity to forge a legacy of resilience, sustainability and shared prosperity.

Manila, Philippines, 20 April 2023. Plastic waste in the San Juan river. According to a report by Oxford University, the Philippines is the largest ocean polluter in the world, contributing a third of the 80 per cent of global ocean plastic that comes from Asian rivers. (Photo by Ezra Acayan/Getty Images)

# EXECUTIVE SUMMARY

**Countries are negotiating a global treaty to end plastic pollution. Our analysis finds that developing countries, specifically, will face a significant financing shortfall to implement an ambitious treaty to end plastic pollution by 2040 [1,2]. We estimate that costs will exceed available funding by at least US\$350 to 500 billion, requiring governments to bridge the gap or risk undermining the treaty's objectives of protecting human health and the environment [3].**

Financial contributions from producers of primary plastic polymers, in the form of a plastic pollution fee (Fee), could provide a critical means of covering this gap. Our analysis demonstrates that a Fee of US\$60 to 90 per tonne of primary polymer – or just ten cents per kilo – would fully close the financing gap.

The Fee would be game-changing for the treaty to end plastic pollution. An ambitious treaty **with** a Fee could virtually end mismanaged plastic waste entering the environment by 2040 and protect human health. It would also reduce greenhouse gas emissions, remediate some of the vast quantities of legacy plastic pollution already in the environment, ensure a just transition for waste workers and address the negative human impacts across the plastic life cycle of production, use and waste.

On the other hand, an ambitious treaty **without** a Fee would inevitably be far from successful in ending plastic pollution and stemming human health impacts. Failing to address the financing gap would result, for example, in five times more mismanaged waste entering the environment annually by 2040 compared to a treaty with a Fee (50 million tonnes compared to 10 million tonnes).

Even assuming the full cost of the Fee is passed on by producers to their customers, a fee of US\$60 to 90 per tonne would increase the price of primary polymers by only 5 to 7 per cent on average. Moreover, because the cost of primary polymers is typically only a small part of the price of final plastic products, the impact on consumer prices would be significantly diluted: to just a fraction of a single percentage point. Cost-of-living impacts would, therefore, be negligible even for the most price-sensitive consumers on very low incomes (US\$1 to 2 per person per year).

In a time of unprecedented pressures on government budgets globally, the Fee represents a breakthrough idea for the treaty negotiations. A small premium on primary polymer prices would deliver positive environmental and human health impacts on a global scale, without any significant negative social or economic impacts.

1. We assume, for this study, that "Developing Countries" includes all Low- and Middle-Income countries as defined by the World Bank and SIDS.
2. As an example of an ambitious treaty, this study builds on the Global Rules Scenario, presented in *Towards Ending Plastic Pollution by 2040*, Systemiq/Nordic Council of Ministers (2023). See Box 1 for further details.
3. Cumulative costs from 2026 to 2040. Available funding includes existing government spending (five-year historical average) and expected funding from the private sector (from private finance and through Extended Producer Responsibility schemes).

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Nairobi, Kenya, 26 February 2022. A waste picker stands in the midst of the Dandora garbage dump with her weighing scale, waiting on people scavenging the landfill for re-usables and recyclables that can be resold. (Photo by Tony Karumba/AFP via Getty Images)





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Yangon, Myanmar, 14 January 2023. Waste collectors paddle polystyrene boats on Pazundaung Creek as they look for plastic and glass to recycle. (Photo by Sai Aung Main/AFP via Getty Images)

# Chapter 1 FIVE KEY FINDINGS

## 1 Developing countries face a financing gap of US\$350 to 500 billion to implement an ambitious global plastics treaty.

Our analysis calculates the costs of implementing an ambitious treaty that ends plastic pollution by 2040 [4]. We also estimate the likely impact of provisions to mobilise financial resources for treaty implementation including from private finance and from Extended Producer Responsibility (EPR) schemes. We estimate that, for developing countries, costs of implementation will exceed financing available from all sources by **US\$350 to 500 billion**.

This means that to end plastic pollution, developing countries would need to raise from their domestic budgets or from international development aid an additional **US\$25 to 35 billion per year** from 2026 to 2040.

These additional costs are broken down as follows:

- **Developing safe and environmentally sound waste management infrastructure** – which will require an estimated US\$175 to 250 billion in additional capital expenditure for formal collection sorting, mechanical recycling and safe disposal [5].
- **Supporting upstream transformation to a circular plastic economy** – requiring an estimated US\$55 to 80 billion in additional capital expenditure for elimination, substitution and re-use models, including reverse logistics [6].
- **Ensuring a just transition** – an estimated US\$25 to 45 billion in total expenditure to support informal waste workers, including their ability to earn a living wage from collecting and sorting plastic.
- **Cleaning up legacy plastic pollution** – US\$60 to 75 billion in total expenditure, targeting plastic pollution hotspots, especially unsanitary dumpsites, rivers and beaches.
- **Addressing the human health impacts of plastic pollution** – US\$25 to 50 billion to fund transparency, traceability and disclosure regimes; human health research and monitoring programs; and the development of standards and guidelines, including chemical simplification, comprehensive chemical regulation and safer alternatives.

## 2 A Fee of US\$60 to 90 per tonne on primary polymer production would close the financing gap and enable developing countries to implement ambitious treaty obligations in full.

In the treaty negotiations, a Fee on primary polymer production is seen as an innovative solution to the financing challenge for developing countries. The Chair's Zero Draft [7] and the Revised Draft [8] both include a Fee as one of the potential means of implementation.

Imposing the Fee on the production of primary plastic polymers, at the start of the plastics value chain, is consistent with the polluter pays principle. Primary polymers are the source of all plastic production and, hence, all pollution [9]. A Fee at this stage of the value chain would be relatively easy to administer because the number of affected entities is small: just 50 companies account for 90 per cent of primary polymers produced [10].

We estimate that generating sufficient funds to cover the financing gap of US\$350 to 500 billion would require a Fee of US\$60 to 90 per tonne of primary polymer produced – assuming a uniform fee is charged on all producers of all primary polymers, and that producers of secondary (recycled) polymers are exempt from the Fee. This fee level includes an assumption that a 10 per cent share of revenues is retained by the country where the Fee is collected, to cover the costs of plastic waste collection and as an incentive to participate; and assumes administrative costs for managing the redistributed revenues of five per cent.

4. For a description of the modelling approach, see Box 1.

5. Costs required over-and-above existing capital expenditure (5-year historical average) and assuming EPR schemes will cover ongoing operating costs of waste management.

6. Estimated capital required to de-risk investment from private finance sources.

7. "Zero draft text of the international legally binding instrument on plastic pollution, including in the marine environment" (UNEP/PP/INC.3/4, 4 September 2023).

8. "Revised draft text of the international legally binding instrument on plastic pollution, including in the marine environment" (UNEP/PP/INC.4/3, 24 January 2024).

9. For more detail, see #2 in FAQs section.

10. Charles D & Kimman L. (2023), *Plastic Waste Makers Index 2023*, Minderoo Foundation - with an extrapolation for the major polymer groups not in the scope of the analysis (PET fibre, PVC).

### 3 The Fee could have a decisive impact on the success of a treaty in ending plastic pollution by 2040.

Our analysis finds that an ambitious treaty with a Fee of **US\$60 to 90 per tonne** would virtually end mismanaged plastic waste by 2040 and significantly reduce both primary plastic production and greenhouse gas emissions (GHG). Although we have not been able to quantify the impacts, other important measures such as legacy pollution, human health and just transition would also be improved.

On the other hand, without a Fee, the same ambitious treaty would fall far short of ending plastic pollution and its harm to human health, even with demanding control measures across the full plastics life cycle. The Fee's critical contribution lies in providing developing countries with the means to cover the significant financing gap between the costs of treaty implementation and the financial resources likely to be available from the private sector.

Specifically, together with ambitious control measures, a Fee of US\$60 to 90 per tonne could deliver by 2040:

- 90 per cent less mismanaged plastic waste entering the environment each year, compared to 2019: from around 100 million tonnes per year in 2019 down to an estimated 10 million tonnes. A treaty without a Fee, would result in only a 50 per cent reduction (to 50 million tonnes).
- 10 per cent less virgin production (equal to 30 million tonnes per year), as compared with a treaty without a Fee.
- 5 per cent less GHG emissions (equal to 100 million tonnes CO<sub>2</sub>e per year), as compared with a treaty without a Fee.
- A reduction in legacy plastic pollution hotspots, which would otherwise not be well addressed in a treaty without a Fee.
- The ability to mitigate human health impacts and a capacity to monitor and respond to existing and emerging harms.

### 4 The Fee would provide much-needed support for a just transition and not have any meaningful adverse social or economic impacts.

The Fee would have a positive impact on developing economies, stimulating job creation and economic growth through investment in infrastructure for a circular economy in the upstream part of the plastics value chain; and safe and sustainable waste management and recycling systems in the downstream. By providing funding to ensure a just transition for the informal waste sector, the Fee could also raise the living standards of an estimated 24 million waste workers globally.

The adverse economic impacts of the Fee are expected to be limited. Even assuming 100 per cent of the cost is passed on by producers, a fee of US\$60 to 90 per tonne would increase the price of primary polymers by only 5 to 7 per cent on average, in a context where prices have historically fluctuated by plus or minus 20 per cent on average over the past decade. Moreover, the impact of these price increases on consumer demand would be significantly diluted because the cost of primary polymers is only a small fraction of the price of final products.

By extension, a Fee of US\$60 to 90 would not have any meaningful adverse social impacts. We estimate the average impact of the Fee on consumer prices to be just a fraction of a single percentage point, even for the most cost-sensitive products in most price-sensitive developing countries. The impact on the cost-of-living from the Fee would be negligible – an estimated average additional cost per capita of US\$1 to 2 per year in low-income countries.

### 5 While a much higher Fee could support switching away from primary plastic production, it would not replace the need for ambitious regulatory control measures. A much higher Fee would also come with greater uncertainty and potential adverse social and economic impacts.

Our analysis supports studies by the OECD, which suggest that to function as an economic instrument that reduces primary plastic production, the Fee should be between US\$1,000 to 2,000 per tonne [11]. At those levels, we would expect to see increased switching to circular solutions, as the economics of recycling, re-use and substitution improve in comparison to primary plastic production.

However, our analysis suggests that ambitious regulatory control measures would still be required to unlock constraints to widespread adoption of alternatives to primary plastics – for example, global adoption of radical re-design standards required to improve the efficiency and safety of closed-loop mechanical recycling.

A fee in the US\$1,000 to 2,000 range would, therefore, not replace the need for control measures; rather, we expect such a fee could have a de-risking effect in delivering the expected impact of such measures. A higher fee – representing a 100 to 150 per cent mark-up on current polymer prices – also comes with greater uncertainty and potential for adverse social and economic impacts.

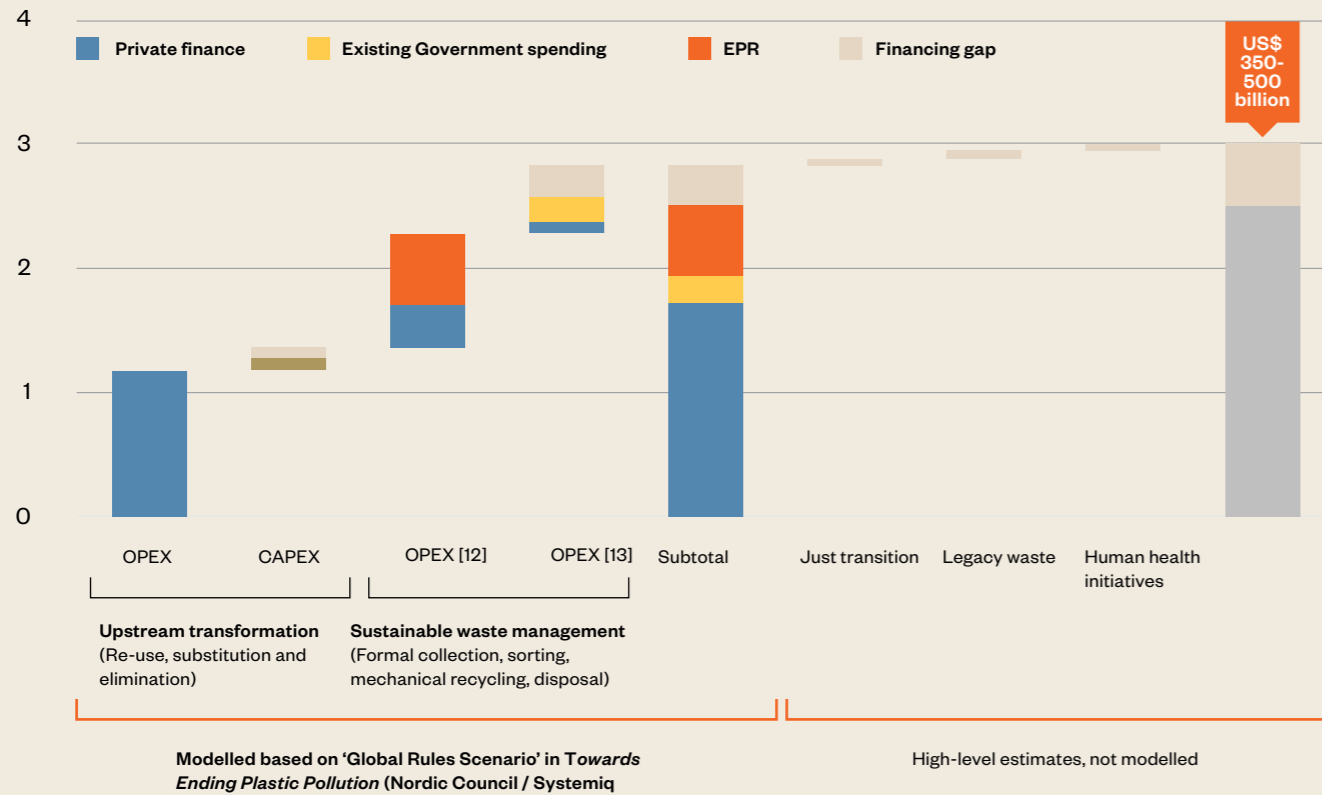


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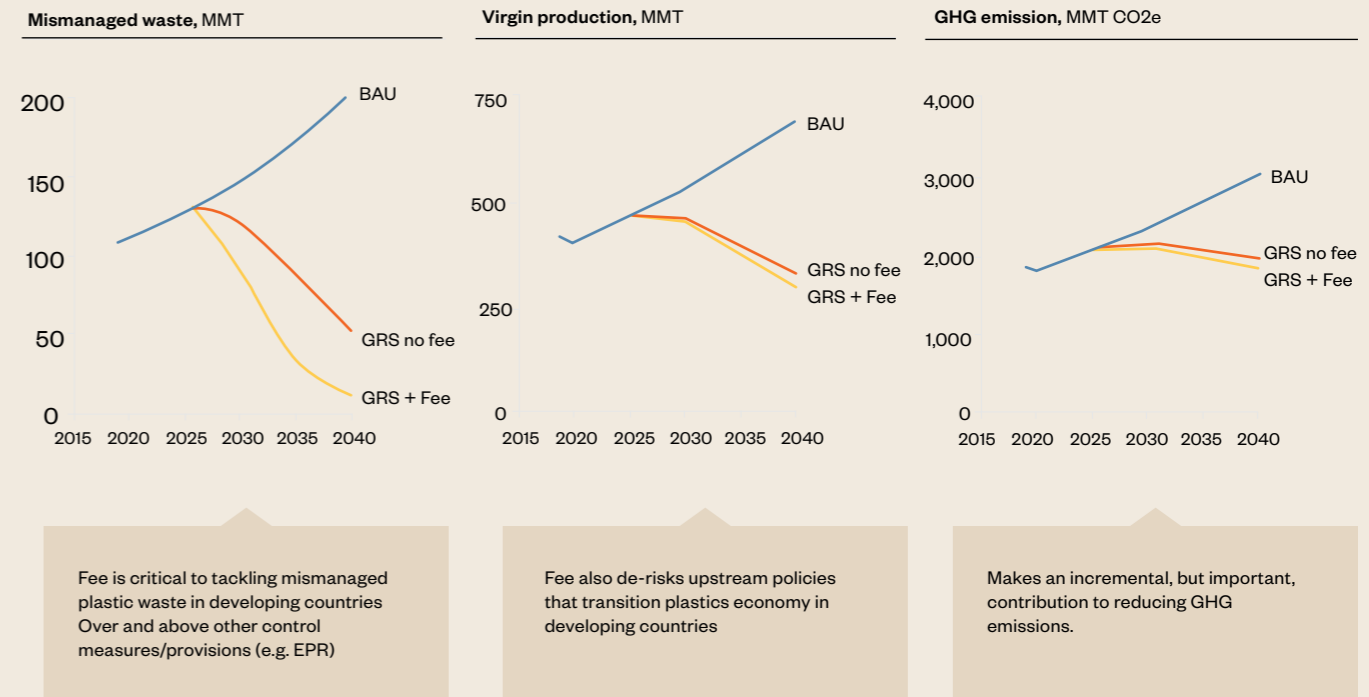
San Jose, Costa Rica, 8 July 2018. People weigh plastic bottles as they help collect 25 tons for recycling in eight hours, setting a Guinness World Record. (Photo Ezequiel Becerra/AFP via Getty Images)

**Figure 1: In developing countries, costs of implementing an ambitious treaty will exceed available funding by an estimated US\$350-500 billion**

Estimated financing requirements and available resources, 2026-2040 cumulative US\$ trillions. All low- and middle-income countries as per World Bank definitions



**Figure 3: Environmental impacts: without a fee, an ambitious treaty will fall short of ending plastic pollution**

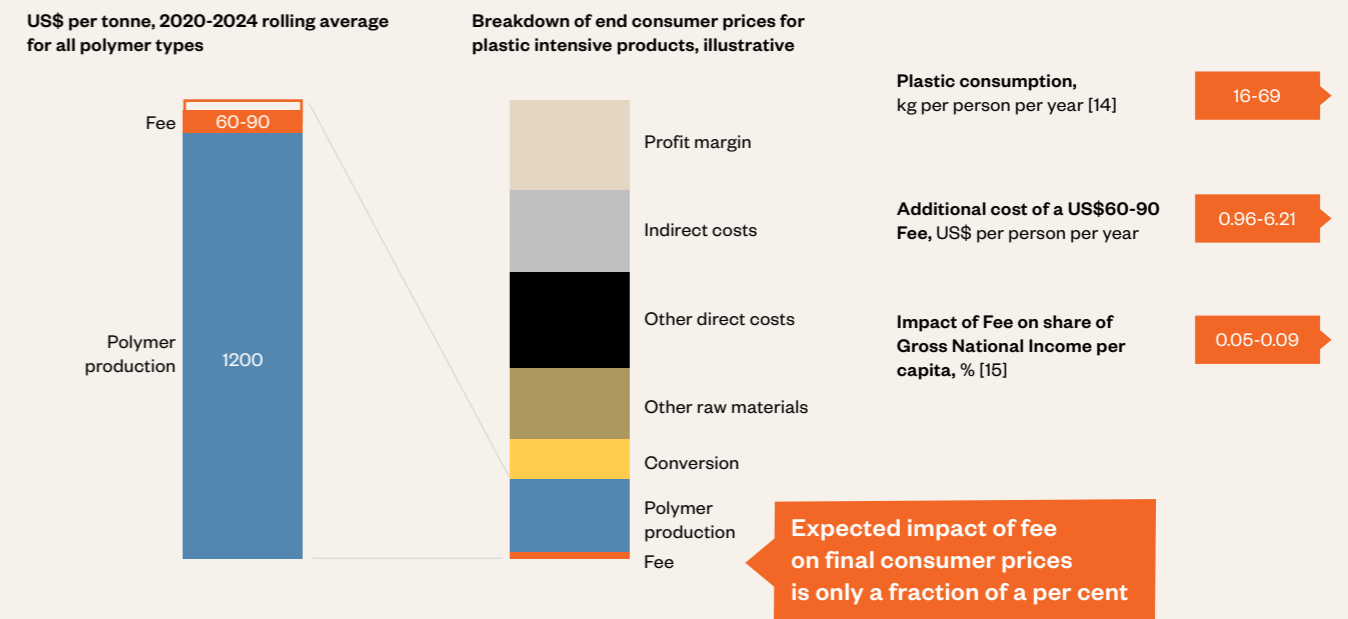


**Figure 2: A Fee of US\$60 to 90 per tonne on primary polymer production would close the financing gap and enable developing countries to implement ambitious treaty obligations in full**

Unique and significant costs of ending plastic pollution in developing countries	Estimated financing gap US\$ billion, cumulative 2026-2040	Fee level required US\$ per tonne virgin production
Safe and environmentally sound waste management	175-250	29-41
Upstream circular economy transformation	55-80	9-13
Ensuring a just transition	25-45	4-8
Addressing legacy plastic waste	60-75	8-12
Human health initiatives	25-50	4-8
Administrative costs of managing redistribution of Fee revenues		3-4
Retained share by governments collecting Fee on plastic producers		6-7
<b>TOTAL</b>	<b>US\$350-500 billion (total) US\$25-35 billion (per year)</b>	<b>60-90</b>

**Figure 4: The fee will not have any meaningful adverse social or economic impacts**

While the impact of a US\$60-90 fee on average polymer prices is around +5-7% ... the impact on converted plastic products is significantly diluted... ... and the impact on cost-of-living is negligible even for developing countries



12. Assumes that as EPR revenues replace existing government expenditure on managing plastics, budget is redirected to cover cost of expanding wider waste management system.  
13. Assumes a contribution to the overall capex costs of expanding the capacity of waste management systems to achieve full recovery of plastic waste.

14. OECD (2022), Global Plastics Outlook database  
15. The World Bank (2024), World Development Indicators



## Chapter 2

# SYNTHESIS OF STAKEHOLDER CONSULTATION: FREQUENTLY ASKED QUESTIONS

With our previous *Design Study (The Plastic Pollution Fee: Outlining the options ahead of INC-3, October 2023)*, we solicited feedback from governmental and non-governmental stakeholders on options for the design and implementation of the Fee. Based on this fruitful engagement, we have distilled answers to some Frequently Asked Questions. We are open to discussing them and any other questions that may arise with interested stakeholders.

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Sousse, Tunisia. Imagine holidaying at this tourist resort, where the beach is awash with vegetation, metal and plastic waste. (Photo by: Andy Solomon/UCG/Universal Images Group via Getty Images)





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**Far left:** Istanbul, Türkiye. A woman puts a plastic bottle into a vending machine as she waits to take extra credit on her travel card at a metro station. Türkiye has a notoriously bad record on recycling and waste. (Photo credit BULENT KILIC/AFP via Getty Images)

**Left:** Nairobi, Kenya. Inger Andersen, Executive Director of the United Nations Environment Programme (UNEP), speaks with Richard Kainika, secretary-general of the Association of Kenyan Waste Recyclers, during a field trip to the Dandora Dumpsite ahead of the Fifth Session of the United Nations Environment Assembly (Photo by James Wakibia/SOPA Images/LightRocket via Getty Images).

## 1 WHO PAYS THE FEE?

All producers of primary plastic polymers would be required to pay the Fee of US\$60 to 90 per tonne of polymer production. This approach would:

- implement the polluter pays principle, with the Fee imposed on the production of primary plastic polymers, at the start of the plastics value chain, which leads to all plastic pollution
- facilitate easy implementation as compared to a Fee imposed on midstream plastic products, where the value chain is far more fragmented with many more companies at each step
- ensure a level competitive playing field for producers around the globe, preventing unfair competition and avoiding a shift in production to countries with a lower or no Fee.

## 2 WHY IS THE FEE IMPOSED ON ALL PRIMARY POLYMER PRODUCERS?

Imposing the Fee on the producers of primary plastic polymers implements the polluter pays principle, a well-established feature of national and international environmental law [16].

There are four interconnected points of note:

- The ultimate source of all plastic pollution is the plastic polymers that are produced at the start of the plastics life cycle, and that are then incorporated into all downstream plastic products. There is no plastic pollution without primary plastic polymers.
- The process of producing these plastic polymers does not simply mark the start of the plastics life cycle. Instead, this first step in the life cycle plays a decisive role in plastics becoming an environmental hazard later in the life cycle. This is because the chemical process of polymerization – which is a producer's proprietary process to create polymers – gives plastic products the unique physical properties that make them, at once, extremely useful to society and an environmental and human health hazard.

- There is a strong correlation between the production of primary plastic polymers and the generation of plastic pollution [17]. Thus, the production of primary plastic polymers generates, with exceptional predictability, a defined quantity of plastic pollution.
- While there may be some variation between polymer types in terms of intensity of plastic pollution, all primary polymers contribute to pollution. A fee on all primary polymer production is therefore justified, also because it avoids regrettable substitution and simplifies implementation of the Fee.

**In summary, it is fitting that primary polymer producers should contribute to meeting the pollution costs resulting from their products.**

The scale of this contribution under the proposed Fee is small (US\$60 to 90 per tonne, which is around 5 to 7 per cent on average of the polymer price, and just a tiny fraction of the price of downstream plastic products); and primary polymer producers paying the Fee may also pass some or all of the costs further down the value chain. The Fee would also apply fairly and uniformly to all polymer producers around the globe, so it would not distort competition among polymer producers in different countries, while generating significant environmental and human health benefits.

Contributions from primary polymer producers would still cover only part of the costs of plastic pollution. Others in the supply chain would also contribute to meeting these costs: for example, through EPR schemes, companies placing final plastic products on the market. The Fee would, therefore, just be one of several mechanisms that ensure fair burden sharing across the plastics value chain.

16. See, e.g., Rio Declaration Principle 16.

17. OECD Global Plastics Outlook: global primary plastic production vs. global mismanaged waste, 2000-2019 (R2 = 0.985).



Palembang, Indonesia. Students weigh plastic waste before class at an early childhood education centre. Indonesia is the world's second-biggest marine polluter behind China and has pledged to reduce plastic waste in its waters some 70 per cent by 2025. (Photo by MUHAMMAD A.F./Anadolu Agency via Getty Images)

### 3 HOW ARE FEE REVENUES DISTRIBUTED?

Countries collecting the Fee from their polymer producers could retain part of the revenues (retained share), while the remainder would be distributed among a group of eligible countries (redistributed share). For present purposes, we assume a 10 per cent retained share and a 90 per cent distributed share.

The retained share (10 per cent) would cover the producing countries' costs of collecting the Fee and create an incentive for participation.

The redistributed share (90 per cent) would be redistributed among eligible countries, including both producer and non-producer countries. Our analysis treats all low- and middle-income countries, as defined by the World Bank, as eligible. These countries would be entitled to receive financing from the Fee to support their costs of treaty implementation, including to develop a safe and sound waste management infrastructure, to support a circular transformation of the "upstream" plastic economy, to enable a just transition and to clean up legacy pollution.

Negotiating countries could agree a different balance between the retained and distributed shares, including an evolution in that balance over time. Countries could also agree a higher retained share for developing producer countries as compared to developed producer countries.

**If countries agreed on a higher retained share, the Fee rate would likely need to increase above US\$60 to 90 per tonne to ensure sufficient redistributed funds are available to end virtually all plastic pollution by 2040.**

### 4 DOES THE FEE REPLACE THE NEED FOR AMBITIOUS CONTROL MEASURES?

No, the Fee would complement ambitious control measures. The Fee would enable low- and middle-income countries to implement control measures in full by closing the financing gap where costs of implementation exceed available sources of finance. Specifically, our analysis assesses the impact of the Fee in closing the financing gap when considering the costs of implementing the ambitious control measures identified in the "Global Rules Scenario" proposed in the Nordic Council of Ministers study (2023). By generating a significant and predictable source of financing, the Fee will enable low- and middle-income countries to accept and implement ambitious control measures, which they might otherwise consider too costly to adopt. Even if countries agreed upon less ambitious control measures, the Fee would still be an important instrument to pay for treaty implementation.

### 5 DOES THE FEE REPLACE THE NEED FOR TRADITIONAL SOURCES OF TREATY FUNDING?

No, the Fee would complement traditional sources of funding for treaty implementation, in particular, meeting some of the large and unique costs of ending plastic pollution (e.g., funding waste management infrastructure and cleaning up legacy pollution and addressing human health impacts). The cost of treaty implementation would, therefore, be shared between private and public financing. The Fee would, therefore, ease the burden on government budgets to end plastic pollution.

### 6 DOES THE FEE REPLACE THE NEED FOR NATIONAL EPR SCHEMES AND PLASTIC TAXES?

No, the Fee would complement, even strengthen, national EPR schemes and plastic taxes, without charging twice to cover the same pollution costs (no double taxation).

These instruments differ in certain ways and are mutually reinforcing:

- Who pays? EPR schemes and plastic taxes typically apply to midstream companies placing plastic products on the market, while the Fee would apply to upstream polymer producers.
- Where? EPR schemes and plastic taxes fund some of the costs of managing pollution in the country where they are collected; while the Fee would cover additional costs of managing plastic pollution, notably in LMI countries.
- What plastic pollution costs are covered?
  - EPR schemes typically cover the operating costs of national waste management for some (but not all) plastic products (e.g., packaging) but generally not the capital costs of significantly scaling up waste management infrastructure.
  - Plastic taxes do not typically cover costs as they are not hypothecated. Rather, taxes are designed to change behaviour – i.e., acting as an economic instrument, not a financing instrument. Examples are UK plastic tax, UK landfill tax, and EU plastic tax.
  - The Fee could cover the capital costs of building a waste management infrastructure in low- and middle-income countries for all plastic waste; it could also cover the costs of cleaning up legacy pollution, just transition, and supporting sustainable circular economy infrastructure, and mitigate human health impacts.

**As an example of the complementary effects, the Fee could finance the capital expenditure costs of building waste management systems in low- and middle-income countries and, once the systems are up and running, EPR could cover the costs of ongoing operations.**

### 7 HOW TO ADMINISTER AND DISTRIBUTE THE FEE REVENUES?

The negotiating countries would have different options for the design of the institutional mechanism to administer the redistributed funds among low- and middle-income countries. Among the issues, they would have to decide whether to pool redistributed Fee revenues with traditional sources of funding under the treaty, and they would have to designate the entities responsible for administration.

Under the Chair's Zero Draft (4 Sep 2023) and Revised Draft (28 Dec 2023), the redistributed funds would be pooled with traditional sources of funding as part of the financial mechanism under the treaty. Both Drafts foresee that the financing mechanism could be one or more new dedicated funds; or it could be a dedicated fund within an existing arrangement, such as the Global Environmental Facility Trust Fund ("GEF").

Countries could also decide to administer the redistributed funds from the Fee separately from traditional sources of funding. A separate funding mechanism could, again, be a new mechanism dedicated to the administration of redistributed revenues or a fund within an existing financial arrangement (e.g., GEF). Other stakeholders, such as producer responsibility organisations ("PROs"), which have experience in waste management, could be involved in the administration and allocation of funds.

## 8 ARE THERE PRECEDENTS FOR THE FEE IN OTHER INTERNATIONAL INSTRUMENTS?

Yes, states have already made international commitments to impose fees and other charges on economic operators for environmental reasons, including to address the costs of a polluting activity and in a way that preserves a level playing field for competition. Under these commitments, states have previously agreed to redistribute revenues to other states, including to pay for environmental costs and to promote international equity and sustainable development.

**Table 1 summarises examples, including the International Oil Spill Compensation Fund (“IOPC Fund”), the Rulebook on Article 6.4 of the Paris Agreement (“Paris Rulebook”), the Carbon Offsetting and Reductions Scheme for International Aviation (“CORSA”) and the OECD/G20 minimum income tax.**

## 9 IS THE FEE CONSISTENT WITH NATIONAL FISCAL SOVEREIGNTY?

Yes, each country would agree to the Fee as part of the plastics treaty, in an exercise of its national sovereignty, following its own constitutional approval and ratification procedure. The Fee would be imposed and collected by national authorities, and not by an international entity, according to national modalities for imposing and collecting the Fee, applying sanctions in case of non-compliance, and distribution of the redistributed share. Thus, national authorities could, at their discretion, choose how to impose and collect the Fee (e.g., administer the Fee independently, or linked to existing mechanisms, such as national EPR schemes).

The precedents in Q6 (and in Table 1) include similar and even more far-reaching commitments than the Fee. To give some examples:

- a. IOPC Fund: Like the Fee, the IOPC fee/levy rate is established by an international entity, the IOPC Fund Assembly, in which all parties are represented. While the Fee would be administered by national authorities, the IOPC fee/levy is administered by an international body. That is, following a decision by the IOPC Fund Assembly, the Director of the IOPC Fund issues an invoice directly to each subject company and each subject company pays its contribution directly to the IOPC Fund.
- b. OECD/G20 minimum income tax: Under the second pillar of the OECD/G20 minimum income tax rules (i.e., the Global Anti-Base Erosion Model Rules), countries have agreed a minimum corporate tax rate, usually a key pillar of national fiscal policy. States have also agreed that, in certain circumstances, one State can collect tax revenues attributable to activities in another State.

## 10 HOW WOULD THE TREATY INCORPORATE THE FEE?

Negotiating countries have options on how to include the Fee in the treaty. The Fee could be included: (a) in the treaty with modalities developed by countries in the governing body; (b) in the treaty with the modalities agreed in an annex; or (c) in a protocol to the treaty.

- a. In the Chair’s Zero Draft, the Fee is integrated into the treaty, with modalities to be agreed by the governing body after treaty adoption (e.g., rate; allocation criteria). This leaves flexibility to develop, and adapt and strengthen, the modalities over time. The Fee would become operational after the governing body has adopted the modalities.
- b. The Fee could, again, be included in the treaty but with modalities agreed in an annex. Countries would have the flexibility to develop, and adapt and strengthen, the modalities, using the procedures applying to the annex. The Fee would become operational upon ratification of the treaty.
- c. Instead of including the Fee in the treaty, it could be agreed in a separate protocol to the treaty. The Fee would apply only to the parties that accept the protocol, although they could take actions to level the playing competitive field in their own markets. The parties would have flexibility to develop, adapt and strengthen, the modalities of the Fee over time, using the procedure in the protocol. The Fee would become operational with ratification of the protocol, which could happen together with the treaty or, more likely, later.

## 11 COULD THE FEE TACKLE “FREE RIDING” BY PRODUCERS IN COUNTRIES NOT PART OF THE FEE MECHANISM?

Yes, the Fee could be designed to prevent “free riding” in case some countries that produce plastic polymers do not agree to the Fee. In that case, producers of plastic polymers in “non-Fee” countries would not pay the Fee in their country of production. To prevent these producers and their products gaining an unfair competitive advantage in the markets of countries that charge the fee, a border adjustment equivalent to the Fee could be charged on imported plastics and plastic products that come from non-Fee countries. As explained in our [Design Study](#) (see Annex D-5/6), this border adjustment could be designed to be consistent with international trade rules.

## 12 HOW DOES THE FEE IN THIS REPORT COMPARE TO OTHER FEE PROPOSALS?

Our proposed Fee is similar to the fee included in the Chair’s Zero Draft (4 September 2023) and Revised Draft (28 December 2023). It is also similar to the fee proposed by Ghana in its submission to INC-2 [18]. The main common features are that the Fee would be a financing instrument (as one of the means of implementation) to finance treaty implementation, in particular the large and unique costs of ending plastic pollution; and the Fee would be paid upstream, by plastic polymer producers, to implement the polluter pays principle.

**Our report is also consistent with the findings from other studies, in particular by the OECD (2022) and the Nordic Council of Ministers (2023). Like our study, these studies show that a fee is an essential part of a plastics treaty that would successfully end plastic pollution by 2040.**

There are notable differences in the amount and design of the charge as proposed by the OECD and Nordic Council of Ministers, with both suggesting charges in the range of US\$500 to 2,000 per tonne, depending on geography. In both proposals, revenues from the charges are retained where they are levied – that is, unlike the Fee, there is no needs-based redistribution of revenues proposed. Our study shows that a much smaller fee of US\$60 to 90 per tonne, redistributed to developing countries, would be sufficient to end virtually all mismanaged plastic waste, and improve other important measures such as GHG emissions, legacy pollution, human health and a just transition. At this lower rate of US\$60 to 90 per tonnes, the Fee has no notable impact on the cost of living facing consumers of plastic products.

### 13 WHY IS HUMAN HEALTH IMPORTANT TO INCLUDE WHEN DESIGNING THE FEE AND USING THE PROCEEDS TO IMPLEMENT THE GLOBAL PLASTIC TREATY?

Our proposal for a Fee was not designed to estimate hazards and impacts of plastic on human health and, indeed, biodiversity. Despite this, we recognise that the impact of plastic on human health is both a driver for needing a fee as well as a mean to address at least some of the impacts from plastic on human health.

**Driver for a fee:** Harms to human health from plastic can be grouped into 4 areas, all of which come with associated costs:

- i. Global and regional impacts from industrial processes across the plastic life cycle from producing plastic to waste management and recycling. This includes green-house gases, particulate air pollution and chemical releases. We estimated that the global human health costs in the production phase attributable to plastic were ~US\$600 billion in 2015 alone [19].
- ii. General population exposure to chemicals including additives that migrate from plastic products. We see harms to humans across our lifecycle from before birth to adults. The health costs of from just 3 chemicals BPA, DEHP phthalate and flame retardant PBDEs for attributable deaths, loss IQ points in children, coronary heart disease and stroke IN US ALONE was ~US\$675 billion in 2015. In addition, polymers need to be considered here because they are composite materials (i.e. polymerised monomers + additives) and may also give rise to several health risks along the life cycle in their own right [20].
- iii. Exposure to micro- and nanoplastics across the plastic life cycle. Although we do not yet have accurate measures of internal exposures in humans due to inadequacies in measurement techniques, there is every reason for human health concerns due to both the physical properties of plastic particles as well as because they are also carry chemicals, both intentionally and non-intentionally added [21].

iv. As noted throughout this paper, health risks are likely keenest felt in occupational & fence line communities, particularly during both the production and waste management / recycling phases. Such communities have little, if any, ability to avoid or mitigate health impacts [22].

**Implementing the treaty:** The Fee as a funding source to mitigate the harms to human health from plastic.

Currently, human health costs are eternalised by industry in terms of both disease burden as well as the biomonitoring and epidemiological research required to determine the extent of the harm. Both these types of activities are undertaken likely exclusively by tax-payer funded schemes. A Fee would contribute towards both reversing the burden of proof for chemical safety before release of plastic products to market and enable policy development and implementation to protect human health after market release. These include:

- **Activities promoting transparency, traceability and disclosure** related to plastic chemicals, polymers and products of concern *before* market release.
- **Monitoring and research programs related to plastics** *after* market release, especially national-scale systems to collect and measure biospecimens to monitor exposure and detect harm should it be occurring. Noting that developing country populations are currently chronically understudied [23].
- **Development of standards and guidelines** on product design, chemical simplification and safer alternatives.

19. Minderoo-Monaco Commission  
 20. Minderoo-Monaco Commission and [https://echa.europa.eu/documents/10162/17233/rest\\_pvo\\_investigation\\_report\\_en.pdf/98134bd2-f26e-fa4f-8ae1-004d2a3a29b6?t=1701157368019](https://echa.europa.eu/documents/10162/17233/rest_pvo_investigation_report_en.pdf/98134bd2-f26e-fa4f-8ae1-004d2a3a29b6?t=1701157368019)  
 [based on attributable deaths, loss IQ points in children, coronary heart disease and stroke]  
 21. Minderoo-Monaco Commission  
 22. Minderoo-Monaco Commission  
 23. Developed country examples include NHANES in the US and the Norwegian Environmental Biobank (MoBa) in Norway.

**Table 1: Relevant international examples**

Relevant international examples	Similarities with the fee
<p><b>IOPC Fund:</b></p> <p>The International Oil Spill Compensation Fund is an international intergovernmental organisation established by countries under an international convention to administer an international compensation regime for pollution caused by spills of persistent oil from tanker. To finance compensation, the convention mandates the IOPC Fund to impose and collect a fee/levy directly on subject companies (based on the quantity of oil received by that company). Each year, the IOPC Fund Assembly establishes the annual rate of the fee/levy considering anticipated compensation and administrative costs. Following a decision by the IOPC Fund Assembly, the Director of the IOPC issues an invoice to each subject company, which pays its contribution directly to the IOPC Fund.</p>	<ul style="list-style-type: none"> <li>a. The IOPC Fund imposes an internationally mandated fee/levy on companies.</li> <li>b. Revenues are redistributed to states/ persons affected by pollution.</li> <li>c. The fee/levy rate is established internationally by the IOPC Fund Assembly, which is composed of all countries party to the convention.</li> <li>d. The fee/levy rate per ton of oil received is uniform, creating a level competitive playing field for companies.</li> </ul>
<p><b>Paris Rulebook:</b></p> <p>Article 6.4 of the Paris Agreement provides for a new Sustainable Development Mechanism (“SDM”) which enables the creation and trading of carbon offsets, known as “Article 6.4 ERs”. The Paris Rulebook provides detailed procedural rules to participate in the SDM. Relevantly, States have mandated a levy of 5 per cent of Article 6.4ERs issued to a mitigation activity to be transferred to, and monetised by, the UNFCCC Adaptation Fund. These funds will then be redistributed to support climate adaptation in developing countries. A further 2 per cent of Article 6.4ER must be cancelled to support overall mitigation in global emissions.</p>	<ul style="list-style-type: none"> <li>a. The Paris Rulebook imposes an internationally mandated fee on companies.</li> <li>b. Revenues are redistributed to address developing country needs in relation to an environmental issue.</li> <li>c. The fee rate is uniform, irrespective of where the credit is generated, creating a level playing competitive field for companies.</li> </ul>
<p><b>CORSIA:</b></p> <p>The Carbon Offsetting and Reductions Scheme for International Aviation (CORSIA) is a 2016 scheme agreed within the International Civil Aviation Organization (“ICAO”). Under the offsetting requirements (voluntary today, mandatory from 2027), aircraft operators must purchase carbon credits to offset increases in GHG emissions above a 2019 baseline level for certain international flights. The system is administered by national authorities, which report to ICAO on their airline operators’ liabilities.</p>	<ul style="list-style-type: none"> <li>a. CORSIA imposes an internationally mandated charge on economic operators to cover pollution costs by requiring the purchase of carbon offsets.</li> <li>b. Uniform requirements imposed on all aircraft operators, creating a level competitive playing field for companies.</li> <li>c. Administered nationally, requiring states to report to an international entity (ICAO).</li> </ul>
<p><b>OECD/G20 minimum income tax:</b></p> <p>Under the OECD/G20, countries have agreed an Inclusive Framework on Base Erosion and Profit Shifting (“BEPS”) to prevent tax avoidance. Under the second pillar, countries have agreed to incorporate a minimum corporate tax of 15 per cent on large multinational enterprise groups (“MNE Groups”) by implementing the Global Anti-Base Erosion Model Rules (“GloBE”). If MNE Groups are subject to a tax rate below 15 per cent, they pay a top-up to bring the tax to 15 per cent. This top-up can be collected by the home jurisdiction of the ultimate parent entity or in the jurisdiction where the MNE is located. Under Pillar II, countries have agreed to give greater taxing rights to developing countries, where the recipient is subject to a nominal corporate income tax rate below 9 per cent.</p>	<ul style="list-style-type: none"> <li>a. Countries implementing the GloBE have agreed to impose a charge (minimum tax) on economic operators.</li> <li>b. The minimum income tax is designed to ensure a level competitive playing field for companies.</li> <li>c. BEPS Pillar II includes a mechanism that provides differentiated treatment in favour of developing countries.</li> </ul>

## Chapter 3

# BACKGROUND, OBJECTIVES AND SCOPE

The global community is demonstrating its commitment to ending plastic pollution like never before. The United Nations Environment Assembly (UNEA) has mandated the negotiation of a legally binding international treaty to end plastic pollution, including in the marine environment. Ending plastic pollution will have many benefits: protecting human health, human rights, biodiversity and the environment generally; and tackling climate change by lowering greenhouse gas emissions from the plastics life cycle.

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Valladolid, Castilla y Leon, Spain,  
11 July 2023. European Union  
environment and energy ministers  
meet on the second day of an  
informal meeting. (Photo By  
Photogenic/Claudia Alba/Europa  
Press via Getty Image)





President of UNEA-6, Leila Benali (right) flanked by Executive Director of the UN Environment Programme Inger Andersen (left) during the closing session of the 6th United Nations Environment Assembly. (Photo by SIMON MAINA / AFP) (Photo by SIMON MAINA/AFP via Getty Images).

To meet this objective, alongside ambitious control measures, extensive financing is required from both the public and private sectors to implement the treaty, with investment needed across all stages of the plastics lifecycle. Developed and developing countries alike will require large-scale investment to transition to a sustainable, circular plastics economy, to ensure the comprehensive environmentally sound and safe management of plastic waste, to address the vast amounts of legacy plastic pollution on land and in oceans, to ensure a just transition, and to address the human health impacts of plastic pollution.

The financing challenge is particularly acute in developing countries. Governments in these countries often lack the institutional and fiscal capacities to develop sound waste management practices, resulting in waste management systems that are often rudimentary and at times non-existent. Many developing countries already have high rates of uncollected and mismanaged waste.

### As a result, developing countries already bear the worst environmental and social consequences of accumulated “legacy” plastic in the environment.

They are also likely most exposed to the adverse human health risks from plastic pollution across the lifecycle: for example, from widespread burning of mismanaged plastic waste, or from greater exposures to chemicals and polymers of concern – with under-funded regulatory and compliance regimes an exacerbating factor.

These same countries are expected to see significant growth in demand for plastic alongside economic development. Funding for a transition to sustainable, circular models of producing and using plastic (e.g., re-use, recycling) is essential for reducing demand for primary plastic products – which will not only limit the costs and challenges of downstream waste management, but also reduce the climate impacts of plastic which are concentrated in the production phase of the lifecycle.

At the third meeting of the International Negotiating Committee (INC) held in Nairobi in November 2023, multiple governmental and non-governmental stakeholders argued that the level of ambition of the treaty – and its success in ending plastic pollution – will be limited by the means available to implement it. They underlined that financing will be the primary constraint.

## 1 THE PLASTIC POLLUTION FEE

To address the financing challenge, multiple stakeholders have proposed to incorporate a Fee into the treaty [24]. The Chair’s Zero Draft (4 September 2023) and the Revised Draft (28 December 2023) explicitly identify a plastic pollution Fee as an innovative financing instrument to fund treaty implementation, particularly for developing countries. The drafts propose to impose the Fee on primary polymer producers in the beginning of the value chain. In addition, both drafts also recognise the potential for a Fee as an economic instrument, to support control measures, by encouraging the use of more sustainable feedstocks, delivery models or materials; and by reducing demand for, and production of, primary plastic polymers.

### Objectives of this impact study

This report builds upon a Design Study published in October 2023 [25], which outlined a set of choices to design and operationalise a Fee. This follow-up report now presents the results of an analytical exercise to model the impact of a Fee, both as a financing and economic instrument.

As financing instrument, the objective of the Fee is to generate funding for implementing an ambitious treaty, complementing other public or private funding. Here, the Fee supports the implementation of control measures by developing countries, and the level of the Fee is set in light of treaty financing costs. Alternatively, a Fee could be designed as an economic instrument to change behaviour of producers and consumers to reduce primary plastic production and consumption. Here, the Fee serves as a control measure, and the level of the Fee must be set to induce behavioural change.

Regarding the Fee as a financing instrument, to date, no study has estimated the financing needs to implement an ambitious treaty, the potential financial resources available, nor the potential environmental, social, human health and economic impacts of a Fee – as proposed in the Chair’s Zero draft and the Revised draft. Our impact study aims to meet this research need by building on the ambitious control measures for the plastics life cycle identified in the “Global Rules Scenario” as proposed in the Nordic Council of Ministers study (2023) [26]. This is further explained in **Box 1**.

Regarding the Fee as an economic instrument, we analyse the degree to which a Fee can reduce demand for primary plastics and accelerate the transition from a linear to a circular plastics economy. We examine the economics of switching from the use of primary plastic polymers to recycled polymers, reuse systems and plastic substitutes.

### Scope

This study builds on previous models developed by Systemiq and presented in other recent studies, including *Breaking the Plastic Wave* (2020) [27], *ReShaping Plastics* (2022) [28], *Achieving Circularity* (2023) [29] and *Towards Ending Plastic Pollution by 2040* (2023) [30]. Like *Towards Ending Plastic Pollution by 2040*, the scope covers:

- **all plastic categories** in the economy (packaging and household goods, textiles, electronics, transportation, construction, fishing and aquaculture, agriculture, and others)
- **all costs** both capital and operating expenditures
- **each step in the value chain** from the production of plastics to the consumption of plastic products to a comprehensive coverage of end-of-life outcomes
- **the globe** while distinguishing between geographies and their development status, considering the wide variation in waste generation and management outcomes between regions.

For this study, our model also incorporates the following innovations:

- A new “upstream” module that includes data on production and conversion of primary plastic polymers, by polymer and region – providing regional estimates on where the Fee is collected.
- A more detailed geographical scope that disaggregates developed and developing countries and regions according to World Bank definitions – enabling regional estimates on where the Fee revenues are distributed.

24. Nordic Council of Ministers, *Toward Ending Plastic Pollution by 2040* (2023); Ghana submission to INC-2; OECD submission to INC-2; CIEL submission to INC-2; Minderoo’s submission to INC-2.

25. Charles D & Dons M 2023, *The Plastic Pollution Fee: outlining the options ahead of INC-3*, Minderoo

26. Nordic Council of Ministers (NCM), *Toward Ending Plastic Pollution by 2040* (2023) (“NCM study”).

27. *Breaking the Plastic Wave: A Comprehensive Assessment of Pathways Towards Stopping Ocean Plastic Pollution*, PEW Charitable Trusts & SYSTEMIQ

28. *ReShaping Plastics – Pathways to a Circular, Climate Neutral Plastics System in Europe*, SYSTEMIQ

29. *Achieving Circularity – A low-emissions, circular plastic economy in Norway*, SYSTEMIQ

30. *Towards Ending Plastic Pollution: 15 Global Policy Interventions for Systems Change*, SYSTEMIQ

## 1 THE PLASTIC POLLUTION FEE (CONT.)

To our knowledge, our model is the most in-depth exercise to date to measure the environmental, social, human health and economic impacts of a Fee (as a financing instrument, and economic instrument).

At the same time, we are also faced with fragmented data availability on plastic stocks and flows, and on pollution. To address these limitations (i) the analytics included in this modelling exercise draw from all available sources; (ii) when no data was available, we worked with informed assumptions made in light of the existing literature and in collaboration with subject matter experts; and (iii) when warranted, results are presented as ranges.

To strengthen and validate the robustness of our model and its results, we engaged a wide range of experts from developed and developing countries:

- **Functional and technical design options:** to support the analysis we have engaged experts in international environmental and trade law, and in policy-making related to the safe and environmentally sound management of plastics across the lifecycle.
- **Impact assessment:** we engaged economists and modelling experts in environmental, social and economic outcomes of plastic policies.
- **Advisory Group:** we have convened an independent group comprised of academics, lawyers and business leaders to provide input into, and validate, the scope, approach and findings. For the list of contributors, see [Acknowledgements](#).
- **Expert Panel:** we consulted an independent group drawn from academia to provide input to, and validate, the detailed modelling approach and assumptions, with a focus on the environmental, social and economic impacts of policy options.

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Nairobi, Kenya, 29 February 2024.  
The 6th Session of the United Nations Environment Assembly (UNEA) at the United Nations Environment Program (UNEP) Headquarters. (Photo by Gerald Anderson/Anadolu via Getty Images).





Box 1

# MODELLING THE COSTS OF A TREATY THAT ENDS PLASTIC POLLUTION

Further detail on the modelling approach can be found in the Technical Annex.

We estimate the impact of the Fee with the ambitious control measures identified in the “Global Rules Scenario” (GRS), as proposed in *Towards Ending Plastic Pollution by 2040*. That study was commissioned by the Nordic Council of Ministers and developed by Systemiq.

In the GRS, the NCM study models the impact, by 2040, of 15 ambitious policy interventions (across the plastics lifecycle, adopted across all geographies) on plastic stocks and flows, GHG emissions, costs and employment. Partnering also with Systemiq for this study, we have developed the modelling further to estimate, specifically, the costs for developing countries to implement fully the GRS [31].

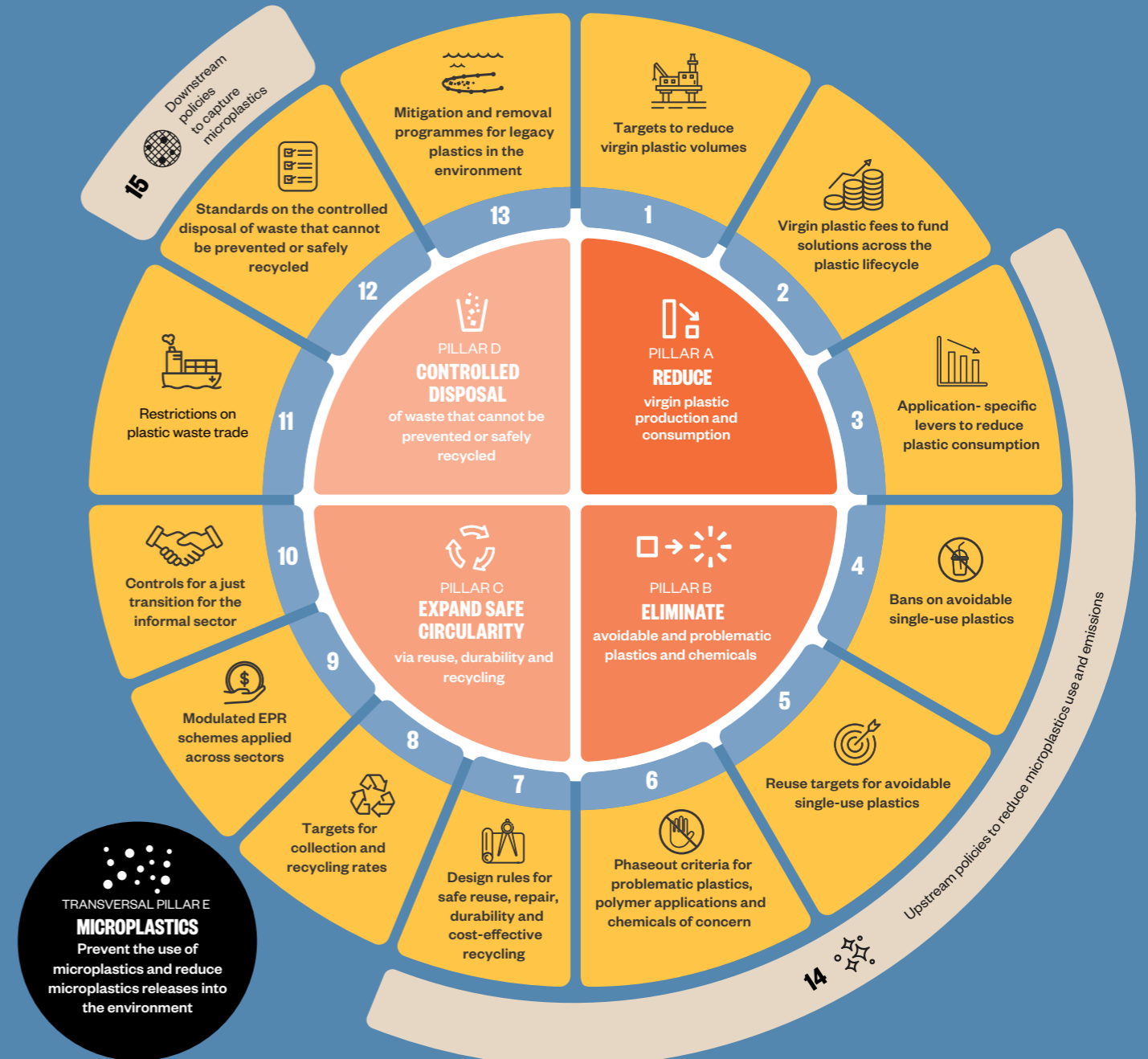
The modelling estimates all costs (operating and capital expenditure) for all parts of the plastics system. The modelling also considers whether costs will be met by private finance (for “bankable” projects), by contributions from the private sector (specifically through EPR mandates), or whether the costs will fall on the public sector. Further, we assume that traditional sources of multilateral funding (from governments) will cover financial support to the treaty secretariat and to developing countries and economies in transition for enabling activities [32].

The model allows us (i) to estimate the costs on developing countries to implement an ambitious treaty that heads towards ending plastic pollution by 2040; (ii) the financing gap facing developing countries to cover these costs after mobilising funds from private finance and private sector contributions, including through EPR; (iii) to design a Fee covering the gap costs; and (iv) to estimate the environmental, social and economic impacts of such a Fee.

In terms of limitations, we note that the model is not designed to (i) estimate hazards and impacts of plastic on human health and biodiversity [33]; (ii) design a Fee in a scenario that achieves net-zero GHG emissions or alignment with the Paris Climate Agreement [34]; and (iii) estimate the cost of the remediation of legacy plastics already in the environment. Given the absence of detailed data on legacy pollution, we use existing literature on the subject, coupled with discussions with experts, to estimate the cost to finance legacy plastic pollution qualitatively.

Figure 5: The Global Rules Scenario involves 15 global policy interventions.

Assumed to be legally binding, concurrent, implemented across all regions, and across the plastic lifecycle.



31. Among the control measures, the study proposes a virgin plastic fee ranging from \$1,000 to \$2,000/tonne by 2040. The Virgin Tax and the Polymer Premium (plastic pollution Fee) are two variants of a potential charge on primary polymer production but have important differences in design. Most notably, revenues from the Virgin Tax would be retained where they are levied – i.e., unlike the Polymer Premium (plastic pollution Fee), the Virgin Tax does not propose redistribution of revenues to developing countries. To enable us to measure the impact of our proposed Fee, we excluded the study’s proposed fee from the baseline scenario. As a result, we combined our Fee with the GRS study’s proposed control measures, minus their virgin plastic fee. To understand the differences between our proposed Fee and the GRS study’s proposed fee, see FAQ 12.

32. As defined by EIA in “Convention on Plastic Pollution Essential Elements: Financial Aspects”, January 2022.

33. This is because these hazards can depend on factors such as the level and frequency of exposure to specific substances or toxins, or intrinsic properties of a chemical, and do not have a linear relationship to plastic stocks and flows, which is the focus of the model.

34. While the model estimates the GHG emissions from both scenarios, it does not include additional levers such as further reducing virgin production, decarbonising energy sources, switching feedstock or capturing end-of-life emissions.

## Chapter 4

# FEE AS A FINANCING INSTRUMENT

### SUMMARY OF FINDINGS

- Developing countries face a financing gap of US\$350 to 500 billion to implement an ambitious treaty that ends plastic pollution by 2040.
- This treaty financing gap exists even after making ambitious assumptions on how a treaty could mobilise financial resources from complementary sources, including private finance and EPR schemes.
- A small Fee of US\$60 to 90 per tonne of primary polymer could close the financing gap and have a decisive impact on the success of a treaty in ending plastic pollution by 2040.
  - Together with ambitious control measures, the Fee would result in 90 per cent less mismanaged plastic waste entering the environment annually by 2040, compared to 2019: from around 100 million tonnes per year in 2019 down to an estimated 10 million tonnes. A treaty without a Fee, would result in only a 50 per cent reduction by 2040 (to 50 million tonnes each year).
  - The Fee would reduce virgin plastic production by an extra 10 per cent, resulting in a reduction of GHG emissions by an extra 5 per cent compared to a treaty without a Fee.
  - The Fee would address hotspots of legacy plastic waste already in the environment. This would otherwise not be financed.
  - The Fee would address the human health impacts of plastic pollution by funding transparency, traceability and disclosure regimes; human health research and biomonitoring programs; and the development of standards and guidelines, including chemical simplification, chemical regulation and safer alternatives. This would otherwise not be financed.
- The Fee would also provide much-needed support for a just transition – which would otherwise not be financed – and would not have any adverse social or economic impacts.

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Merida, Mexico, 15 December 2023. A stand with plastic piggy banks for sale at a local market. (Photo by Artur Widak/NurPhoto via Getty Images)

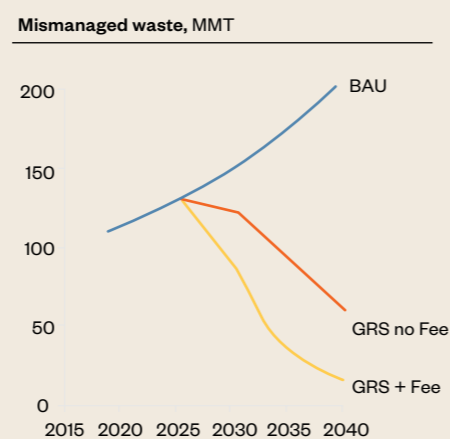
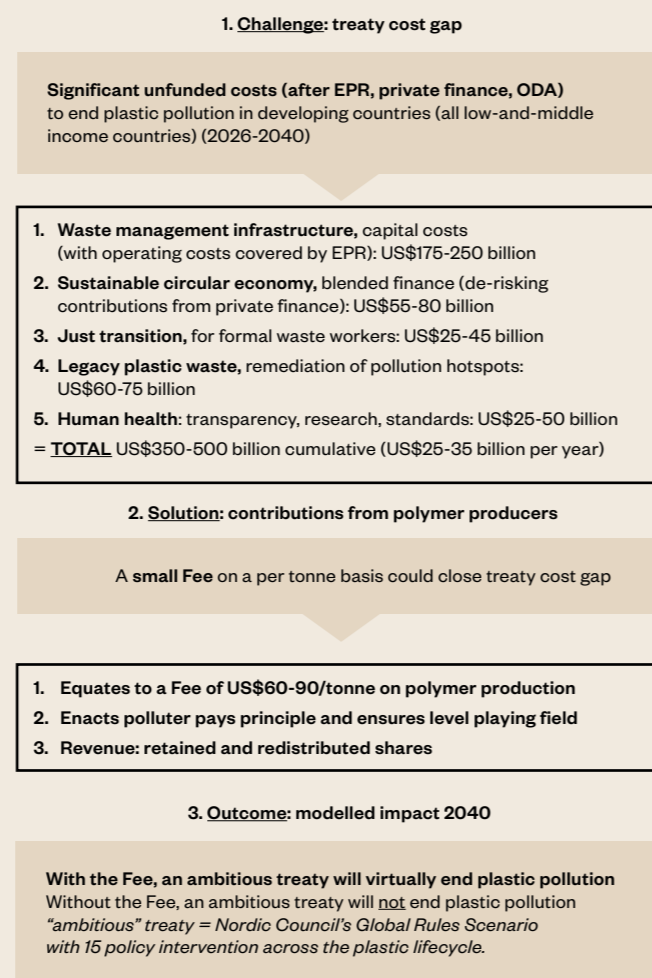
# 1 OBJECTIVE AND APPROACH

In this Section, we analyse the Fee as a financing instrument, as envisaged in the Chair's Zero Draft (4 Sep 2023) and the Revised Draft (28 Dec 2023). This is a Fee on polymer producers designed to support financing of developing countries' costs of implementing a treaty that ends plastic pollution by 2040. Such a Fee aims to provide predictable, sustainable, adequate, accessible and timely financial resources to support the implementation of the treaty by developing countries, including Small Developing Island States (SIDS) and least developed countries, and could ensure a level playing field for the private sector entities subject to the Fee. The Fee would complement other sources of public and private funding.

To design the Fee as a financing instrument, including to decide on its level, we need a robust understanding of what the treaty implementation costs involve. In this chapter, we estimate the treaty financing gap – that is the difference between the total treaty financing costs and what could be covered by other sources of public and private funding (Section 1); we design a Fee that could cover this treaty financing gap (Section 2); and we estimate the environmental, social and economic impacts of this Fee (Section 3). **Figure 6** shows these three steps with the results of our analysis.

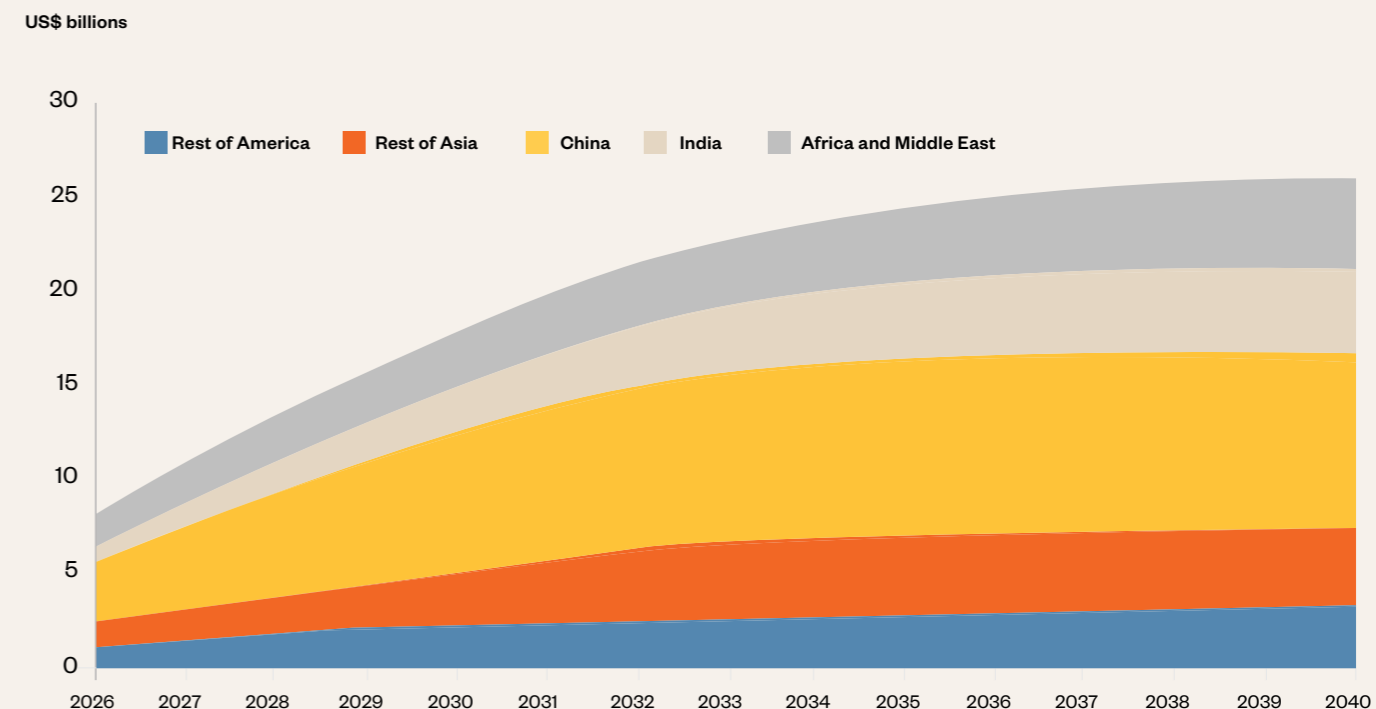
Further detail on the modelling approach can be found in the *Technical Annex*.

**Figure 6: Overview of approach**



- Business-as-usual (BAU): 200 MMT/year mismanaged waste (+90%)
- Ambitious treaty, no Fee: still 50 MMT/year mismanaged waste (-50%)
- Ambitious treaty with Fee covering the cost gap:
  - 10 MMT/year mismanaged waste (-90%)
  - Virgin production down by an extra 10%
  - GHG emissions down by an extra 5%
  - Substantial clean-up legacy pollution financed, not otherwise
  - Just transition for waste workers financed, not otherwise
  - No adverse social or economic impacts

**Figure 7: Estimated costs falling on developing countries to end plastic pollution, by region**



## 2 TREATY FINANCING GAP: DEVELOPING COUNTRIES FACE A US\$350-500 FINANCING GAP TO END PLASTIC POLLUTION

The treaty financing gap describes the shortfall, for developing countries, between the costs and the available financial resources of funding full implementation of an ambitious treaty to end plastic pollution by 2040 – for which we assume the Global Rules Scenario as presented the Nordic Council of Ministers report (as described in Box 1).

The costs are broken down as follows:

- Developing safe and environmentally sound waste management infrastructure (including closed-loop mechanical recycling).
- Supporting upstream transformation to a circular plastic economy (elimination, substitution and re-use).
- Ensuring a just transition.
- Cleaning up legacy plastic pollution.
- Addressing the human health impacts of plastic pollution.

Across all developing countries, from 2026 (the year assumed the treaty comes into force) to 2040 (the target year assumed for ending plastic pollution), the treaty financing gap is estimated to be in the range of US\$350 to 500 billion, equivalent to at least US\$20 to 30 billion per year.

Figure 7 displays how China faces the largest treaty financing gap (US\$115 billion, 38 per cent of total), followed by roughly similar costs for developing countries in Asia (US\$50 billion, 17 per cent), Middle East and Africa (US\$50 billion, 17 per cent), India (US\$50 billion, 17 per cent), and the Americas (US\$35 billion, 11 per cent). It also shows how the gap is expected grow up to 2040 as investment in infrastructure is assumed to ramp up over the first decade of the treaty's implementation.

**Figure 8: Financing gap required at each stage of waste management**

Waste management stage	Specific assumptions in modelling	Estimated cost US\$ billions 2026-40
1 Collection and sorting infrastructure	Contribution to capex cost to expand waste management system: <ul style="list-style-type: none"> <li>• 100% of plastics share (by weight)</li> <li>• 50-100% of organics share (by weight)</li> <li>• 0% of other materials (glass, paper, metal) share (by weight, assumed to be self funding)</li> </ul>	140-215
2 Recycling Infrastructure	<ul style="list-style-type: none"> <li>• 10% of capex costs to expand closed loop mechanical recycling (to de-risk private sector finance for "bankable" projects)</li> </ul>	5
3 Disposal infrastructure	<ul style="list-style-type: none"> <li>• 100% of capex costs to expand controlled landfill of plastics</li> </ul>	30

## 2.1 US\$175 to 250 billion for the development of safe and environmentally sound waste management (collection, sorting, recycling and disposal) infrastructure.

Environmentally safe and sound waste management requires: (i) collection and sorting infrastructure; (ii) recycling infrastructure; and (iii) disposal infrastructure for residual waste.

This infrastructure is still lacking, or underdeveloped, in developing countries. Waste collection rates in developing countries range from 25 per cent to 85 per cent, with the lower end of this range mostly consisting of rural areas, where the expansion of waste collection systems is more difficult from an economic and operational perspective. Waste that is not collected is mostly mismanaged and ends up released into land or water environments, or burned in the open. Further, only a tiny fraction of the plastic waste that is collected is separated at source and suitable for recycling – meaning only around one per cent of all plastic is recycled in a circular “closed loop”.

In the Global Rules Scenario, the suite of policy interventions is designed to establish environmentally safe and sound waste management infrastructure; that is, to expand waste collection and sorting, recycling and disposal infrastructure.

These measures would reduce mismanagement, increase recycling rates and recycled content, and ensure the controlled disposal of waste that cannot be prevented or safely recycled, in all regions – specifically by 2040 [35] to:

- reach 95 per cent formal collection and sorting rates, on average, across developing regions
- reach an average closed-loop mechanical recycling rate of 22 per cent, on average, across developing regions
- meet all controlled disposal needs.

Our study estimated the capital expenditure (“capex”) and operating expenditure (“opex”) costs of implementing these policy interventions, the expected financial resources available to meet them, and the resulting financing gap. **Figure 8** displays these results of the financing gap.

As these results show, the largest gap is financing the infrastructure capex for collection and sorting of plastic waste (US\$140 to 215 billion from 2026 to 2040), where we assume no other source of finance is available beyond existing government spending. As the collection and sorting of plastic waste cannot be managed in isolation of other materials, this figure also includes a contribution to the overall costs of expanding the capacity of waste collection and sorting systems to ensure full recovery of plastic waste.

Once this infrastructure is in place (and with contributions from EPR schemes estimated to cover the opex costs of collection and sorting), recycling would become a profitable business. We assume private finance will cover the opex and most of the capex costs of expanding recycling capacity – we assume some additional blended financing (US\$5 billion from 2026 to 2040) will be required to de-risk the capital investment expected from private finance sources.

**Figure 9: Financing gap required for upstream transformation**

Upstream circular solutions	Specific assumptions in modelling	Estimated cost US\$ billions 2026-40
1 Re-use	<ul style="list-style-type: none"> <li>• 50-100% of total capital expenditure required to scale the introduction of re-use systems</li> <li>• Primarily in packaging and household goods sector</li> </ul>	5-15
2 Elimination	<ul style="list-style-type: none"> <li>• 50-100% of the capital expenditure required to support the elimination of plastics, through alternate delivery systems and product design</li> <li>• Primarily in industrial sectors</li> </ul>	20-35
3 Substitution	<ul style="list-style-type: none"> <li>• R&amp;D funding to for plastic alternatives and bio-polymers</li> <li>• Primarily to be used within the plastic packaging sector</li> </ul>	30

## 2.2 US\$55-80 billion to de-risk private finance investment in upstream transformation to a circular plastic economy (elimination, substitution and re-use).

Today, 98 per cent of plastics products are manufactured from fossil-fuel-based primary polymers. The Global Rules Scenario includes a suite of policy interventions designed to reduce the volume of primary plastics in the system, eliminate avoidable and problematic plastics, and prioritise the expansion of circularity in those plastics that remain [36]. These policies drive a transition from today’s linear model of production, consumption and disposal to a more circular plastics economy – and will require a significant deployment of capital to implement.

Our study estimated the capex and opex costs of implementing these policy interventions. Specifically, we model the costs of reaching a market share of 13 per cent for re-use systems and of substituting 11 per cent of plastics used in the packaging and household goods sector; and of funding research and development into alternative safe, environmentally sound and sustainable polymers. We then estimate the expected financial resources available and the resulting financing gap in achieving implementation (**Figure 9**). In this context, ambitious control measures are expected to create the certainty for private finance to flow into what will be profitable circular economy business models. However, we expect there to be a significant need for blended finance to de-risk the upfront capital costs.

## 2.3 US\$25 to 45 billion to ensure a just transition for affected populations.

A just transition, and in particular a treaty that is inclusive and adequately recognises the contribution of informal waste workers, is an important priority for many countries given that a transformation in the global plastic system would have considerable implications for the informal sector. A recent study by the Fair Circularity Initiative estimated that between 19 and 24 million informal waste workers are responsible for around 60 per cent of global plastic collected for recycling, with these workers often among the most vulnerable and marginalised in society [37].

Countries, therefore, recognise that the treaty must ensure a just transition. The Chair’s Zero Draft includes an obligation on parties to promote and facilitate a fair, equitable and inclusive transition for affected populations, with special consideration for vulnerable groups.

Financing a just transition will come at a cost, particularly for developing countries. Estimating those costs is, however, challenging. This is a complex and multifaceted issue that cannot be fully represented in the model. We estimate the cost of a just transition as follows.

A living income for the informal waste workers would provide for a healthy diet, decent housing, other essential needs (education, healthcare), decent working conditions and small savings for unforeseen circumstances. Initial research by the Fair Circularity Initiative and Systemiq, applying a methodology to establish a living income in the informal waste sector to sites in Brazil, Ghana and India, indicates a 50 per cent premium on the current income of informal waste pickers may be needed to provide a living income [38].

35. See *Towards Ending Plastic Pollution by 2040: 15 Global Policy Interventions for System Change Technical Annex* pp 21.

36. See *Towards Ending Plastic Pollution by 2040: 15 Global Policy Interventions for System Change Technical Annex* pp 21.

37. “A living income for the informal waste sector: A methodology to assess the living income of waste workers in the context of the Global Plastics Treaty”, Fair Circularity Initiative & Systemiq (2024).

38. “Living Income Study Highlights”, Fair Circularity Initiative and Systemiq (2023).

Other control measures in an ambitious treaty – specifically, policies designed to increase recycling and, by extension, demand for plastic waste – could lead to this 50 per cent premium required to provide a living income being achieved. However, given the lack of transparency in the informal supply chain, this is by no means certain [39]. Therefore, we assume funds equivalent to a 25 to 50 per cent premium on current informal sector incomes should be made available to provide programmatic support for these communities. **Figure 9** displays these costs by region, based on the respective size of the informal sector. We assume no other significant sources of funding will be available to fund a just transition for waste workers under the treaty.

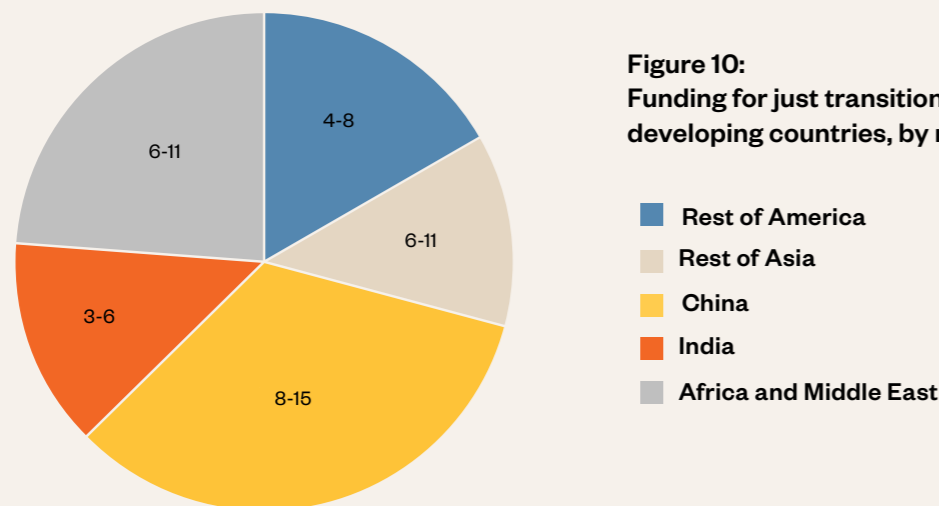
(200 million tonnes) – totalling 750 million tonnes [40].

We have then sourced indicative costs to remediate plastic from each of these environments based on (limited) available studies (**Figure 11**) [41]. While the exact costs of cleaning up all legacy plastic pollution are unknown, the studies suggest that the total costs run well into the hundreds of billions. We assume a very modest contribution towards meeting those costs of US\$3 to 5 billion per year, or US\$50 to 75 billion over 2026 to 2040, will be required to make a significant impact on legacy pollution hotspots in developing countries. We assume no other significant sources of funding will be available to fund remediation of legacy plastic pollution under the treaty.

## 2.4 US\$50 to 75 billion to address legacy plastic pollution hotspots.

A significant gap has long existed between the volume of waste generated globally and the capacity to manage that waste in an environmentally sound way. As a result, the world has accumulated significant legacy plastic pollution, on land and in the marine environment. Although this legacy pollution is composed of historic plastic production, it has adverse environmental and health effects on a continuing basis. The volume of this legacy plastic pollution continues to grow every day, until the plastic pollution gap is finally closed.

Detailed data on the amount of legacy plastic pollution, and the costs of cleaning it up, are lacking – this is an area needing further research. As a result, our model cannot estimate the costs of addressing legacy plastic. Instead, based on available studies, we have made high-level estimates of legacy pollution plastic in regulated dumpsites (300 million tonnes), other plastic pollution on land (250 million tonnes) and ocean pollution



## 2.5 Addressing the human health impacts of plastic pollution

Awareness and understanding of the negative impacts on human health from plastic pollution is growing rapidly. Negative impacts on human health occur across the plastic lifecycle of production, use and disposal and includes exposure to toxic chemicals and to micro- and nano-plastics in both the general population as well as occupationally exposed workers and fence line communities [42]. Recent studies suggest that the social cost of plastic pollution on human health runs into the hundreds of billions of dollars each year [43, 44]. For example, using a 'value per statistical life' approach, global human health costs attributable to plastic production in 2015 have been estimated at \$US592 billion (purchasing power parity, PPP). These costs comprise worker deaths due to accidents and injuries, and to particulate matter and gases, deaths from worker exposure to benzene and formaldehyde and deaths from PM2.5 (particulate matter) due to upstream emissions and disposal [45].

**Figure 10:** Funding for just transition in developing countries, by region

- Rest of America
- Rest of Asia
- China
- India
- Africa and Middle East

Similarly, human health costs in the USA alone in 2015 resulting from exposure to just three chemicals commonly used in plastic have been estimated at \$US675 billion PPP. These costs comprise deaths from exposure to DEHP [(di(2-ethylhexyl phthalate), plasticiser]; and additionally using a 'cost of illness approach', comprise loss of IQ points and intellectual disability in children from exposure to PBDE [polybrominated diphenyl ether, flame retardant], as well as coronary heart disease and stroke from exposure to BPA [bisphenol A, a monomer used in the manufacture of polycarbonate plastic and epoxy resins] [46]. Such costs are conservative due to the small number of plastic-associated chemicals for which data are available and will increase as plastic production continues to increase.

The Fee could fund critical initiatives to address these impacts, which would otherwise not be funded (or may require additional funds beyond traditional sources of finance):

- **Activities promoting transparency, traceability and disclosure** related to plastic chemicals, polymers and products of concern, including independent hazard assessments for plastic chemicals *prior* to market release, developing disclosure standards, establishing effective disclosure systems (e.g. product passports or centrally maintained databases), and enforcement [47].

- **Monitoring and research programs related to plastics after market release**, especially national-scale systems to collect and measure biospecimens to (i) to determine exposure of chemicals that are known to cause harm in humans; and (ii) determine exposure and human health outcomes for chemicals of concern where health impacts are unknown (with a focus on chemicals which have high exposure potential and are hazardous); and (iii) determine exposure and human health outcomes for micro- and in particular nanoplastics which, because of their small size, are more likely to penetrate biological barriers. Such work must be underpinned by development of sensitive and accurate measurement techniques. Developing country populations are currently chronically understudied [48].
- **Development of standards and guidelines** on product design, chemical simplification and safer alternatives. While these activities (and, in all likelihood, funding) would need to be coordinated by the science-policy body under the treaty, they would need to be implemented at national level.

We have made a preliminary estimate that the cost of financing these activities would be in the range of US\$2 to 3 billion per year, cumulatively US\$25 to 50 billion 2026-40.

**Figure 11: The costs of remediating legacy plastic pollution**

Plastic in the environment, MT[49]	Possible solution	Cost per ton	Total cost
Dumpsites	Retrofit into an engineered landfill	\$30 [50]	\$9 billion
Land pollution	Collection and process	\$3,000 [51]	\$750 billion
Ocean pollution	Collection and process	\$5,900 [52]	~ \$1 trillion

45.(CITE Minderoo-Monaco Commission)

46.(CITE Minderoo-Monaco Commission)

47. The Zero Draft contains several options for mechanisms to increase transparency, traceability and reporting. For example, ZD, Part II.13.1(a) contains an option that requires countries to ensure harmonized disclosure by industry of information on chemical composition of plastics. Part II.13.1(b) contains a potential obligation to ensure the traceability of chemicals, polymers and the plastic contents of feedstocks and products.

48. Developed country examples include NHANES in the US and the Norwegian Environmental Biobank (MoBa) in Norway.

49. Estimated with high uncertainty of +/- 50%.

50. Based on the cost of the landfill.

51. EIA Report "Clean ups or clean washing".

52. Estimated at one-half the cost of ocean clean-up.

39. *Pricing Transparency in the Recycled Plastics Supply Chain in India, Indonesia, Thailand, and Vietnam*, The Circulate Initiative (2023).

40. Extrapolation based on "Breaking the Plastic Wave", "Production, Use, and Fate of all Plastics ever made" and "Stemming the Plastic Tide". CITATIONS

41. Footnotes on Figure 6: 1 Estimate with high uncertainty of +/- 50%; 2 Based on the cost of landfill; 3 Based on EIA's report "Clean ups or clean washing"; 4 Estimated at half the cost of ocean clean-up. Source: extrapolation based on "Breaking the Plastic Wave", "Production, Use, and Fate of all Plastics ever made"; and "Stemming the Plastic Tide".

42. (CITE Minderoo-Monaco Commission)

43. Landrigan PJ et al. (2023) The Minderoo-Monaco Commission on Plastics and Human Health. *Annals of Global Health*. 89(1). doi:10.5334/aogh.4056.

44. Merkl A & Charles D 2022, *The Price of Plastic Pollution: Social Costs and Corporate Liabilities*, Minderoo Foundation.

Figure 12: Modelling assumptions for Fee design

	Key design options	Modelling assumptions and rationale
Imposition of the Fee	• Legal force	• Mandatory Fee, uniform across all producing countries => ensure a level playing field and prevent free-riders
	• Uniform or differentiated Fee	
	• Entities subject to the Fee	• Polymer production in country of operation
	• Modulation and exemptions	• Exemptions for sustainable recycled polymers
	• Size of the Fee	• Covers costs to implement fully a treat that ends plastic pollution (Global Rules Scenario)
Distribution of revenues	• Retained share by producer country	• Share to cover admin costs plus incentivise collection
	• Use of redistributed revenues	• Four unique and significant costs to end plastic pollution
	• Eligibility criteria	• All low-middle-income countries (cf. World Bank)
	• Forms of funding	• Grants

### 3 THE SOLUTION: A FEE OF US\$60 TO 90 PER TONNE OF PRIMARY POLYMER TO CLOSE THE TREATY FINANCING GAP

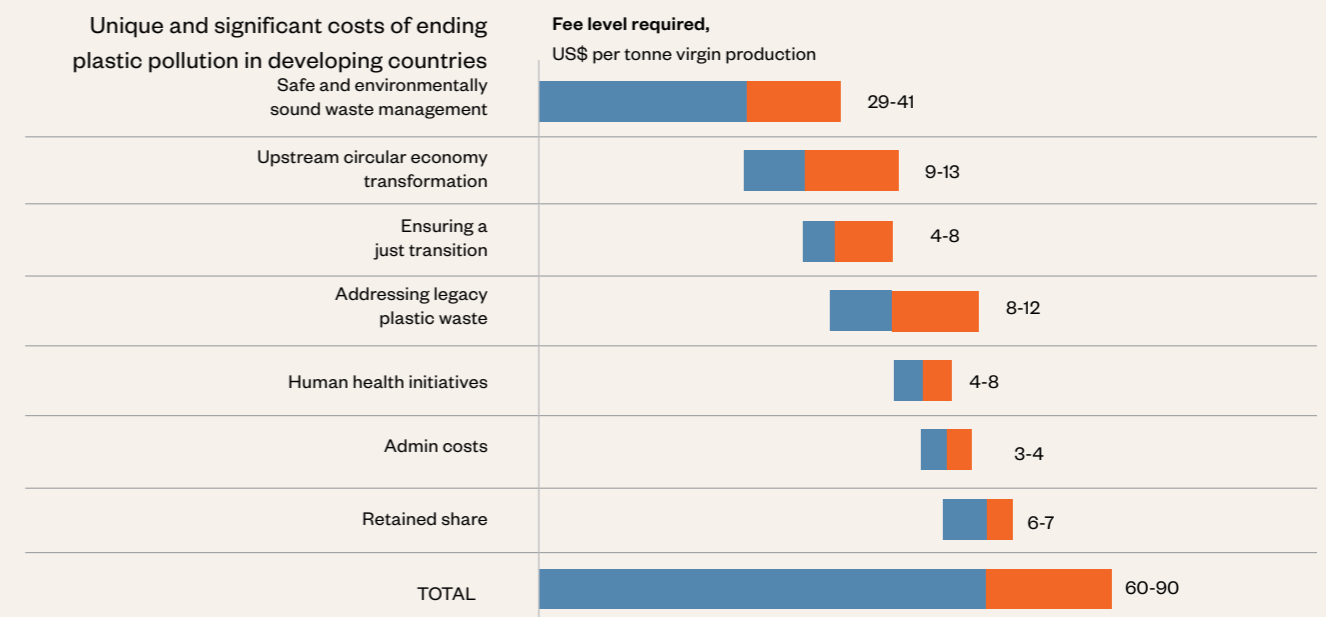
In the previous section, we highlighted a financing gap of US\$350 to 500 billion in developing countries to fund the implementation of a treaty that heads toward ending plastic pollution by 2040. In this section, we show that a Fee of US\$60 to 90 per tonne of primary polymer could close this gap.

In the Design Study, we described key design options relating to the imposition of the Fee and the distribution of Fee revenues [53]. In the present study, we made assumptions on each design option to model the Fee as a financing instrument. The options and assumptions are summarised in **Figure 12**.

Key design assumptions of the Fee include:

- **A uniform Fee paid by all polymer producers:** The Fee would be paid by all primary polymer producers globally, implementing the polluter pays principle and ensuring a competitive level playing field among producers. See also Section 2. FAQs: #1 and #2.
- **Retained and redistributed shares:** To ensure that the plastic pollution Fee can address pollution costs across the globe, irrespective of where polymers are produced, the revenues raised from the Fee could be shared. Producing countries could retain a part of the revenues, with the remainder redistributed among developing countries on a needs basis, net of fund administration costs. The retained share could, at a minimum, cover the producing countries' costs of administering the Fee, while the redistributed share could allow the Fee to serve as an innovative means of funding treaty implementation, in particular for developing countries, transferring at least some of the responsibility for ending plastic pollution to plastics producers. See also Section 2. FAQs: #3.
- **Complementary to other sources of funding:** The Fee could complement traditional funding sources (including from governments) and other innovative funding sources (including EPR schemes) under the treaty to help to ensure full implementation [54].
- **Combined with ambitious control measures:** The Fee would complement ambitious control measures, by enabling their proper implementation. See also Section 2. FAQs #4. The model thus estimates primary polymer production levels from 2026 to 2040, taking into account the impact of all policy interventions across the lifecycle in the Global Rules Scenario [55].

Figure 13: Breakdown of the US\$60 to 90 per tonne Fee as a financing instrument



Based on these design choices and on our understanding of the treaty financing gap (Section 4.2, above), we calculated the Fee level required as a financing instrument as follows:

- We sum the cumulative costs, 2026 to 40, that will fall on developing countries to fund full implementation of a treaty that ends plastic pollution (as outlined above).
- To this total funding gap, we add 5 per cent for costs to administer the redistribution of funds, based on benchmarks from other multilateral financing mechanisms.
- We add an additional 10 per cent to reflect the share of revenues retained by countries imposing the Fee, to cover their costs of collection and incentivise participation.
- Finally, we divide the total revenues required by the cumulative primary polymer production in the period (estimated around 6 billion metric tonnes), resulting in an average US\$ per tonne Fee level.

As shown in **Figure 13**, we find that a Fee of US\$60 to 90 per tonne of primary polymer suffices to close the financing gap.

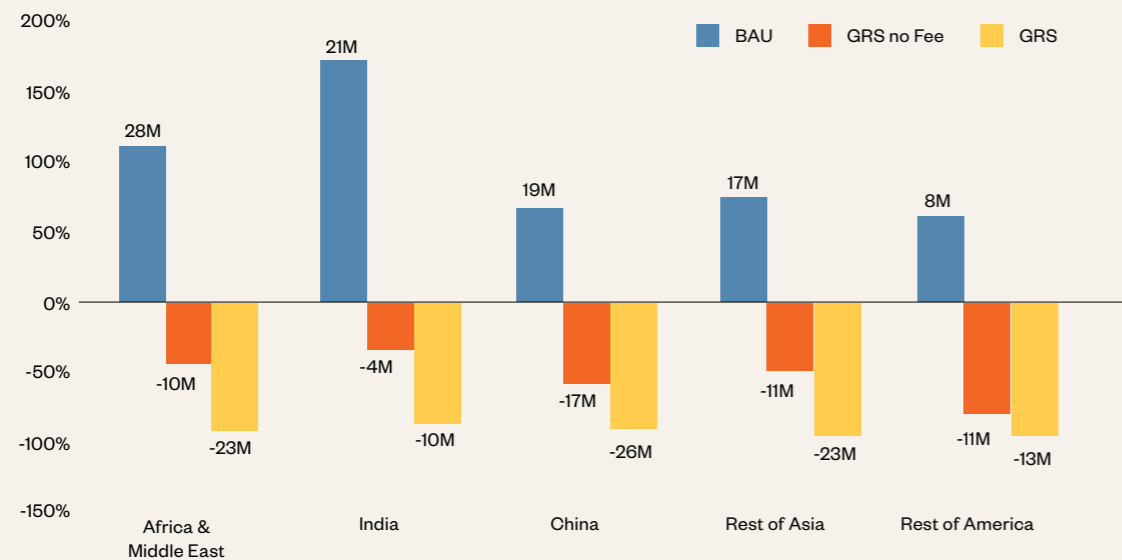
### 4 OUTCOME: THE FEE COULD HAVE A DECISIVE IMPACT ON THE SUCCESS OF A TREATY IN ENDING PLASTIC POLLUTION BY 2040

With a US\$60 to 90 Fee, an ambitious treaty could virtually end mismanaged waste leaking into the environment by 2040. The Fee would also bring other positive outcomes (reduce GHG emissions, significantly reduce legacy pollution, fund a just transition, address human health impacts), without any meaningful adverse social or economic impacts. Without a Fee, an ambitious treaty would inevitably be far from successful in ending plastic pollution.

In this section, we first estimate the environmental impacts of the Fee, and thereafter the social and economic impacts.

53. See Design Study pp. 10-18 for further details: Charles D & Dons M 2023, The Plastic Pollution Fee: outlining the options ahead of INC-3, Minderoo Foundation.  
 54. See Environmental Investigation Agency, "Convention on Plastic Pollution: Essential Element: Financial Aspects" (2022). 'Traditional' financial resources are defined as financial support to the secretariat and financial support to developing countries and economies in transition for enabling activities.  
 55. SA simplifying assumption is that any increase or reduction in demand for primary polymer is equally weighted across regions using a baseline share of total polymer production (in 2021).

Figure 14: Impact of the Fee on mismanaged waste in developing countries, by region



#### 4.1 Positive outcomes: the Fee's impacts on the environment

Our stocks and flows model considers two main types of environmental impacts:

- Mismanaged waste polluting the environment because of open burning, or direct discharge of plastic waste on land or into the marine environment.
- Greenhouse gas (GHG) emissions across the lifecycle of plastics.

We note that our model does not estimate other potentially positive impacts of the Fee on the environment resulting from other impacts of plastic pollution across the lifecycle (e.g., chemical toxicity).

Our model finds that a Fee of US\$60 to 90 per tonne of primary polymer would have a significant positive impact on the environment:

- Together with ambitious control measures, the Fee would result in 90 per cent less mismanaged plastic waste entering the environment each year by 2040, compared to 2019: from around 100 million tonnes per year down to an estimated 10 million tonnes. A treaty without a Fee, would result in only a 50 per cent reduction (to 50 million tonnes each year).
- The Fee would reduce virgin plastic production by an extra 10 per cent, reducing GHG emissions by an extra 5 per cent, as compared to a treaty without a Fee.

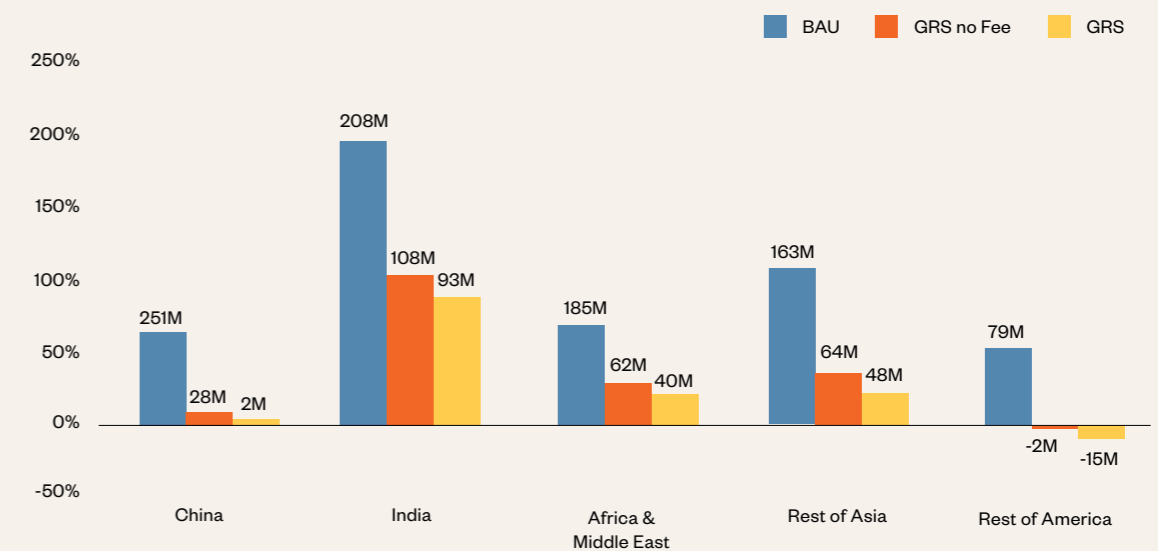
In addition, while not modelled (see **Box 1**), the Fee would address hotspots of legacy plastic waste in the environment. That is, the Fee would make US\$3 to 5 billion per year, or US\$50 to 75 billion over 2026-2040, available to address legacy pollution hotspots in developing countries.

#### The Fee's impact on mismanaged waste polluting the environment

A Fee of US\$60 to 90 per tonne of primary polymer could fund a substantial expansion of waste management infrastructure in developing countries, enabling the establishment and further development of collection, sorting, closed-loop mechanical recycling, and, for residual waste, disposal infrastructure. In addition, by supporting the scaling up of circular economy alternatives to primary plastics production, the Fee could reduce overall waste generation and, therefore, reduce potentially mismanaged waste. When combined with other ambitious regulatory control measures across the plastics lifecycle, the Fee could reduce mismanaged waste leaking into the environment by 90 per cent in 2040 compared with 2019 levels (from around 100 to 10 million tonnes), where a business-as-usual scenario would see mismanaged waste reach 200 million tonnes per year by 2040.

Without a Fee, an ambitious treaty would fall far short of ending plastic pollution (50 million tonnes of mismanaged plastic waste annually by 2040). The picture is consistent across developing regions (**Figure 14**).

Figure 15: Impact of the Fee on mismanaged waste in developing countries, by region



#### The Fee's impact on GHG emissions

As well as reducing overall waste generation and mismanagement, the Fee of US\$60 to 90 per tonne of primary polymer has an important impact on primary plastics production. The reason is that the Fee supports the scaling up of circular economy alternatives. As a result, the Fee's combined impact on investments in re-use, elimination and substitution in developing countries could lead to an additional reduction in demand for primary plastic of 10 per cent per year by 2040 (versus an ambitious treaty without a Fee).

This, in turn, makes an incremental but important contribution to reducing GHG emissions across the lifecycle by 5 per cent per year by 2040 (versus an ambitious treaty without a Fee; **Figure 15**). The picture is consistent across developing regions.

#### 4.2 The Fee has no meaningful adverse social or economic impacts

With our model, we not only estimate the positive impacts of the Fee on the environment, we also estimate whether the Fee may have any negative social or economic impacts. We find that the Fee of US\$60 to 90 has no meaningful negative impacts. In this Section, we examine the Fee's social and economic impacts.

#### The Fee's social impact

A fee on polymer producers may potentially affect the cost to the end consumer of goods containing plastics if companies along the supply chain pass on the cost. To model the social impact of the Fee, we used the most pessimistic scenario from the perspective of consumers: that is, we assumed that the Fee of US\$60 to 90 is entirely passed on throughout the plastic supply chain, into the price of plastic products for consumers. This pessimistic scenario may not hold, because the cost of the Fee may in part, or in full, be absorbed by companies in the plastic supply chain, and not, or only in part, be reflected in the price of final plastic products.

To analyse whether a Fee of US\$60 to 90 per tonne of primary plastics has any negative social impacts, our model estimated the impact of the Fee (i) on the cost-of-living across all low- and middle-income countries; and (ii) on the price of sensitive plastic products in four countries representing each of the major developing economic regions.

First, our model assessed the potential impact on the cost-of-living in low- and middle-income consumers. We estimated the impact of the Fee on gross national income per capita, based on total annual plastic consumption and the additional costs placed on primary polymer. **Figure 4** displays how the impact on cost-of-living of a Fee of US\$60 to 90 per tonne. The results show that the impact is negligible: the impact on gross national income per capita ranges from just 0.05 to 0.09 per cent.



A young rag picker carries a garbage sack while searching for reusable items at Cyber City. (Photo by Pradeep Gaur/SOPA Images/LightRocket via Getty Images)

Second, we also estimated the Fee's impact on a basket of "sensitive" plastic products in developing countries. The reason being that, while plastics are relatively cheap and abundant, in developing countries they can also be critical to allow affordable access to essential goods. With this in mind, we also assessed a basket of plastic products that are potentially more sensitive to a Fee – essential products with a high plastic content and low margin – in four countries representing different developing regions. **Table 2** shows the impact of a US\$60 to 90 per tonne fee on a selection of retail products. The results show that the impact is expected to be minimal for retail products. While the impact on certain wholesale products is slightly higher (but still very small), it should be noted that these products will represent just a fraction of a much broader basket of goods procured by households and businesses.

**The Fee's economic impact**

We also estimated the economic impact of the Fee of US\$60 to 90 per tonne of primary polymer which are expected to be limited.

The Fee of US\$60 to 90 would be imposed on all plastic polymer producers, ensuring a competitive level playing field between companies. Assuming 100 per cent of the cost is passed on, the Fee would increase the average price of primary polymer prices by about 5 to 7 per cent. For context, these prices have historically fluctuated by plus or minus 20 per cent.

The impact of these potential price increases of polymer on consumer demand would be significantly diluted because the cost of primary polymers is only a small fraction of the price of final products.

The potential impacts of a higher Fee level, designed as an economic instrument, are explored in the next chapter.

**Table 2: Estimated % age increase in price resulting from US\$100/MT fee on primary polymers**

Plastic Category	Products	Wholesale or retail	Brazil	China	India	Nigeria
Bottles	500ml unbranded water	Retail	0.41%	0.27%	0.68%	0.69%
Clothing	High visibility vest	Retail	0.19%	0.62%	0.50%	0.06%
Clothing	Unbranded polyester t-shirt	Retail	0.38%	0.29%	0.53%	0.16%
Consumer Goods	Refrigerator with 250-350L capacity	Retail	0.38%	0.68%	0.34%	0.30%
Electronics	2 core copper electrical cable (price per meter)	Wholesale	0.05%	0.18%	0.15%	0.05%
Flexibles	LDPE disposable gloves	Wholesale	0.33%	1.67%	1.55%	0.07%
Multimaterial	Single use shampoo sachet (6g)	Retail	N/A	N/A	0.54%	0.03%
Multimaterial	Surgical mask	Wholesale	0.27%	1.18%	2.84%	0.45%
Rigids	1ml disposable syringe with hypodermic needle	Wholesale	0.29%	0.85%	0.90%	0.56%
Rigids	Shampoo 400ml	Retail	0.08%	0.16%	0.09%	0.05%
Transportation	New subcompact budget passenger vehicle	Retail	0.08%	0.16%	0.28%	0.08%
Tyres	Passenger vehicle tyres 17-inch rim	Retail	0.43%	0.13%	0.46%	0.31%



## Chapter 5

# FEE AS AN ECONOMIC INSTRUMENT

### SUMMARY OF FINDINGS

- A higher Fee, designed as an economic instrument, could support switching away from primary plastic production. A Fee of US\$600 to 800 per tonne would fully bridge the higher costs of closed-loop mechanical recycling; and a Fee of US\$1,500 to 2,000 would fully bridge the higher costs of re-use models, substitution to non-plastic alternatives, and chemical recycling.
- While a much higher Fee could support switching away from primary plastic production, it would not replace the need for ambitious regulatory control measures.
- Introducing a higher fee of US\$1,000 to 2,000 – a 100 to 150 per cent mark-up on current average primary polymer prices – comes with greater uncertainty and potential for adverse social and economic impacts.

Workers from a French-Indonesian joint venture company demonstrate the use of a floating debris trawler net off the coast of Jakarta, in the latest initiative to combat the scourge of plastic waste. (Photo credit GOH CHAI HIN/AFP via Getty Images)



# 1 OBJECTIVE AND ROADMAP

Fees have also been proposed in the Zero Draft, and in the literature (OECD, Nordic Council of Ministers), as a possible control measures to reduce primary plastic production and consumption. That is, in addition to its financing role, a Fee on plastic polymer producers could be designed as an economic measure to influence two types of behaviour:

- **Switching:** A Fee on plastic polymer producers could accelerate the transition from a linear to a circular plastics economy. For example, a Fee on the production of primary plastic polymers could encourage producers and users of plastic to switch to safe, environmentally sound and sustainable recycled plastic contents or alternative plastics and plastic products.
- **Demand reduction:** A Fee on plastic polymer producers could also reduce demand for plastic products, because of switching to reuse, refill and repair models; switching to non-plastic substitutes; [55] and/or increased product prices for end consumers (subject to the pass-through-rate of the Fee on prices and the price elasticity of demand) [56].

In this section, we explain the design of the Fee as economic instrument and estimate the level of the Fee needed to serve as economic instrument. Such a Fee is at least 10 times higher than the Fee needed to cover the treaty financing costs (financing instrument). As we explain in the final section, the much higher Fee would not replace the need for ambitious regulatory control measures and comes with greater uncertainty and potential for adverse social and economic impacts.

# 2 DESIGN OF THE FEE AS AN ECONOMIC INSTRUMENT

In modelling the Fee as an economic instrument, we assume that revenues will still be redistributed to developing countries to support treaty implementation equivalent to the financing need detailed in the previous chapter. This means that, even if the plastic pollution Fee is primarily designed as an economic instrument, the plastic pollution Fee will, in any event, act as a financing instrument, by raising revenues that could be used for treaty implementation. The results presented in this chapter are therefore Intended to highlight the incremental impacts of a Fee designed as an economic instrument.

To model the Fee as an economic instrument, we adopted the same assumptions on the design options as we did for the Fee as financing instrument (**Figure 1**, in the previous chapter), with two exceptions: (i) the Fee is to be set at a level sufficient to drive switching and reduce demand for primary polymers; and (ii) the retained share is determined as the difference between the Fee level and the share of the Fee required to meet the financing needs of developing countries (defined in Section 4.2).

Modelling the size and potential impacts of a Fee as an economic instrument has a high degree of complexity and uncertainty, with a large number of considerations and assumptions. As a guiding principle, to avoid suggesting improper precision, we have sought directional results and thresholds or ranges for the required Fee level and potential impacts. **Figure 13** provides a summary of the key considerations and simplifying assumptions used as well as their rationale.

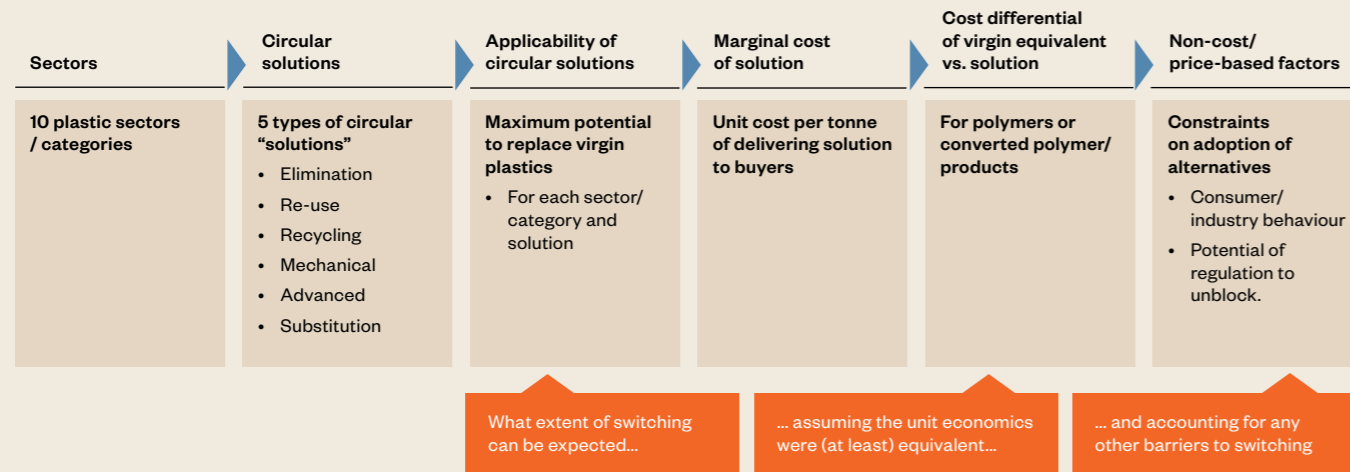
Table 3: Analysis of “sensitive” products

Key considerations in modelling fee as an economic instrument	Proposed assumptions	Limitations
<ul style="list-style-type: none"> <li>• Cost pass-through (producer =&gt; converter =&gt; distributor =&gt; consumer)</li> <li>• Strategic response and impact on different marginal cost producers</li> </ul>	<ul style="list-style-type: none"> <li>• 100% cost pass-through</li> <li>• Uniform pass-through by all virgin producers</li> <li>• Reduction in demand impacts producers uniformly</li> </ul>	<ul style="list-style-type: none"> <li>• Reflects maximum economic impact of the Fee</li> <li>• Low-cost producers could absorb Fee, sacrificing ST margins for LT market share</li> <li>• Reduction will impact higher cost producers first</li> </ul>
<ul style="list-style-type: none"> <li>• 10s if not 100s of grades of polymer with range cost/price points (+/150%)</li> <li>• 1,000s of plastic product applications with wider cost/price differences</li> </ul>	<ul style="list-style-type: none"> <li>• Taken a weighted average cost/price-point across all sectors/categories</li> <li>• 4-year rolling average (2020-23) where available</li> </ul>	<ul style="list-style-type: none"> <li>• Model simulates switching level as an end-point (or “cliff”) achieved over LT with cost/price parity</li> <li>• In reality, polymers and products will sit on a highly differentiated cost curve</li> </ul>
<ul style="list-style-type: none"> <li>• Multiple existing and emerging technologies within solution categories</li> <li>• Unit cost of potential solutions will improve as tech matures and scales</li> </ul>	<ul style="list-style-type: none"> <li>• Taken a weighted average cost/price-post across all sectors/categories</li> </ul>	<ul style="list-style-type: none"> <li>• As above</li> </ul>
<ul style="list-style-type: none"> <li>• Material cost of plastics only marginal share of consumer price</li> </ul>	<ul style="list-style-type: none"> <li>• Negligible impact on and consumer demand even at higher fee levels (e.g. \$1,000/tonne)</li> </ul>	<ul style="list-style-type: none"> <li>• Some specific product categories will experience higher price impacts and noticeable demand decline (factoring in price elasticity)</li> </ul>
<ul style="list-style-type: none"> <li>• Complementary/overlapping impacts</li> <li>• Both send economic signals (pushing in same direction)</li> </ul>	<ul style="list-style-type: none"> <li>• Calculate impact of Fee in BAU scenario only (i.e. with no regulatory impacts)</li> <li>• Assume the Fee has a de-risking effect on estimated impacts of new regulation.</li> </ul>	<ul style="list-style-type: none"> <li>• No estimate of how fee level unlocks equivalent impacts as regulation</li> <li>• No estimate of combined/reinforcing impacts of fee and regulation</li> </ul>
<ul style="list-style-type: none"> <li>• Inflation</li> <li>• Oil price</li> </ul>	<ul style="list-style-type: none"> <li>• Assume no inflation on costs or prices</li> <li>• Assume constant oil price scenario</li> </ul>	<ul style="list-style-type: none"> <li>• Variation in oil prices will drive virgin polymer prices up/down (through, historically, less than supply/demand factors) - and change cost/price parity with solutions for fee level</li> </ul>

55. Zero Draft, footnote 37. Any switching from plastics to non-plastic substitutes should take into account the potential for environmental, economic, social and human health impacts (see Zero Draft, Section II.6.1) and the risk of regrettable substitution (e.g., GHG impacts of switching from plastic to paper packaging).

56. The extent to which a net reduction in total consumption of final products, notwithstanding the type of input materials or delivery model, is a desired outcome should be considered. Other policies may be more effective at reducing demand for specific plastic products (e.g., Zero Draft, Section II.3.a, “Problematic and avoidable plastic products, including short-lived and single-use plastic products”).

**Figure 16: Modelling approach considers the maximum potential of circular solutions and their cost premium vs. primary plastic polymers or products**



**Figure 17: Results of potential for switching and reduction away from primary plastic polymers**

	Applicability of circular solutions Max. potential to replace virgin polymer / products, %		Marginal cost of solution Weighted avg., 2023 \$ per tonne	Cost of virgin equivalent Rolling weighted avg., 2020-23 \$ per tonne	solution vs. virgin \$ per tonne	Non-cost/price-based factors
	Under BAU	With enabling regulation				
<b>Elimination</b>	n/a	30%	0	2,000-5,000 (converted polymer)	(2,000-5,000)	<ul style="list-style-type: none"> <li>Product branding (e.g., packaging)</li> <li>Planned obsolescence (e.g., textiles)</li> </ul>
<b>Re-use (Packaging)</b>	<2%	40%	4,000-5,000 (re-use system equivalent cost)	2,000-2,500 (converted polymer)	2,000-2,500	<ul style="list-style-type: none"> <li>Need for shared infrastructure across industry to scale solution</li> <li>Consumer adoption/convenience</li> </ul>
<b>Closed-loop Mechanical Recycling</b>	14%	60%	1,800-2,000 (polymer)	1,200 (polymer)	600-800	
<b>Chemical Recycling</b>	10%	n/a	2,000-3,000 (polymer)	1,200 (polymer)	800-1800	<ul style="list-style-type: none"> <li>Serious sustainability concerns</li> </ul>
<b>Substitution (Packaging)</b>	12%	12%	4,000 (paper/coated paper packaging)	2,000-2,500 (converted polymer)	1,500-2,000	

### 3 A HIGHER FEE, DESIGNED AS AN ECONOMIC INSTRUMENT, COULD SUPPORT SWITCHING AWAY FROM PRIMARY PLASTIC PRODUCTION

At a higher Fee level, we would expect to see increased switching to circular solutions, as the economics of recycling, re-use and substitution improve in comparison to primary plastic production. We estimate the potential for increased switching, based on an analysis of:

We estimate the potential for increased switching, based on an analysis of:

- the applicability of different circular solutions to replace primary plastic polymers or products, taking into account factors including technological maturity, convenience, performance and safety [57].

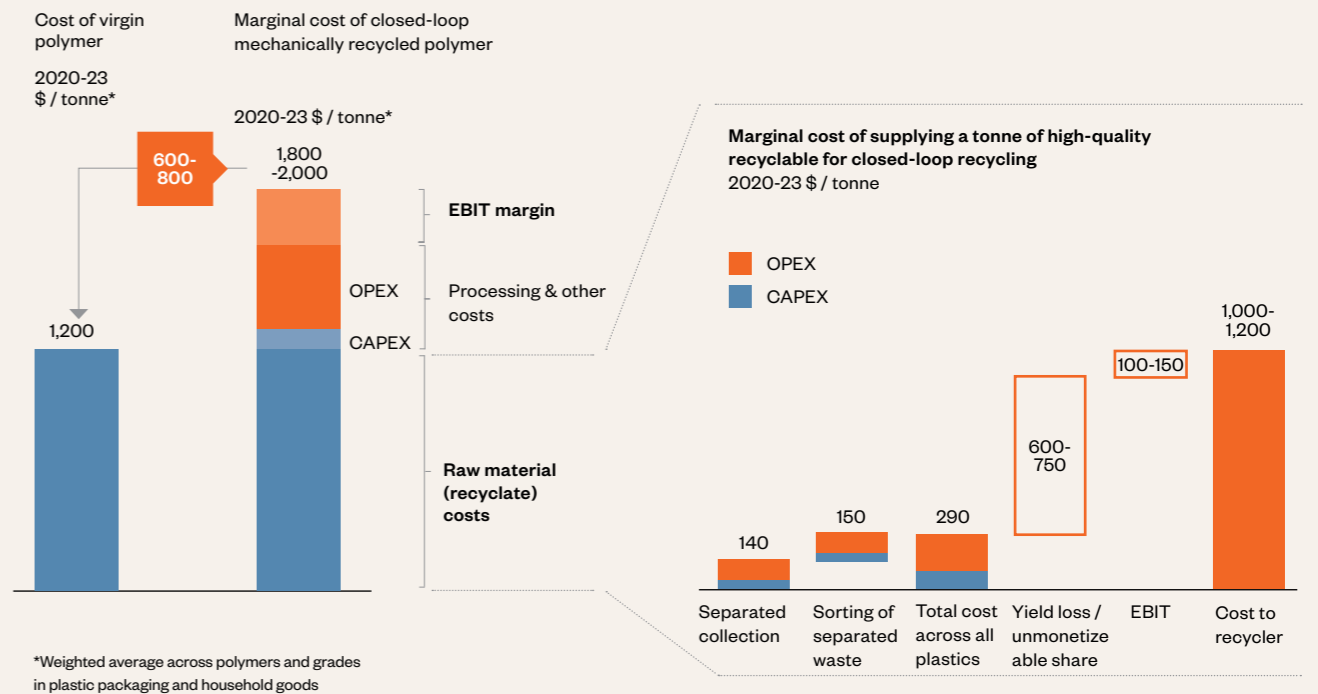
- the cost differential of each solution compared to the equivalent primary plastic polymer or product [58].

- an assessment of non-cost/price-based factors.

The approach and results are summarised in **Figure 14** and **Figure 15**. **Figure 16** presents an example of the cost differential analysis, for closed-loop mechanical recycling.

As shown in **Figure 17**, a Fee of US\$600 to 800 per tonne of polymer is needed to fully bridge the higher costs of closed-loop mechanical recycling; and a Fee of US\$1,500 to 2,000 is needed to fully bridge the higher costs of re-use models, substitution to non-plastic alternatives, and chemical recycling.

**Figure 18: Analysis of the economic gap between primary and closed-loop mechanically recycled polymers**



57. Expressed in percentage terms and are all based on assumptions used in Towards Ending Plastic Pollution, and which were validated in that study by an Expert Panel.

58. Primary polymer prices are sourced from Wood Mackenzie; re-use economics are sourced from EMF/Systemiq *Unlocking a reuse revolution: scaling returnable packaging*; mechanical recycling and substitution economics from *Towards Ending Plastic Pollution*; and chemical recycling economics from Minderoo's own research.

Figure 19: Economic activity across the plastic economy



Seine River, Paris, France, 27 May 2023. Canadian artist and activist Benjamin Von Wong's 5m tall art installation, the "Perpetual Plastic Machine", symbolises the globe's runaway use of plastic. (Photo by Bertrand Guay/AFP via Getty Images)

#### 4 A HIGHER FEE WOULD NOT REPLACE THE NEED FOR AMBITIOUS REGULATORY CONTROL MEASURES

As displayed in Figure 19, multiple non-cost-based factors constrain adoption of circular alternatives to primary plastic polymers and products. We expect that many of these constraints will only be unlocked through enabling regulation under an ambitious treaty (as opposed to market-based measures alone).

As an example, the potential of closed-loop mechanical recycled polymers to replace primary polymers is dependent on the maximum yield (of recycled polymer) that can be achieved from separately collected and sorted waste streams. Currently, maximum yields are estimated to be only 14 per cent across all packaging waste,

due to factors such as contamination and a lack of standardisation in formats and polymer composition. However, with an ambitious regulatory drive to radically simplify polymers, additives and formats, it is estimated that yields could increase to as much as 60 per cent [59].

We expect that a Fee on primary polymers, set at a level that bridges the full cost differential to circular alternatives – US\$600 to 800 in the case of closed-loop mechanical recycled polymer – would lead to a scale-up equivalent to the maximum potential of the solution under a “business as usual” regulatory environment (e.g., a 14 per cent closed-loop recycling rate). However, we do not expect a market-based measure alone could unlock a coordinated response across industry equivalent in impact to ambitious regulatory control measure (e.g., a 60 per cent closed-loop recycling rate).

The suite of regulatory control measures in the Global Rules Scenario that address upstream transformation is ambitious and, as displayed in Figure 19, are expected to have a transformative effect on the plastics economy: the balance of economic activity (opex plus annualised capex) changes from almost entirely fossil fuel-based today in a business-as-usual scenario, to an almost equal balance of circular and fossil fuel-based activity.

We expect a higher fee would limit the risk of control measures falling short of their expected ambition (i.e., would de-risk the control measures), but have only a limited additional impact on the transition to circularity. At the same time, a higher fee at the level of US\$1,000 to 2,000 – representing a 100 to 150 per cent mark up on current prices – also comes with greater uncertainty and potential for adverse social and economic impacts.

**Feedback and consultation on this Impact Study will inform subsequent work leading up to INC-5.**

**We expressly welcome and solicit feedback from any interested stakeholders, including government, civil society, and business. Please contact [loshalem@minderoo.org](mailto:loshalem@minderoo.org) and [jgriffiths@minderoo.org](mailto:jgriffiths@minderoo.org).**



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