Policy Scenarios for Eliminating Plastic Pollution by 2040

POLICY HIGHLIGHTS

OECD

BETTER POLICIES FOR BETTER LIVES

Contents

"The flexibility and versatility of plastics is difficult to match. However, escalating levels of plastics production and use, particularly in short-lived applications, have led to increasing waste levels and pollution of this all-pervasive material in recent decades. Plastic pollution can be found in the water we drink, the air we breathe and the food we eat, posing an increasing threat to the environment and human health, with consequences for sustainable economic growth and human well-being.

The ongoing negotiations to develop an international legally-binding instrument on plastic pollution provide a unique opportunity for governments to create a powerful global response to this environmental issue. This new OECD analysis sheds light on the benefits and costs of alternative policy packages with varying levels of policy stringency across the world."

Jo Tyndall, OECD Environment Director

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BETTER POLICIES FOR BETTER LIVES

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Introduction

In March 2022, all 193 UN Member States united in a landmark decision to develop an international legally binding instrument on plastic pollution, including in the marine environment (UNEA Resolution 5/14 entitled "End Plastic Pollution: Towards an International Legally Binding Instrument"). This marks a unique opportunity to co-ordinate and amplify policy efforts to combat plastic pollution globally.

International negotiations to develop such a legally binding instrument have been underway since 2022 and policymakers are discussing the strategies, targets and actions that could achieve this ambitious goal. There is growing political momentum for implementing comprehensive policy actions targeting the full lifecycle of plastics, towards a common target to end plastic pollution by 2040 (High Ambition Coalition to End Plastic Pollution, 2024[1]; G7 Ministers of Climate, Energy and the Environment, 2024[2]). At the same time, there are different positions across countries on the intended scope of the treaty and the types and stringency of envisioned policy interventions, including regarding the balance between actions to reduce (primary) plastics production and demand versus actions to improve waste management. Furthermore, many low-income countries may face significant challenges in ramping up policy action and investments, including to achieve safe waste collection and treatment.

The OECD report ***Policy Scenarios for Eliminating Plastic Pollution by 2040*** provides insights on the potential benefits and consequences of varying levels of international policy ambition towards the elimination of plastic pollution. The report develops and contrasts alternative policy scenarios that simulate varying degrees of policy stringency, lifecycle scope and geographical coverage. The analysis provides crucial insights into some of the key trade-offs on where to prioritise policy action, and how interventions along the plastic lifecycle can help charting the path towards ending plastic pollution.

Key findings

1. Business as usual is unsustainable as plastic flows and their environmental impacts will continue to grow rapidly

- Annual plastics production and use is projected to rise from 435 million tonnes (Mt) in 2020 to 736 Mt in 2040 in the Baseline scenario. The share of recycled plastics would remain unchanged at 6% of total plastics use (41 Mt in 2040)
- While waste management is expected to improve, advances will not keep pace with the growth of plastic waste (617 Mt in 2040, up from 360 Mt in 2020), resulting in 119 Mt of mismanaged waste in 2040 (increasing from 81 Mt in 2020).
- Leakage of plastics to the environment will continue (30 Mt in 2040, up from 20 Mt in 2020), amplifying adverse environmental and health impacts. The stock of plastics in rivers and oceans will almost double from 152 Mt in 2020 to 300 Mt by 2040
- The plastics lifecycle will emit 2.8 gigatonnes of carbon dioxide equivalent ($GtCO_2e$) of greenhouse gas (GHG) emissions annually by 2040 (5% of global emissions), up from 1.8 $GtCO_2e$ in 2020, primarily driven by the production and conversion of plastics

2. Partial measures, such as policy responses focused on enhancing waste management alone or global action with broad policy coverage but with low policy stringency, are likely to fall short of ending plastic pollution, as are policy responses with ambitious action along the lifecycle implemented only in advanced economies

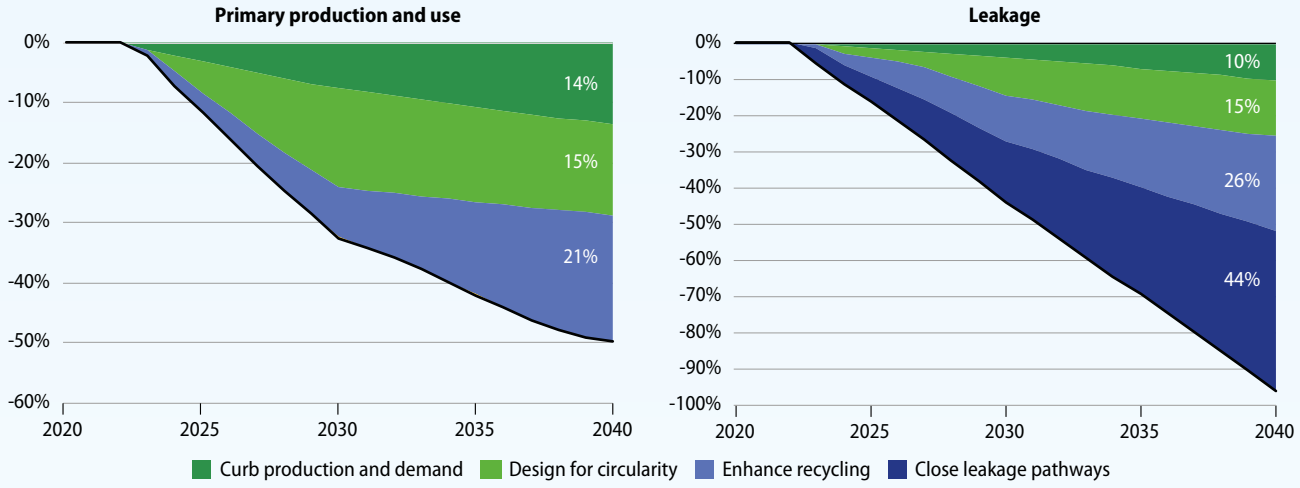
- Enhancing waste management in all countries (Global Downstream High stringency scenario) can reduce the share of mismanaged waste to 9% by 2040 (compared to 23% in 2020). However, 54 Mt of plastic waste would still be mismanaged in 2040
- Stringent policy action in advanced economies only (Advanced economies Lifecycle High stringency scenario) is unlikely to reduce mismanaged plastic waste below 2020 levels. Similarly, global action with broad policy coverage, but low policy stringency (Global Lifecycle Low stringency scenario), is unlikely to significantly alter Baseline trends
- These partial ambition strategies cannot reduce primary plastics production and use below 2020 levels. Mismanaged plastic waste will not be eliminated without highly-stringent measures to curb production and demand implemented globally

3. The implementation of stringent policies along the plastics lifecycle in all countries *(Global Lifecycle High stringency* scenario) can prevent growth in primary plastics production from 2020 levels and nearly end plastic leakage to the environment by 2040

- Stringent policies to curb production and demand (limiting total plastics use to 508 Mt in 2040), combined with policies to enhance recycling rates (quadrupling to 42%), can ensure that all growth in plastics use is met through recycled plastics rather than through primary production
- This policy package can nearly eliminate mismanaged waste by 2040 (97% below Baseline levels) and prevent 74 Mt of plastics from entering rivers and oceans relative to the Baseline scenario
- Stringent policy action can reduce plastics-related GHG emissions to 1.7 $GtCO_2e$ by 2040, well below the projected Baseline level of 2.8 $GtCO_2e$ in 2040

FIGURE 1. **Combining policies that target different lifecycle stages can nearly eliminate plastic leakage**

Primary production and use and leakage, percentage change compared to the *Baseline, Global Lifecycle High stringency [Global Ambition]* scenario

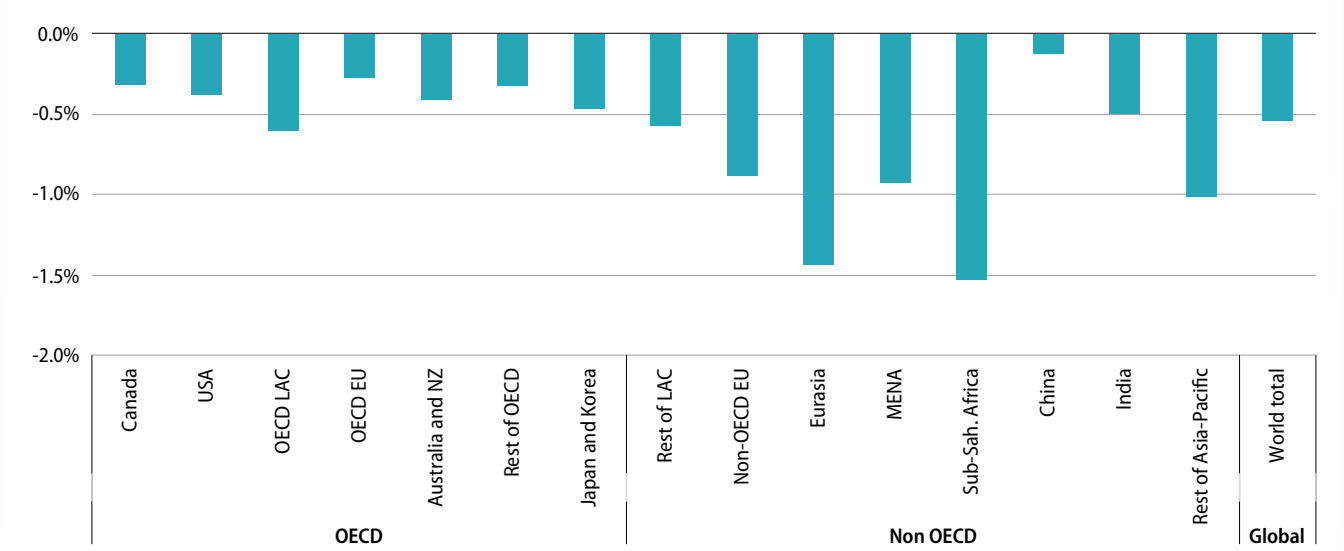


4. Global ambition has modest macroeconomic costs overall, however these costs are unevenly distributed across regions

- The implementation of stringent global policy action along the lifecycle is projected to incur a 0.5% global GDP loss in 2040 compared to the Baseline scenario but result in vastly improved environmental outcomes. A slower pace of policy action may have some short-term economic benefits, but leads to significantly higher pollution levels
- Non-OECD countries will face higher costs than OECD countries on average (0.6% vs. 0.4% GDP loss compared to the *Baseline*, respectively, in 2040), as the strongest policy efforts are needed in countries with less advanced waste management systems, particularly in Sub-Saharan Africa (1.5% GDP loss)

FIGURE 2. **The macroeconomic burden of policy implementation falls most heavily on countries with less advanced waste management systems**

Impact on GDP of the *Global Lifecycle High stringency [Global Ambition]* scenario, in percentage change compared to the *Baseline* in 2040



Key findings

5. Implementation of an ambitious whole of lifecycle approach globally requires overcoming significant technical, economic and governance barriers

- Enhancing waste collection systems, especially in many low- and middle-income countries, is essential to reduce mismanaged waste, but requires robust policy frameworks and adequate and stable sources of finance
- Ending plastic leakage by 2040 relies on significant improvements in waste sorting and recycling yields and quality in all regions (to reach a global recycling rate of 42% in 2040, up from 9.5% in 2020). Robust markets for scrap and secondary plastics are required to ensure a viable business case for plastics recycling
- Internationally harmonised standards and co-ordinated research efforts are needed to establish eco-design criteria for phasing out problematic or unnecessary plastics and hazardous chemicals, as well as for facilitating waste sorting and recycling

6. Ending plastic leakage warrants mobilising significant financial resources and strengthening international co-operation

- Under current policies, global investment needs for plastic waste management are projected to amount to USD 2.1 trillion between 2020 and 2040. Waste reduction policies, alongside redirecting investment flows towards waste sorting and recycling, could limit additional investment needs required to end plastic leakage to only USD 50 billion by 2040
- Successful policy implementation will require leveraging diverse sources of public and private finance and directing capital flows towards interventions along the plastics lifecycle, including to scale up reuse systems and promote eco-design
- Developing countries, often the most vulnerable to plastic pollution, are expected to undertake major policy efforts. This underscores a need for enhanced international co-operation and financing. Development finance can play a catalytic role to leverage other sources of finance
- Strengthened technical co-operation, capacity building and technology transfer are essential to establish robust policy frameworks, ensure reliable revenue streams for domestic financing of waste collection and treatment (e.g. Extended Producer Responsibility), and target problematic applications

7. Eliminating plastic leakage is critical, but other plastic pollution aspects require additional interventions

- Despite the large benefits of globally ambitious action, the policies modelled are insufficient to mitigate all aspects of plastic pollution, beyond leakage to the environment. Additional, targeted interventions will be needed to reduce risks associated with microplastic pollution and chemicals of concern
- Even with global ambition, stocks of plastics in the environment will continue to grow, with 226 Mt of plastics in rivers and oceans by 2040 (up from 151 Mt in 2020). Cost-effective remedial interventions are needed to mitigate environmental and health risks, especially in pollution hotspots
- Further reducing plastics-related GHG emissions to align with the ambitions of the Paris Agreement requires dedicated climate mitigation policies, potentially including reforms of government support for primary polymer production and conversion

1. Business-as-usual is unsustainable

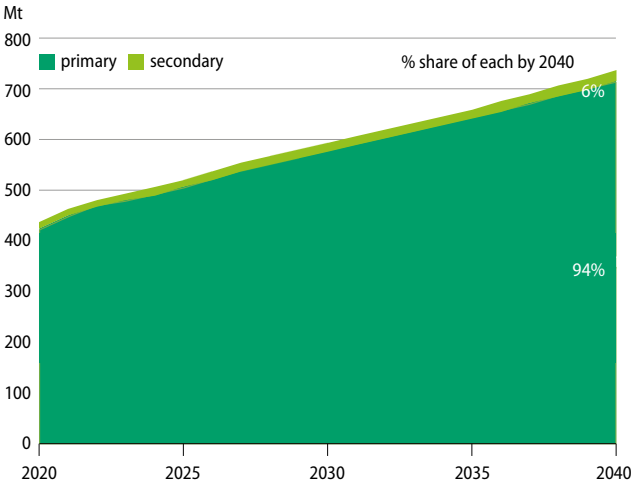
By 2040…

Annual plastics use and waste generation will increase by 70% compared to 2020 levels. Despite expected improvements in waste collection, sorting and treatment, higher plastic waste generation would lead to an increase in the absolute amount of mismanaged waste (i.e. waste that is not disposed of in an environmentally sound manner) compared to 2020 levels. Despite rising recycling output, most waste will be landfilled or incinerated (Figure 3, Panels A and B).

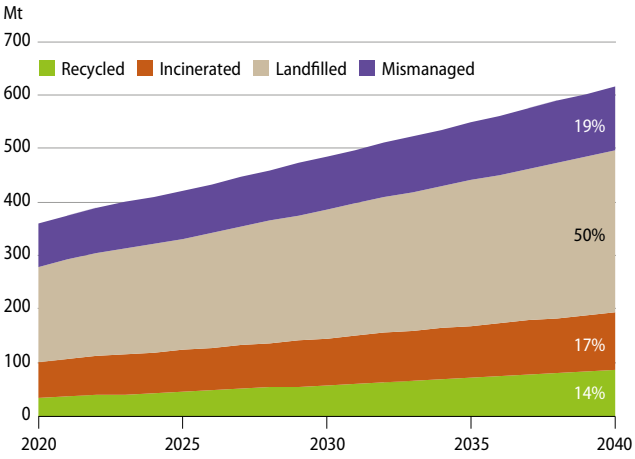
Plastic leakage to the environment will increase by 50%, to 30 million tonnes (Mt) (Figure 3, Panel C). The accumulation of plastics in the environment will worsen, amplifying negative impacts for ecosystems, human well-being and coastal economies. Plastics in aquatic environments alone will nearly double, to reach 300 Mt (from an estimated 152 Mt in 2020)**.**

FIGURE 3. **Plastic flows and pollution are set to increase substantially, without more ambitious policies**
Million tonnes, *Baseline* scenario

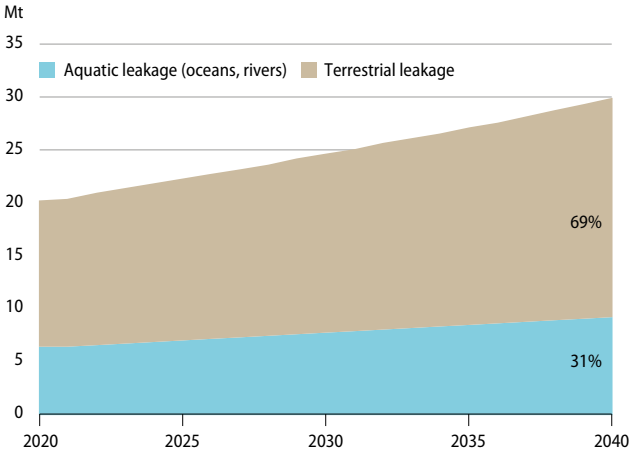
PANEL A. Annual plastics use (primary vs secondary)



PANEL B. Plastic waste and its end-of-life fates



PANEL C. Plastic leakage to the environment

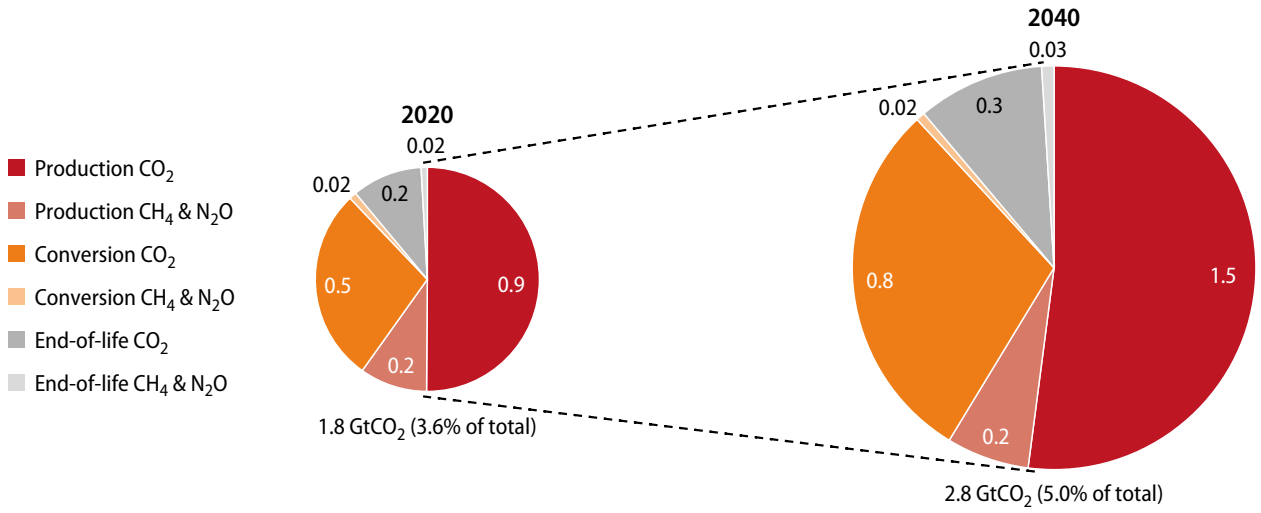


1. Business-as-usual is unsustainable

Greenhouse gas (GHG) emissions from the plastics lifecycle will increase by 60% compared to 2020 levels (1.8 GtCO2e), an undesirable outcome not in line with the Paris Agreement. The plastics lifecycle is closely linked to climate change, due to the fossil-based origins of most plastics and the domination of fossil fuels in current production. Emissions from the plastics lifecycle accounted for 3.6% of total global emissions in 2020, which is projected to rise to 5% by 2040. Nearly 90% of quantified plastics-related emissions are attributed to the production and conversion stage in plastic manufacturing (Figure 4) and are relatively hard to abate.

FIGURE 4. **Greenhouse gas emissions from plastics are projected to increase by more than one-half**

Annual GHG emissions from the plastics lifecycle in gigatonnes carbon dioxide equivalent (GtCO2e), *Baseline* scenario



2. Policy scenarios chart alternative paths to ending plastic pollution

Countries have a wide array of tools at their disposal to mitigate plastic pollution. Policy interventions can be grouped into four core pillars (OECD, 2022[3]):[1]

1. **Curb production and demand:** restrain plastics production and demand to sustainable levels.
2. **Design for circularity:** promote the eco-design of plastic products and packaging.
3. **Enhance recycling:** improve the separate collection, sorting and recycling of plastic waste to close material loops.
4. **Close leakage pathways:** promote effective waste collection and disposal, as well as municipal litter collection and street sweeping, to minimise losses to the environment.

The analysis considers alternative policy scenarios with different degrees of policy stringency, lifecycle scope and geographical coverage of the policy package. All scenarios involve 10 policy instruments across 4 key policy pillars listed in Figure 5, or a subset of these.

FIGURE 5. **Policy instruments modelled in the scenarios**

Curb production and demand	Design for circularity	Enhance recycling	Close leakage pathways
Targeted taxes to reduce certain plastics (e.g. packaging)	Eco-design criteria and product standards for reuse, durability and repair	Recycled content targets	Improved waste collection, sorting and management (including via the use of economic instruments)
Taxes on all plastics, to disincentivise primary production	Bans on select single-use plastics	Enhanced collection, sorting and recycling	Improved municipal litter management
	Design criteria to substitute away from plastics (where beneficial)	Extended Producer Responsibility (EPR) for packaging and durables	

Note: The choice of policy instruments modelled in the policy scenarios is not intended to be prescriptive, but indicative of a potential set of effective instruments that could be implemented. Countries will need to strengthen policy packages using the instruments that are best suited to their specific circumstances. Ideally, comprehensive policy mixes combine mutually reinforcing tools: regulatory and economic instruments, as well as enabling policies.

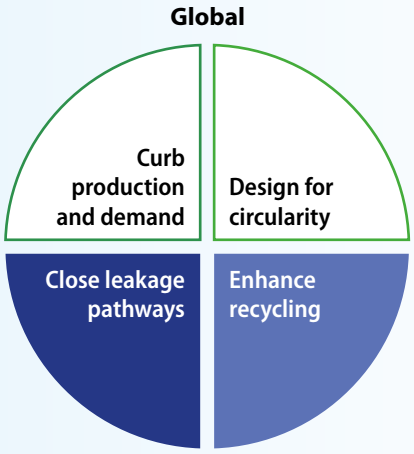
1. A fifth lever concerns **clean up and remediation**, i.e. the removal of plastics from the environment and the mitigation of associated risks. Its evaluation is left for future analysis.

2. Policy scenarios chart alternative paths to ending plastic pollution

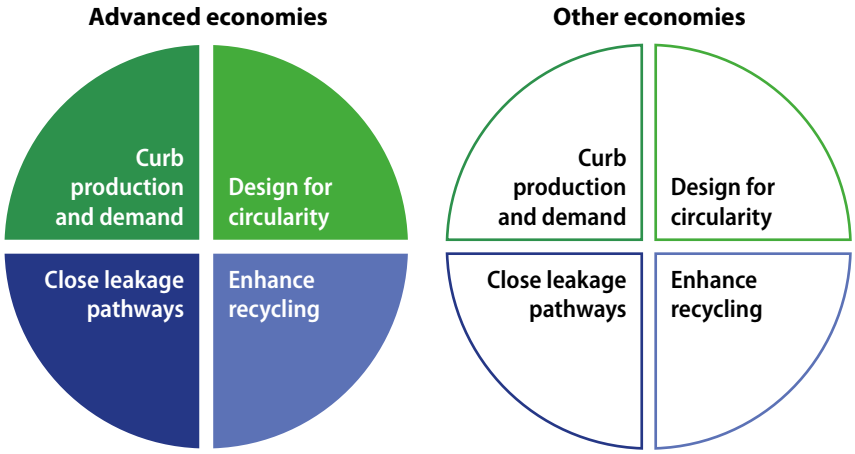
Three **partial ambition policy scenarios** simulate stylised directions for the international treaty:

The colours represent the level of stringency.
For example: Business-as-usual
Low stringency High stringency

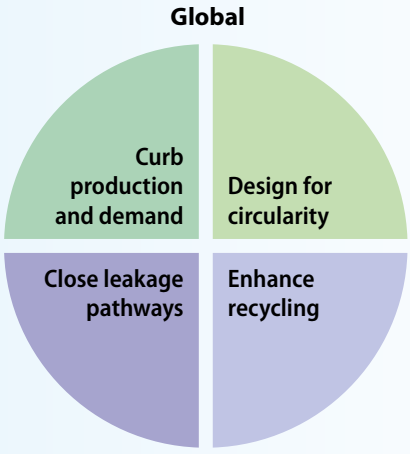
The ***Global Downstream High stringency*** policy scenario models stringent policies to improve waste collection, sorting, recycling and municipal litter collection.



The ***Advanced economies Lifecycle High stringency*** scenario models the implementation of policies with high stringency across all four pillars in advanced economies only (approximated as OECD and European Union countries).

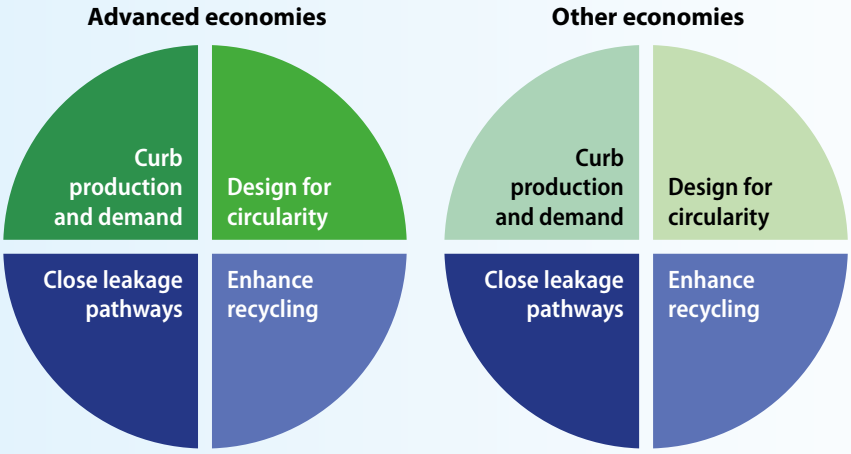


The ***Global Lifecycle Low stringency*** scenario models the global implementation of policies on all four policy pillars with low policy stringency.

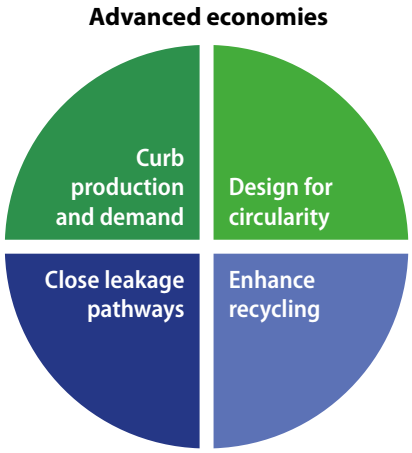


Two **high ambition policy scenarios** combine multiple aspects of the scenarios presented above:

The ***Global Lifecycle Mixed stringency*** scenario reflects moderate international alignment on the lifecycle coverage of policies. Advanced economies implement highly stringent policies in all four policy pillars. Other countries implement highly stringent waste management policies, and other policies with low stringency.



The ***Global Lifecycle High stringency [Global Ambition]*** scenario models the global implementation of highly stringent policies across all four pillars, aligned with the shared goal of ending plastic pollution by 2040. In the model, this is reflected as the target to end macroplastic leakage by 2040.



2. Policy scenarios chart alternative paths to ending plastic pollution

Figure 6 details the degrees of policy stringency of the ten policy instruments as modelled for the *Global Lifecycle High stringency* [*Global Ambition*] scenario. The other scenarios involve (a subset of) the same ten policy instruments across the four key policy pillars, but degrees of policy stringency and geographical coverage of the policy package vary across scenarios.

FIGURE 6. **Policy instruments modelled in the policy scenarios**

	Curb production and demand		Design for circularity		
Policy instrument	Packaging plastics tax	Non-packaging plastics tax	Eco-design for durability and repair	Bans on select single-use plastics	Substitute away from plastics
Stringency modelled in Global Lifecycle High stringency [Global Ambition]	**Global:** USD 1 000/tonne by 2030, doubling by 2040	**Global:** USD 750/tonne by 2030, doubling by 2040	**Global:** 15% lifespan increase by 2030, constant after; 10-20% decrease in demand for durables by 2030, constant after; like increase in demand for repair services	**Global:** Phase-out of primary plastics for selected consumer products by 2030	**Global:** 17% reduction of plastics use in production by 2030 with compensating increase in use of other inputs, constant thereafter

	Enhance recycling			Close leakage pathways	
Policy instrument	Recycled content targets	Enhance recycling rates	EPR for packaging, electronics, automotive and wearable apparel	Improved waste collection	Improved litter management
Stringency modelled in Global Lifecycle High stringency [Global Ambition]	**Global:** 30% target by 2040	*Targets* **EU, Japan, Korea:** 60% by 2030, 80% by 2060 **Rest of OECD, China:** 60% by 2040 **Rest of non-OECD:** 45% by 2040	**Global:** Tax on plastics inputs USD 300/tonne by 2030, constant after; 30% point increase in recycling by 2040; waste sector subsidy such that instrument is budget neutral	**Global:** All waste is adequately collected and managed by 2040	**Global:** Increase in collection rates between 5%-points (high-income countries) and 10%-points (lowincome countries) by 2040

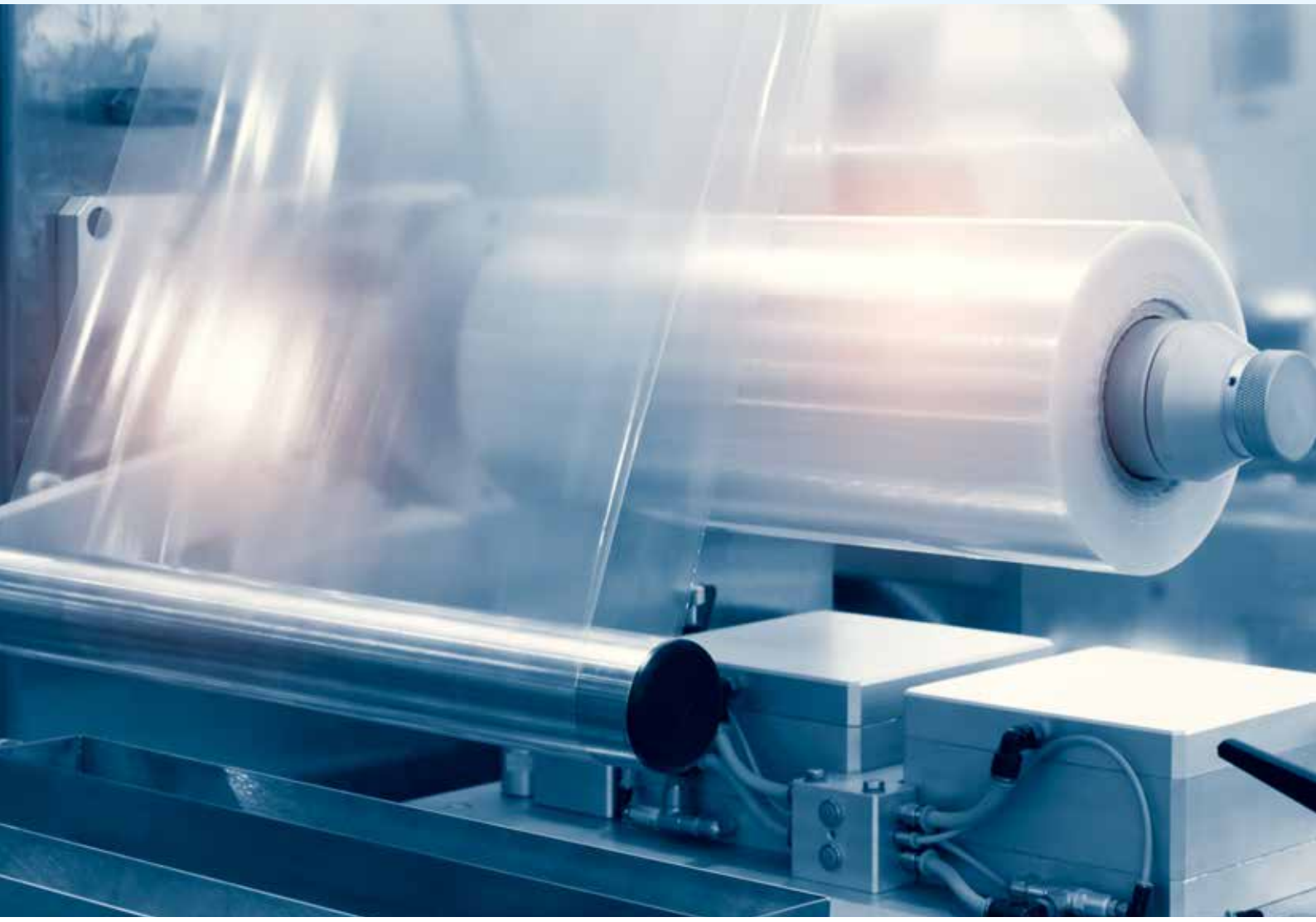
Note: The choice of policy instruments modelled in the policy scenarios is not intended to be prescriptive, but rather indicative of a potential set of effective instruments that could be implemented. For instance, the packaging tax translates into roughly EUR 0.90 per kilogramme, and could be interpreted as a shadow-price for alternative instruments to curb production and demand.

Source: Authors' own elaboration.

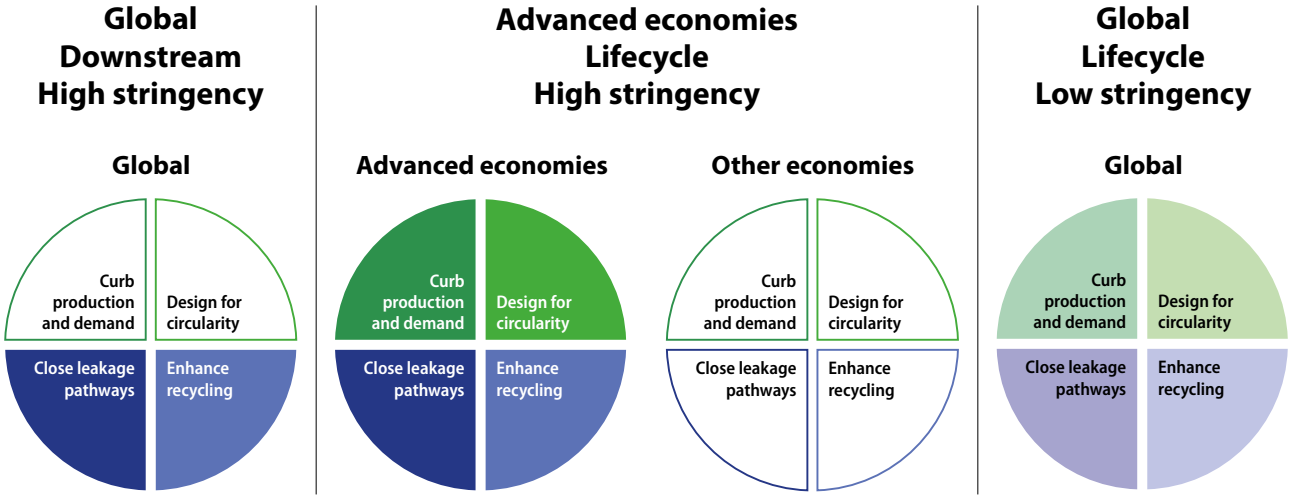
Methodological clarifications on the policy scenario analysis

The policy scenario analysis contained in the report "Policy Scenarios for Eliminating Plastic Pollution by 2040" builds on the OECD Global Plastics Outlook publications (2022[4]; 2022[3]) and exploits the same modelling framework to estimate plastic flows (from production to waste end-of-life fates), macroplastic leakage to the environment and plastics-related greenhouse gas emissions. The quantification of other aspects of plastic pollution is beyond the scope of this analysis, although some of these are presented qualitatively.

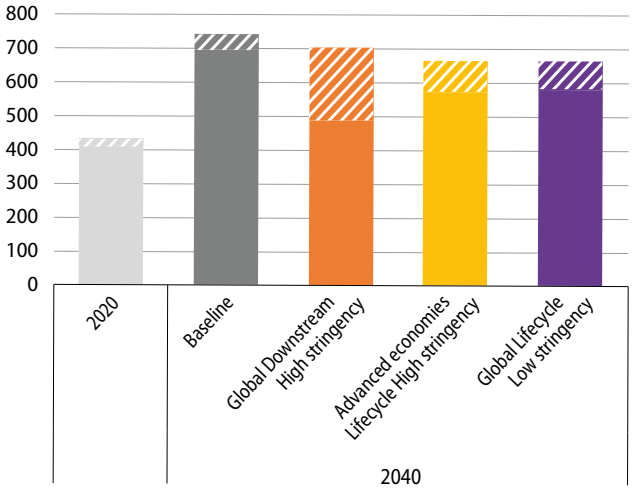
Projections over long time horizons are inevitably subject to uncertainties. However, the comparison of alternative policy scenarios can highlight the possible environmental and economic consequences of different policy in the fight against plastic pollution, such as a focus on waste management versus taking action all along the lifecycle of plastics. The policy scenarios presented here employ mainly economic instruments to represent interventions at specific steps in the lifecycle of plastics, such as taxes on plastics, in addition to regulation (e.g. recycling rates, eco-design policies). While, in practice, a wide array of different policy instruments are available to policymakers to mitigate the adverse impacts of plastics, the policy package presented here can constitute a cost-effective benchmark against which countries can evaluate alternative instruments, such as regulation.



3. Partial ambition scenarios fail to eliminate plastic pollution



Plastics production and use, primary and secondary (Mt)

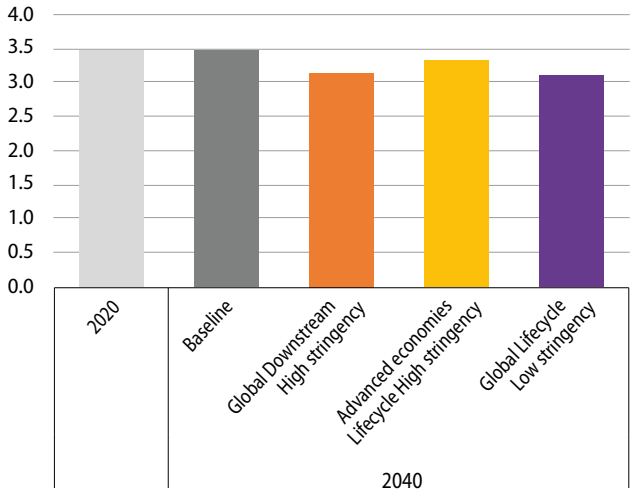


Reducing **(primary) plastics production and use** is essential to reduce GHG emissions and other production-related adverse impacts.

None of these scenarios can stabilise primary plastics production and use at or below 2020 levels. The stringent policies to curb production and demand and to improve eco-design, implemented in *Advanced economies Lifecycle High stringency*, reduce primary plastics use only in the advanced economies.

Note: The striped portion of the bars indicate secondary plastics.

Plastics intensity (t/USD)

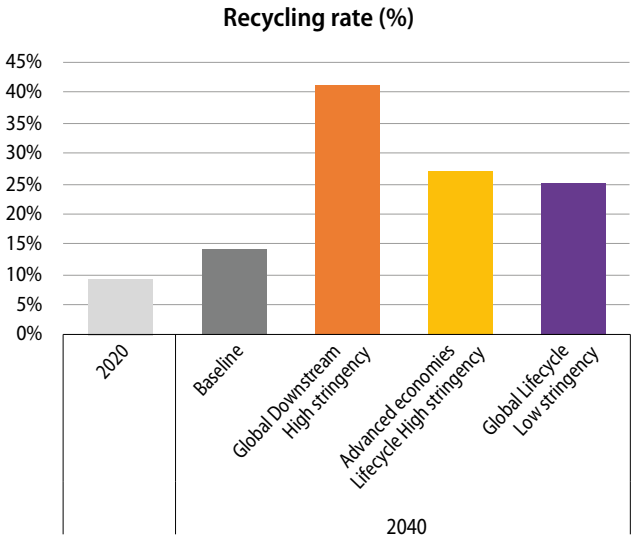


Reducing the **plastics intensity** of the global economy (i.e. by increasing the use rate for plastic materials before they become waste) can decouple economic growth from plastic flows and pollution.

The *Global Downstream High stringency* scenario has virtually no effect on the plastics intensity of the global economy.

The *Advanced economies Lifecycle High stringency* scenario is effective for countries undertaking policy action, with very small effects on other countries and overall marginal impacts on global plastics flows.

The *Global Lifecycle Low stringency* scenario partially reduces plastics use and intensity.

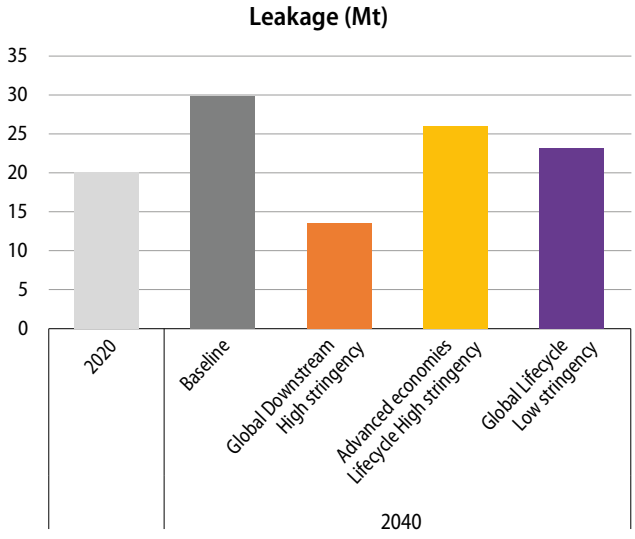


Increasing recycling rates is essential to displace primary plastics and can help to divert waste from mismanagement and other less desirable end-of-life fates.

Assuming that existing barriers to further scaling up mechanical recycling are overcome, the *Global Downstream High stringency* scenario quadruples the global recycling rate to 42%.

Improvements in recycling are limited to a subset of countries in the *Advanced economies Lifecycle High stringency* scenario.

The *Global Lifecycle Low stringency* scenario is less effective in enhancing recycling.

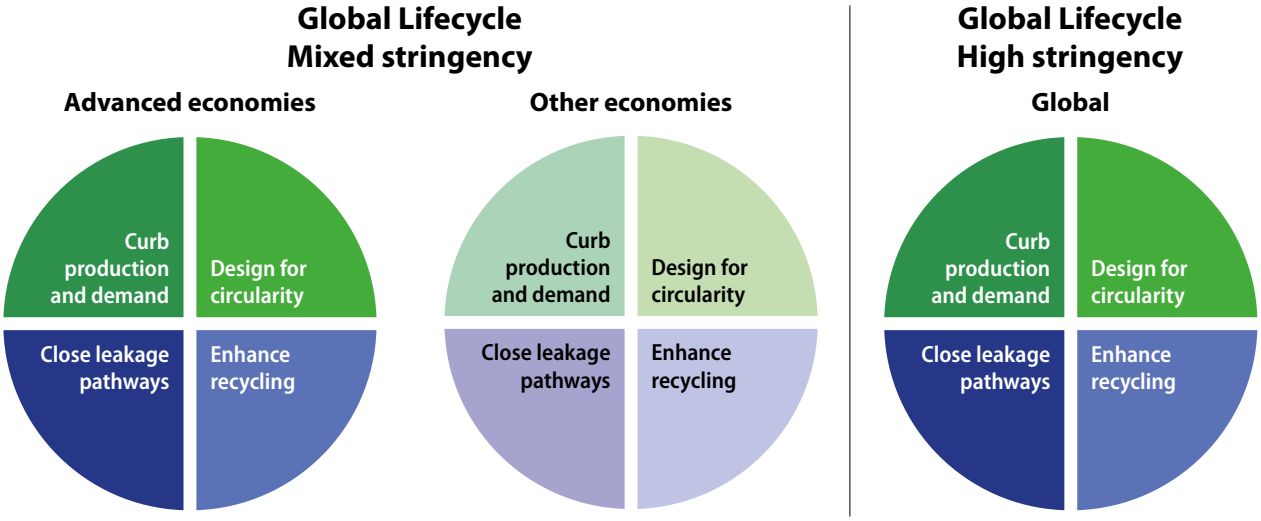


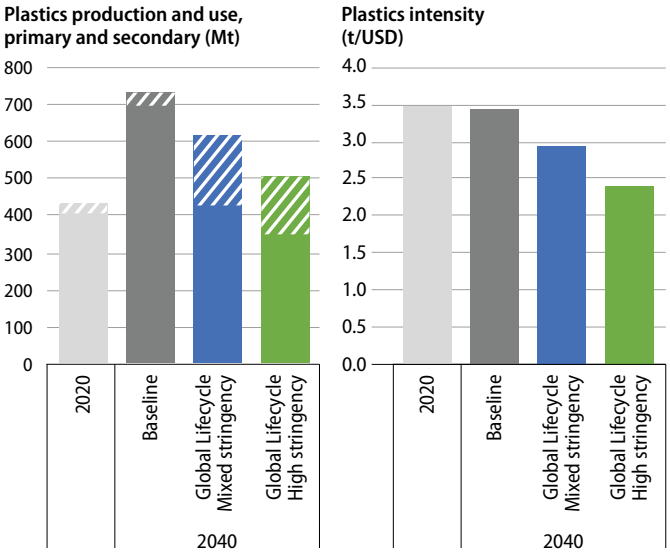
Reducing plastic waste mismanagement and leakage to the environment is essential to end plastic pollution.

The *Global Downstream High stringency* scenario reduces plastic leakage to the environment by a third compared to 2020 levels (-55% compared to *Baseline*), highlighting the importance of stringent downstream policies to improve waste collection, sorting and treatment and ensure safe waste disposal. At the same time, this scenario cannot close all leakage pathways in the absence of action to also reduce plastics use and waste.

In the *Advanced economies Lifecycle High stringency* and the *Global Lifecycle Low stringency* scenarios, plastic waste leakage increases significantly compared to 2020 levels.

4. Eliminating plastic leakage requires stringent action along the lifecycle

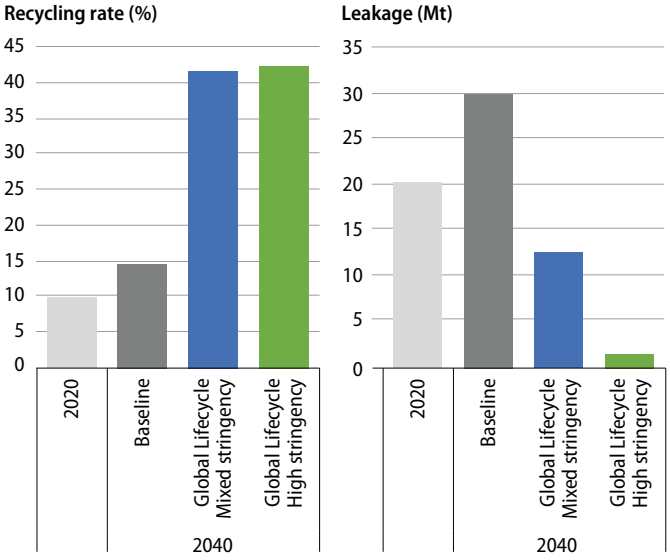




The ***Global Lifecycle Mixed stringency*** scenario contains growth in primary plastics production and use, although overall plastics production still increases significantly compared to 2020 levels. The decrease in the plastics intensity of the global economy is mostly driven by interventions to curb production and demand and to design for circularity, implemented across all world regions albeit with different stringency levels.

The ***Global Lifecycle High stringency*** scenario stabilises primary plastics production and use below 2020 levels. The plastics intensity of the global economy is reduced by a third.

Note: The striped portion of the bars indicate secondary plastics.



The *Global Lifecycle Mixed stringency* scenario reduces mismanaged plastic waste and leakage to the environment below 2020 levels, but does not eliminate it. Highly stringent downstream policies quadruple recycling rates to 42% by 2040.

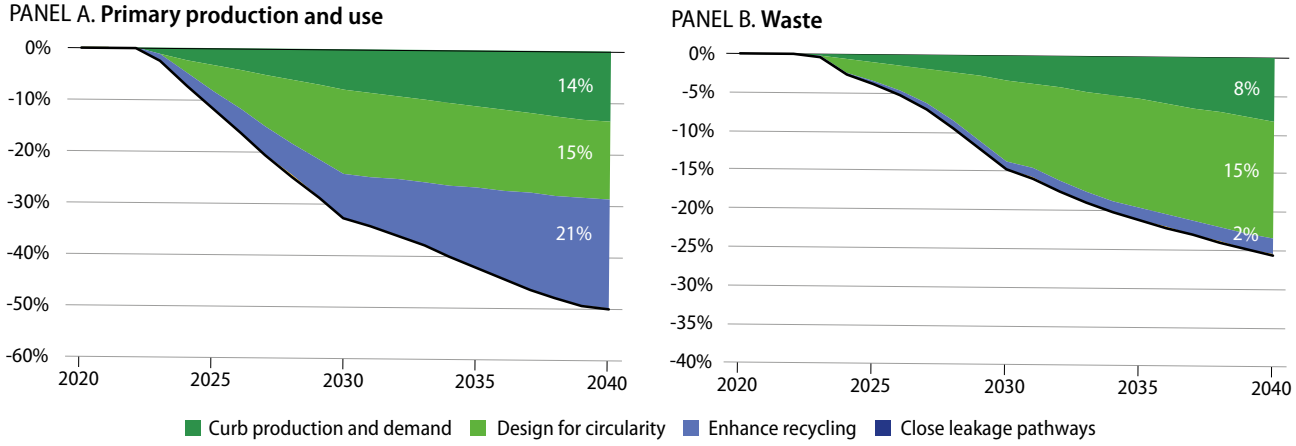
By contrast, the global implementation of a high stringency policy package covering all four policy pillars, as modelled in the ***Global Lifecycle High stringency* [*Global Ambition*]** scenario, can nearly eliminate mismanaged plastic waste and leakage by 2040.[2]

2. In this scenario, 4 Mt of mismanaged waste remain in 2040. A full reduction is not feasible in the policy scenario, as some streams continue to evade the modelled waste management systems, including uncollected litter.

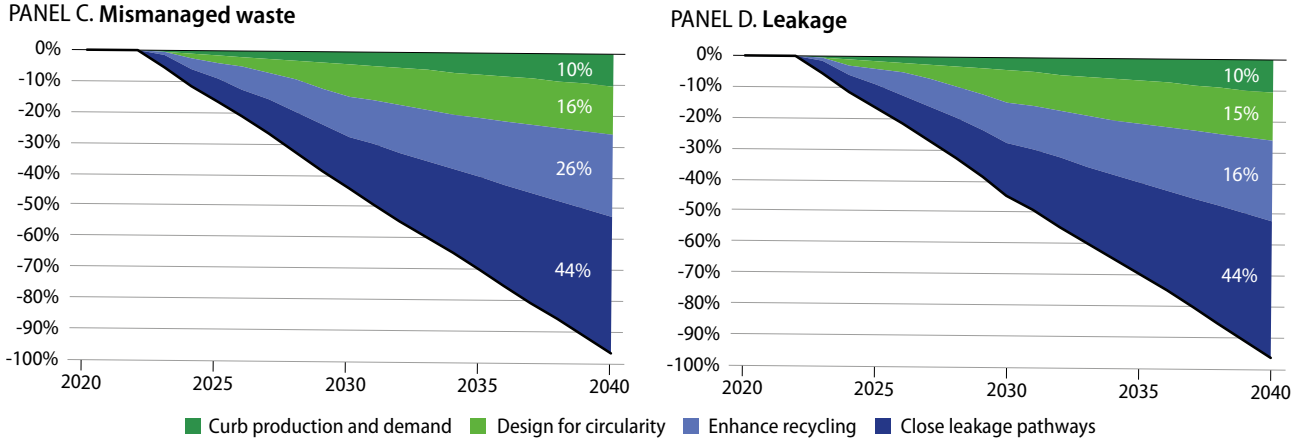
The comprehensive mix of policies along the lifecycle modelled in the *Global Lifecycle High stringency* [Global Ambition] scenario reduces primary plastics production and use and nearly eliminates plastic leakage to the environment (Figure 7).

FIGURE 7. **Comprehensive policies throughout the lifecycle contribute to eliminating plastic leakage**

Percentage change compared to the *Baseline, Global Lifecycle High stringency [Global Ambition]* scenario



- **Interventions to curb (primary) plastics production and demand and incentivise eco-design are pivotal to reducing global primary plastics production and use by 50% compared to the Baseline scenario** (Figure 7; Panel A). They are projected to also reduce total plastics use by one-third below *Baseline* scenario 2040 levels (Figure 5), mitigating adverse environmental and health impacts along the plastics lifecycle. In turn, approximately 158 Mt of waste is prevented by 2040, compared to *Baseline* (Figure 7; Panel B). This relieves the burden on waste management systems and reduce leakage to the environment (Figure 7; Panels C and D). Projected waste generation in non-OECD countries fall from a projected doubling in the *Baseline* scenario between 2020 and 2040, to a 40% increase over the same time frame. Improvements in sorting and recycling are required in all countries to increase recycling rates and reduce reliance on primary production (Figure 7; Panel A).



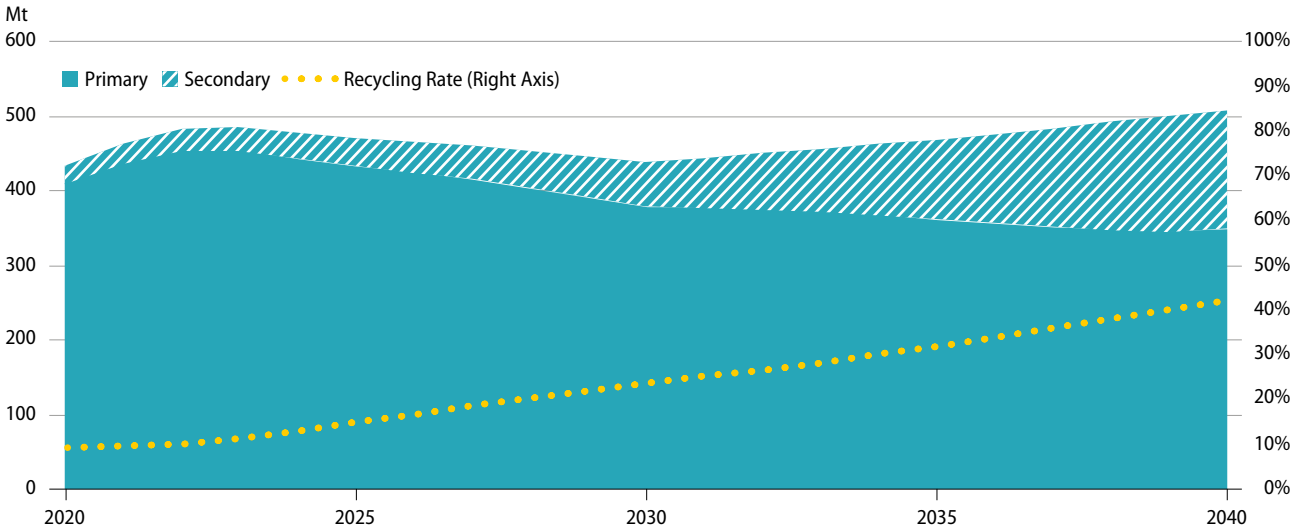
- **Ensuring that all countries have adequate waste management systems by 2040 is also crucial** (Figure 7; Panels C and D) to end plastic waste mismanagement and leakage. While most developed countries already have widespread municipal waste collection and treatment, this is not the case in a large share of developing countries, especially in non-urban areas. An urgent expansion of waste collection systems is a crucial prerequisite for ending plastic pollution, as waste that is not collected is mostly mismanaged and may end up in natural environments or be burned informally, leading to serious adverse consequences for human health and ecosystems.

4. Eliminating plastic leakage requires stringent action along the lifecycle

- **Driving down primary plastics production and use is essential to reduce GHG emissions and other adverse impacts associated with extraction and production, and to slow down the use of plastics in the economy and reduce the amount of waste to be managed.** The comprehensive policy package in the *Global Lifecycle High stringency* [*Global Ambition*] scenario also facilitates the transition to more circular plastics use, as secondary plastics production rises in parallel to the increased availability of scrap from downstream recycling efforts. As a result, demand for primary plastics would be lower than in 2020 (Figure 8).

FIGURE 8. **The *Global Ambition* scenario reduces primary plastics production below 2020 levels**

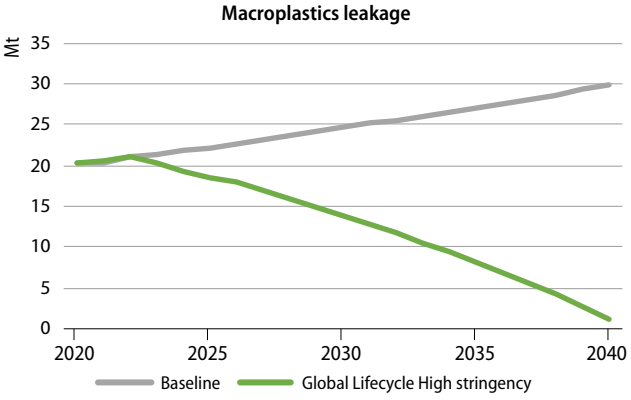
Global plastics production in Mt (left axis) and average recycling rate (right axis), *Global Lifecycle High stringency [Global Ambition]*



5. Global ambition can deliver large environmental benefits

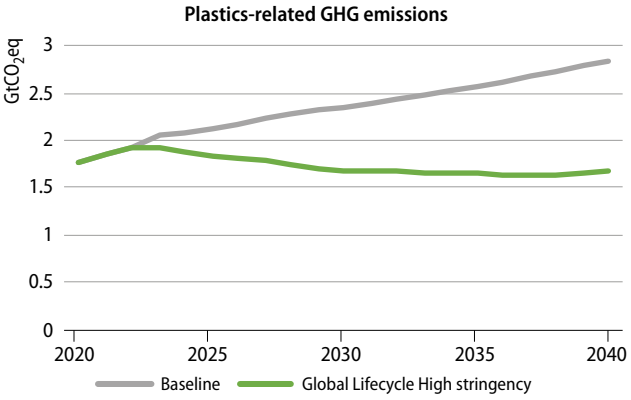
Compared to the *Baseline*, by 2040 the *Global Lifecycle High stringency [Global Ambition]* scenario results in:

-96%
in macroplastic leakage



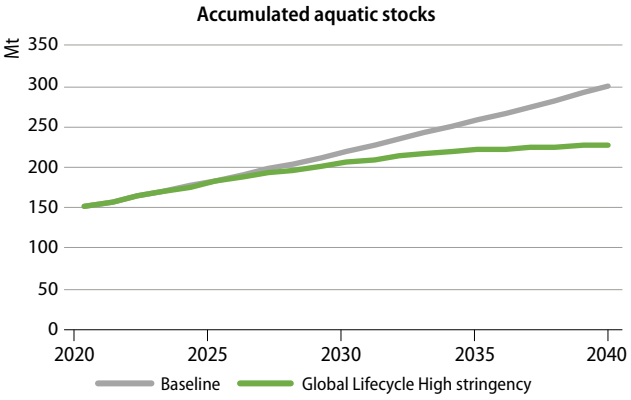
The combination of waste prevention measures and improvements in waste collection and treatment leads to an almost immediate fall in the leakage of macroplastics to the environment and a near elimination by 2040. By mitigating mismanaged waste, this scenario is also likely to deliver considerable benefits for human health.

-41%
in plastics lifecycle GHG emissions levels



A reduction in plastics-related GHG emissions is essential for achieving ambitious climate goals. The *Global Lifecycle High stringency* [*Global Ambition*] scenario reduces plastics-related GHG emission levels to 1.7 $GtCO_2e$ compared to 2.8 $GtCO_2e$ in *Baseline* 2040 levels. This scenario would also prevent significant increases compared to 2020 levels although it would still not be compatible with the ambitions of the Paris Agreement.

Avoided 74 Mt
of plastics accumulating in rivers and oceans

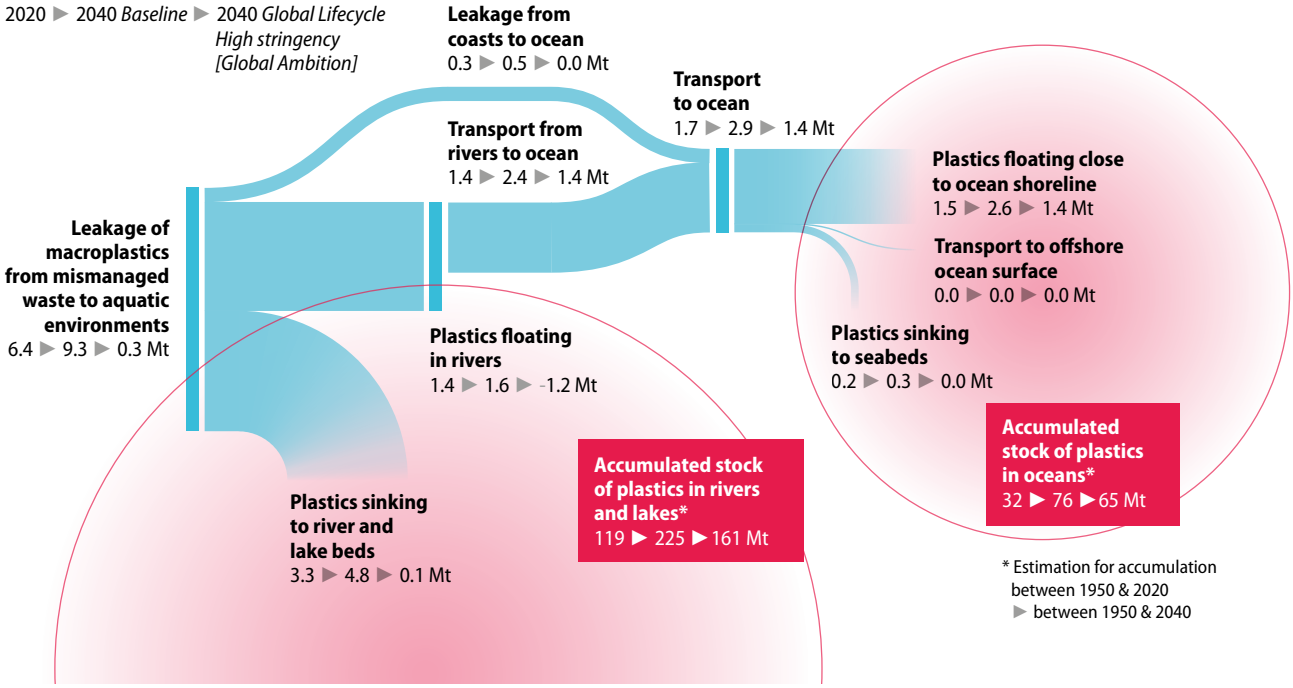


Under this scenario, all major trajectories of plastics in aquatic environments are significantly reduced (Figure 9). Nevertheless, as plastic leakage between 2020 and 2040 continues to build up in aquatic environments, stocks of total accumulated plastics are still projected to grow, reaching 226 Mt in 2040. Despite the large benefits expected from this scenario, the ten policies modelled would be insufficient to address all aspects of plastic pollution. The need for additional measures is touched upon in section 8.

5. Global ambition can deliver large environmental benefits

FIGURE 9. **The *Global Ambition* scenario reduces plastic leakage, but accumulated plastics in rivers and oceans still increase**

Plastic leakage to aquatic environments in Mt

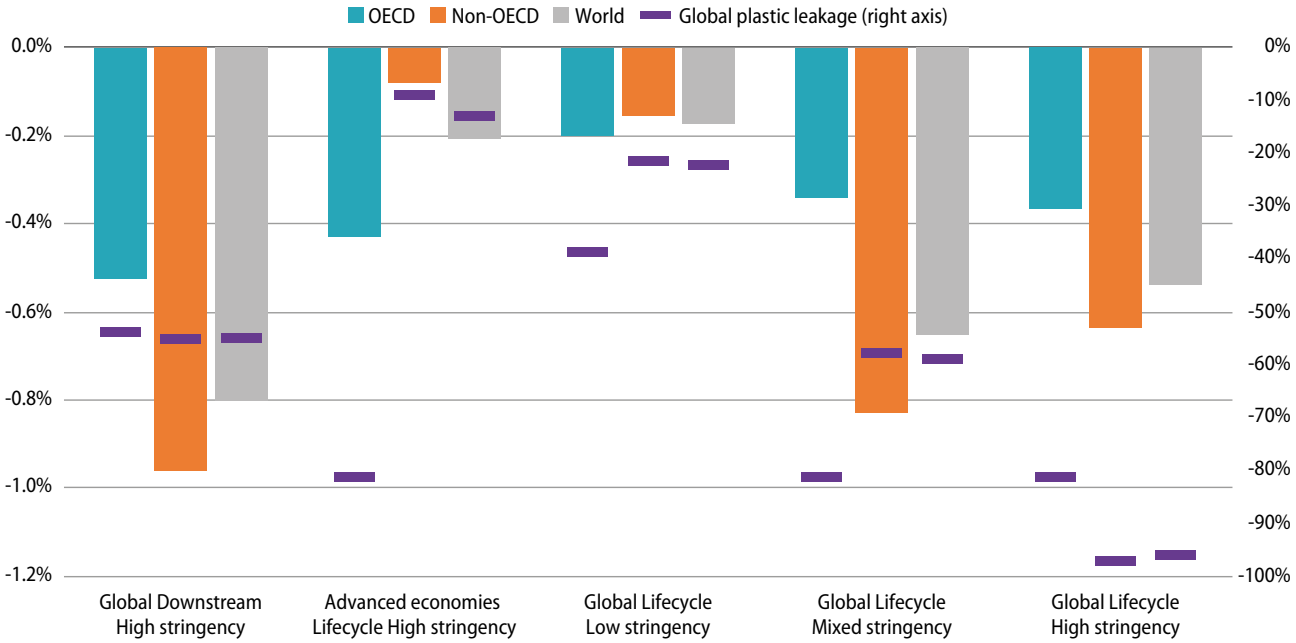


6. Policy action along the lifecycle is more effective and less costly than a downstream focus

The Global Lifecycle High stringency [Global Ambition] scenario:

Achieves the largest environmental benefits at modest costs, globally (Figure 10). Implementing the ten policy instruments modelled in the Global Lifecycle High stringency [Global Ambition] scenario would cost 0.5% of global GDP in 2040. Non-OECD countries would face substantially higher costs (0.62% of GDP in 2040) than OECD countries (0.37% of GDP in 2040). The scenario combines policies to slow down plastics production and use, which are the most effective way to reduce environmental impacts and costs, with policies to achieve safe waste collection and treatment. Costs exclude the avoided costs of inaction and should be considered in the context of the substantial economic benefits resulting from reduced pressures on the environment, climate and human health.

FIGURE 10. **It is more costly and less effective to focus solely on waste management policies**
Percentage change in GDP (left axis) and in plastic leakage (right axis) compared to *Baseline* in 2040



Note: The lower reduction in leakage in OECD countries compared to non-OECD countries in the Global Lifecycle Mixed stringency and Global Lifecycle High stringency [Global Ambition] scenarios reflects the lower shares of mismanaged waste, rather than a lower level of ambition.

Minimises the scale of investment required to end plastic pollution. *Baseline* investment needs for plastic waste collection, sorting and treatment are projected to amount to more than USD 2.1 trillion between 2020 and 2040, globally. The *Global Lifecycle High stringency [Global Ambition]* scenario has two distinct effects on these investment needs:

i. on the one hand, the measures to curb production and demand and to improve eco-design reduce the amounts of plastics in the economy and total plastic waste volumes, making waste management solutions easier to implement and reducing the costs of collection, sorting and treatment;

ii. on the other hand, the downstream measures imply that larger shares of waste (and litter) are collected, and that more expensive waste management solutions are used, such as for recycling.

On balance, an additional USD 50 billion in investment (cumulative 2020 to 2040) is required in the *Global Lifecycle High stringency* [*Global Ambition*] scenario relative to levels projected in the *Baseline* scenario (Figure 11).

6. Policy action along the lifecycle is more effective and less costly than a downstream focus

By contrast (Figure 11):

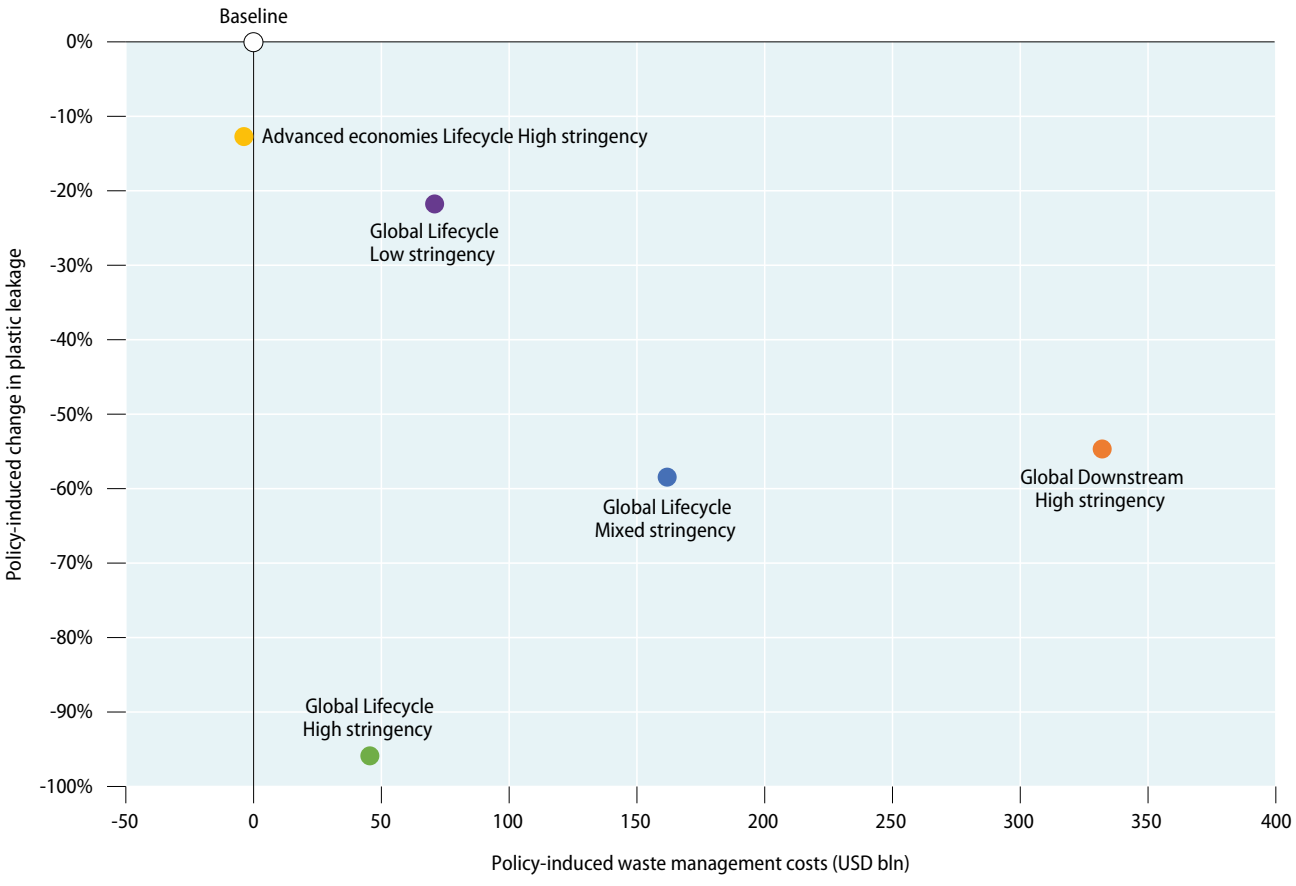
- The *Global Downstream High stringency* scenario significantly increases the total waste management costs, especially in developing countries where plastic use and waste generation is projected to increase most rapidly. As waste volumes continue to grow, the scenario is unlikely to fully prevent leakage to the environment. Additionally, the viability of a downstream-oriented strategy is uncertain, as it assumes that countries with less developed waste management systems can make very swift improvements, but technological, governance and economic constraints may impede a rapid deployment and inflate costs.

- The *Global Lifecycle Mixed stringency* scenario adds stringent policies along the lifecycle in advanced economies. Because these are not applied globally, this scenario remains costly but does not eliminate plastic leakage.

- The *Global Lifecycle Low stringency* scenario suggests that – without common targets and highly stringent policies – incremental improvements to current policies fall far short of eliminating plastic pollution.

- High policy ambition in advanced economies only, as modelled in the *Advanced economies Lifecycle High stringency* scenario, has limited effects on waste management costs (as most advanced economies already have high waste collection rates and safe disposal) but the reduction in global plastic leakage remains small.

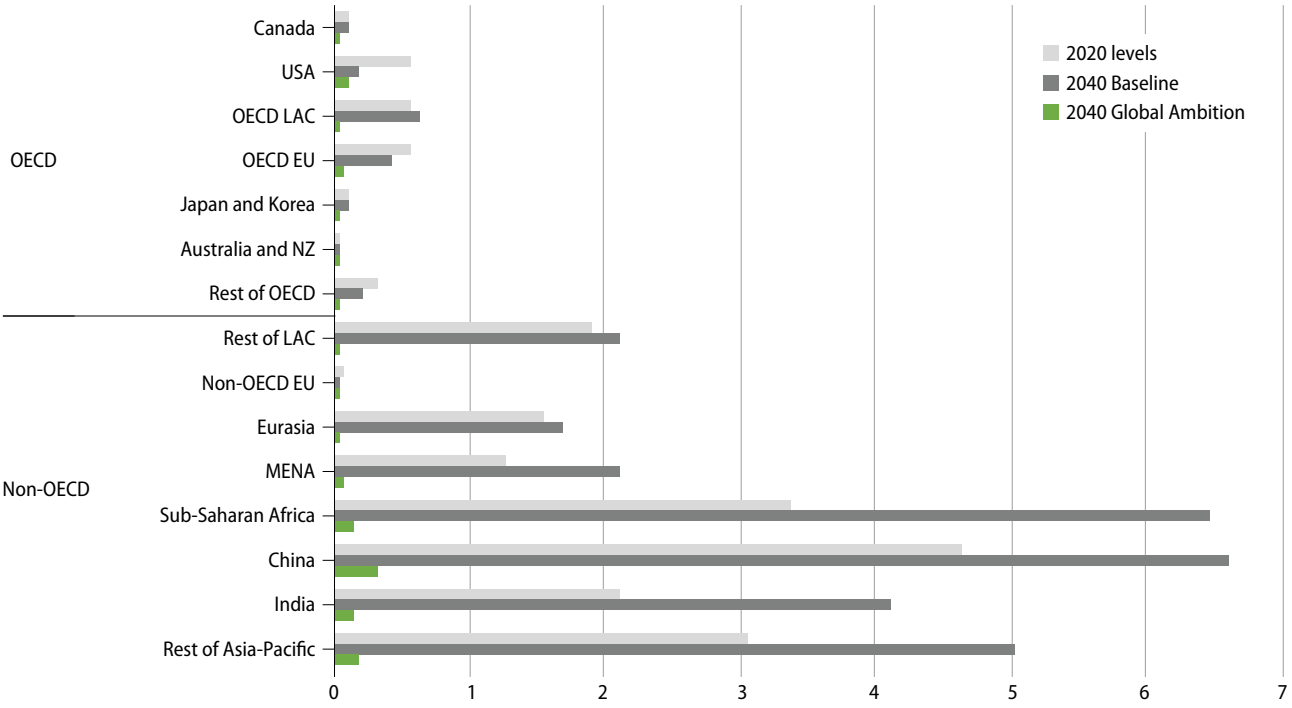
FIGURE 11. **Interventions along the life-cycle are more cost-effective than a focus on waste management**
Percentage change in plastic leakage to the environment compared to Baseline in 2040, versus cumulative waste management costs for 2020-2040 in USD billion



7. Ending plastic pollution requires strengthened international co-operation

The comprehensive mix of waste prevention measures and improvements in waste management envisioned in the *Global Lifecycle High stringency* [*Global Ambition*] scenario reduces the mismanagement and leakage of plastic waste in all world regions by more than 95% by 2040 compared to *Baseline* (Figure 12).

FIGURE 12. **The Global Ambition scenario nearly eliminates macroplastic leakage in all regions**
Plastic leakage to the environment in 2020 and 2040 in Mt



DEVELOPING COUNTRIES…

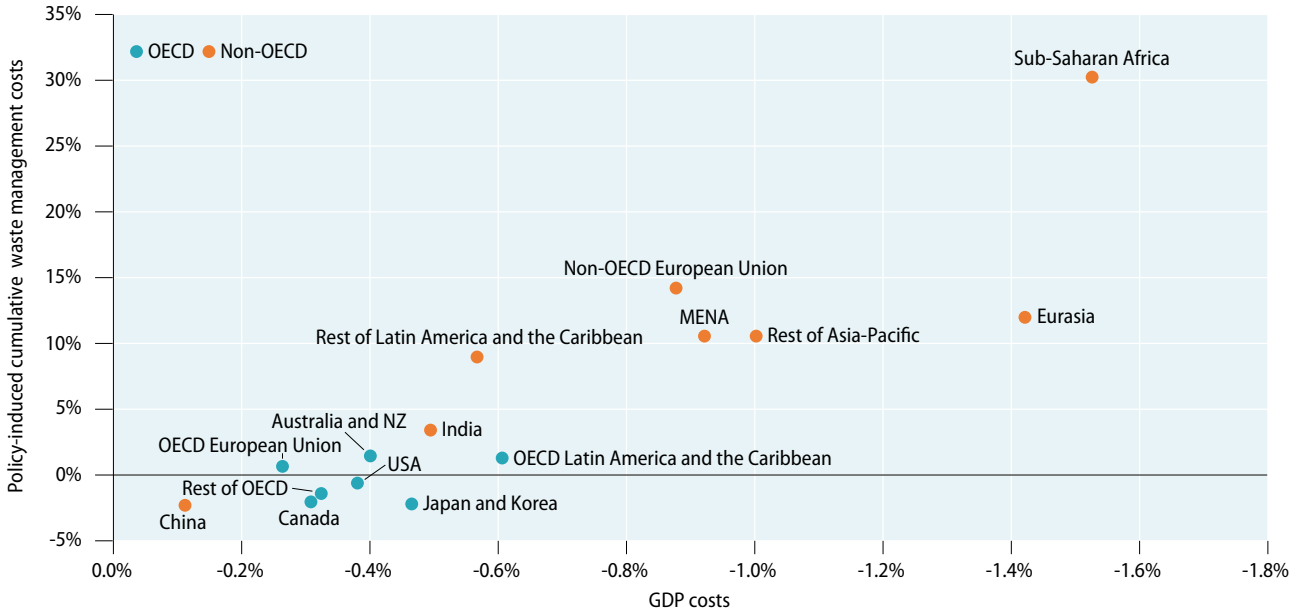
Generally face greater challenges to reducing plastic pollution. They are often the most affected by such pollution, along with accompanying negative impacts on human well-being and economic sectors such as tourism or fisheries. At the same time, these states are projected to require the greatest efforts to close leakage pathways, as they do not yet have the waste collection and treatment systems in place to manage the substantial increases in waste generation expected in the coming years.

Face rapidly increasing waste management costs. The largest costs both in terms of policy-induced waste management costs and the change in GDP resulting from implementing stringent policy packages are projected for fast-growing countries with less advanced waste management systems, such as in Sub-Saharan Africa (Figure 13). In the *Baseline* scenario, waste management costs are relatively low in Sub-Saharan Africa, and the increase in collection and recycling comes with significant additional costs. Reduced costs associated with measures that slow plastics production, use and waste generation cannot fully compensate for the increase in waste management costs related to increased collection and recycling rates.

By contrast, most OECD countries and the People's Republic of China (hereafter China) have relatively advanced waste management systems in place and high recycling rates in the *Baseline* scenario. As such, the additional costs associated with downstream policies are limited, and the cost savings from policies that reduce plastic waste that is generated are significant. Furthermore, stable, diversified economies can absorb the shocks of the upstream plastics policies more easily, limiting macroeconomic impacts.

FIGURE 13. **Costs to eliminate plastic leakage are unevenly distributed across world regions**

Macroeconomic costs (change in GDP) of the policy scenario and policy-induced cumulative waste management costs by region, expressed as percentage changes compared to the Baseline in 2040, *Global Lifecycle High stringency [Global Ambition]*



Require greater support through development co-operation. The investment needs for waste management systems in non-OECD countries amount to more than USD 1 trillion over a 20-year period in the *Global Lifecycle High stringency* [*Global Ambition*] scenario. Waste prevention policies, coupled with an important redirection of current investment flows, can limit investment needs in waste management to only USD 50 billion by 2040. Investments are also required to support the implementation of ambitious policies to restrict problematic or unnecessary plastics, promote reuse, eco-design and material substitution. Strengthened technical co-operation is required to progress with the implementation of robust policy frameworks that would reduce plastic flows and waste generation, create an enabling environment for investments and set up reliable revenue streams for domestic financing.

8. Global ambition requires interventions to overcome a number of challenges

A number of targeted interventions are needed to successfully implement the ambitious policy package envisioned in the *Global Lifecycle High stringency* [*Global Ambition*] scenario, across all world regions.

1. Decouple plastics production and demand from economic growth. It is essential to promote the eco-design of products and packaging that is aligned with safe reuse and recycling, including with product standards at the international level. Reuse models could play a critical role in reducing demand for short-lived applications, but stronger public incentives and harmonised reuse standards are required to facilitate investments in infrastructure and the scale-up of reuse models. Further research on the environmental impacts of alternative materials in different applications can better inform product design and avoid the risk of unanticipated impacts associated with substitute materials.

2. Enhance waste collection, sorting and treatment, especially in developing countries. Many low- and middle-income countries tend to have lower plastics use levels and waste generation rates, compared to advanced economies. However, these countries often lack well-functioning waste collection and management services, and practices such as open dumping and burning that exacerbate environmental and human health concerns, are common. Governance and financing challenges currently hinder the rapid establishment of effective waste management infrastructure in these contexts. Solutions that ensure the integration of the informal sector in waste management systems would allow for the participation of waste pickers in increasing collection rates, while also mitigating human health concerns for workers.

3. Promote improvements in sorting and recycling in all world regions. The scenario boosts the average global recycling rate very rapidly, from 9.5% in 2020 to 42% by 2040. Significant improvements in yields and quality in mechanical recycling technologies, as well as reductions in recycling losses would be needed, including for polymers and waste streams that currently face minimal recycling rates. Achieving this ambition would require scaling up investments in recycling technologies, promoting design for recycling, and boosting well-functioning markets for scrap and secondary plastics. Should the expected technical breakthroughs fall short, ending plastic pollution will require heightened ambition in other parts of the policy package, such as via more significant reductions in demand.

4. Enhance municipal litter management. Reducing the volume of litter that remains uncollected is an important pathway to reducing leakage. The policy scenario assumes a significant increase in litter picking rates and street sweeping in all regions, on top of the improvements already expected in the *Baseline*. Large increases in municipal litter management are expected especially in Africa and India (increasing municipal litter collection rates by 10 percent-points over the coming two decades).

5. Promote a major redirection and mobilisation of investments to support the implementation of stringent policies along the plastics lifecycle, globally. Investment needs for waste collection, sorting and recycling systems would amount to USD 2.1 trillion over a 20-year period. The implementation of solutions higher up in the plastics value

8. Global ambition requires interventions to overcome a number of challenges

chain, including to implement reuse systems for packaging and products, will require additional financing. Aligning financial flows from both public and private sources with the goal of ending plastic pollution will be critical to keeping the costs low and enabling a comprehensive transition, alongside the mobilisation of the additional finance required.

6. **Ensure strong international co-operation and support.** Balanced lifecycle approaches are the most cost-effective strategy for working towards ending plastic pollution, but their implementation requires strong international co-ordination on shared targets and approaches (e.g. to develop harmonised eco-design criteria, reuse standards, action on chemicals of concern and problematic plastics). In developing countries, strengthened technical support is required to progress with the implementation of robust policy frameworks that would support the goal to end plastic pollution and generate an enabling environment for investments. This includes setting up reliable revenue streams for domestic financing of waste collection and treatment (e.g. Extended Producer Responsibility) or targeted bans or fees on problematic plastics. The inclusion of measures to reduce plastic flows in the economy is likely to increase the cost-effectiveness and technical viability of the transition. Official Development Assistance to improve solid waste management (including to curb plastic pollution) has been growing in recent years and reached USD 1 191 million in 2022. While Official Development Assistance alone will not suffice to cover all investment needs, there are ample opportunities to increase its catalytic impact to leverage other sources of finance.

7. Promote cost-effective measures to address other aspects of plastic pollution. While outside of the scope of the modelled policy scenario, targeted interventions are also required to mitigate microplastics pollution (e.g. interventions to prevent pellet losses, improved eco-design of products, enhanced end-of-pipe capture). Further research into the cost-effectiveness of mitigation measures along the lifecycle can help to guide policy in reducing environmental and health risks. In addition, phasing out chemicals of concern is essential to reduce risks for human health and the environment and to enable safe reuse and higher recycling rates. Further reducing plastics-related GHG emissions to align with the ambitions of the Paris Agreement requires dedicated climate mitigation policies.

8. Consider the relevance of remedial interventions. Legacy plastic pollution and additional leakage that is still expected between 2020 and 2040 will lead to continued increases in plastic pollution. Stocks of macroplastics accumulating in rivers and oceans, often used as an indicator of global pollution, would rise from 152 Mt in 2020 to 226 Mt in 2040 in the *Global Lifecycle High stringency* [*Global Ambition*] scenario. Remedial interventions have an important role to play in mitigating environmental risks, especially in countries most affected by plastic pollution. Clean-up interventions, such as citizen clean-ups and interventions targeted at hotspots, may also help to gather data on environmental pollution and inform policy efforts. However, specific attention should be paid to the potential environmental impacts of clean-up interventions and associated risks of ecosystem damage or low cost-efficiency.

References

G7 Ministers of Climate, Energy and the Environment (2024), *Climate, Energy and Environment Ministers' Meeting Communiqué (Torino, April 29-30, 2024)*, https://www.g7italy.it/wp-content/uploads/G7-Climate-Energy-Environment-Ministerial-Communique_Final.pdf (accessed on 5 June 2024). [2]

High Ambition Coalition to End Plastic Pollution (2024), *High Ambition Coalition Ministerial Joint Statement INC-4*, https://hactoendplasticpollution.org/hac-member-states-ministerial-joint-statement-for-inc-4/ (accessed on 11 June 2024). [1]

Lebreton, L. (2024), *Quantitative analysis of aquatic leakage for multiple scenarios based on ENV-Linkages*, unpublished.

Lebreton, L. and A. Andrady (2019), "Future scenarios of global plastic waste generation and disposal", *Palgrave Communications*, Vol. 5/1, p. 6, https://doi.org/10.1057/s41599-018-0212-7. [7]

OECD (2022), *Global Plastics Outlook: Economic Drivers, Environmental Impacts and Policy Options*, OECD Publishing, Paris, https://dx.doi.org/10.1787/de747aef-en. [3]

OECD (2022), *Global Plastics Outlook: Policy Scenarios to 2060*, OECD Publishing, Paris, https://doi.org/10.1787/aa1edf33-en. [4]

OECD (2022), *Modelling plastics in ENV-Linkages: A novel approach to projecting future plastics use and waste*, https://www.oecd.org/environment/plastics/Technical-Report-Modelling-plastics-in-ENV-Linkages.pdf. [5]

OECD (2021), *Policies to Reduce Microplastics Pollution in Water: Focus on Textiles and Tyres*, OECD Publishing, Paris, https://dx.doi.org/10.1787/7ec7e5ef-en. [6]

This Policy Highlights document is based on the OECD publication *Policy Scenarios for Eliminating plastic pollution by 2040*.

The report presents projections to 2040 of plastics use, waste generation and the related environmental impacts. It provides insights into the potential environmental benefits and economic consequences of different levels of international policy ambition towards ending plastic pollution. The analysis shows that business as usual is unsustainable, but that a globally implemented, ambitious policy package based on a whole of lifecycle approach could nearly end plastic leakage to the environment by 2040. This could be achieved at modest overall costs, provided that technical, economic and governance barriers can be overcome. A policy approach that targets all stages of the plastics lifecycle is more impactful and cost-effective than approaches focusing only on enhancing waste management and recycling. Ending plastic pollution will require mobilising significant financial resources and strong international co-operation to address differences in costs and capacity across countries.

The findings of this report can inform policymakers on the environmental and economic implications of alternative visions for an international, legally -binding instrument on plastic pollution, as well as aspects related to its implementation.

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