

Policies to Reduce Microplastics Pollution in Water

Focus on Textiles
and Tyres

POLICY HIGHLIGHTS

Microplastics pollution is one of the most pervasive emerging environmental issues that we face today. The world's oceans, freshwaters, soils and air are increasingly contaminated with tiny plastic fragments, particles, and fibres, raising concerns for the associated environmental and human health impacts.

Key messages

- **Microplastics**, which originate from a wide variety of sources along the lifecycle of plastic products, are now ubiquitous in the natural environment.
- **There are increasing concerns** over the environmental and human health impacts associated to exposure to these pollutants. The potential for long-term and irreversible risks to ecosystems and human health calls for mitigation measures to be taken to halt the accumulation of plastics and microplastics in the environment.
- **Despite the substantial contribution** of textile products and vehicle tyres to microplastics pollution, few existing policies target these sources explicitly. Policy guidance is needed to support policymakers looking to close this gap and comprehensively reduce the leakage of plastics into the environment.
- **Emissions** of textile microfibrils and Tyre and Road Wear Particles (TRWP) occur during (and are influenced by) several product lifecycle stages. As such, a broad range of entry points exist for the implementation of mitigation measures along the lifecycle of textiles and tyres, including improvements in product design, the uptake of pollution mitigation technologies and best use practices, and improved end-of-pipe infrastructure to retain the emitted microplastics before these reach the environment.
- **From a policy perspective**, a comprehensive and lifecycle approach to the issue is recommended. A focus on preventive options early in the lifecycle of textiles and tyres is likely to deliver pollution mitigation in the most cost-effective manner.

- 
- **Several knowledge gaps** persist with regards current and future environmental and human health risks posed by microplastics pollution of different environmental media, as well as the cost-effectiveness of different mitigation interventions. Thus, it is crucial that policymakers prioritise further advancing the state of research, including by supporting the standardisation of measurement methods and international and interdisciplinary cooperation.
 - **In the short term**, significant progress in microfibre and TRWP emission mitigation can be achieved by focusing on “no-regrets” mitigation options. These include best practices and technologies which have low implementation costs and low risk for potential unintended consequences and/or which generate co-benefits aligned with other environmental policy

objectives, such as those addressing the environmental impacts of the textile and apparel sector and of road transport, climate change mitigation, air quality legislation, and improvements in water quality.

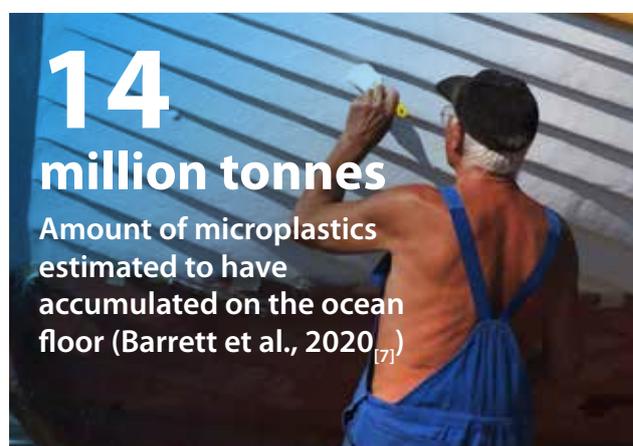
- **When information** on the effectiveness of mitigation measures has improved, additional and more specific policy measures will be needed to mandate, incentivise or encourage the uptake of mitigation technologies and best practices. Some of these policy measures, such as requirements to add microfibre filters to washing machines and consumer-awareness initiatives, are already being explored by governments.

What are microplastics and where do they come from?

Microplastics are plastics with a size smaller than 5mm. They are usually found in the environment as fragments, fibres, pellets, or beads of different sizes and physico-chemical compositions.

Microplastics pollution originates as a consequence of the manufacture, use, and disposal of products containing plastic polymers.

- **During production**, industrial emissions and accidental spillages may release microplastics into the environment.
- **During the use-phase**, microplastics intentionally added to products (e.g. microbeads in cosmetics) are discharged into sewage waters or directly into the environment.
- **The wear and tear** of synthetic products occurring during their use also regularly generates microplastics. Examples include textile microfibres emitted during washing and wear, tyre wear particles emitted during road transport activity, and the wear off of paint from buildings, ships, and other surfaces.
- **The degradation and fragmentation** of macro plastics discarded into the environment at the end of their useful life, under natural weathering conditions.



Why is microplastics pollution a concern?

The widespread occurrence of microplastics in the environment is a reason of concern for water quality, ecosystems, and human health for the following reasons:

- Microplastics have been documented in all types of natural habitats. Recent studies also suggest that microplastics may also be transported for long distances and contribute to the pollution of remote environments such as the Arctic.
- Once in the environment, microplastics are believed to persist for a long time, only slowly degrading into smaller particles.
- Aquatic species, from plankton to large marine mammals, commonly ingest microplastics. Humans too are exposed to microplastics via the ingestion of contaminated seafood and other food and beverages, or via the inhalation of airborne microplastics.
- As plastic production is projected to continue to increase in future years, this raises concern for the projected leakage of plastics and the potential amplification of plastic pollution of the environment. Furthermore, the stock of plastics debris that has already leaked into the environment will continue to be a source of microplastics.
- Although there exist data gaps to reliably assess risks, the persistent nature of plastics, and the projected fast and continued increases in pollution levels indicate that there is a need for policy measures to mitigate current and future risks to ecosystems and human health.

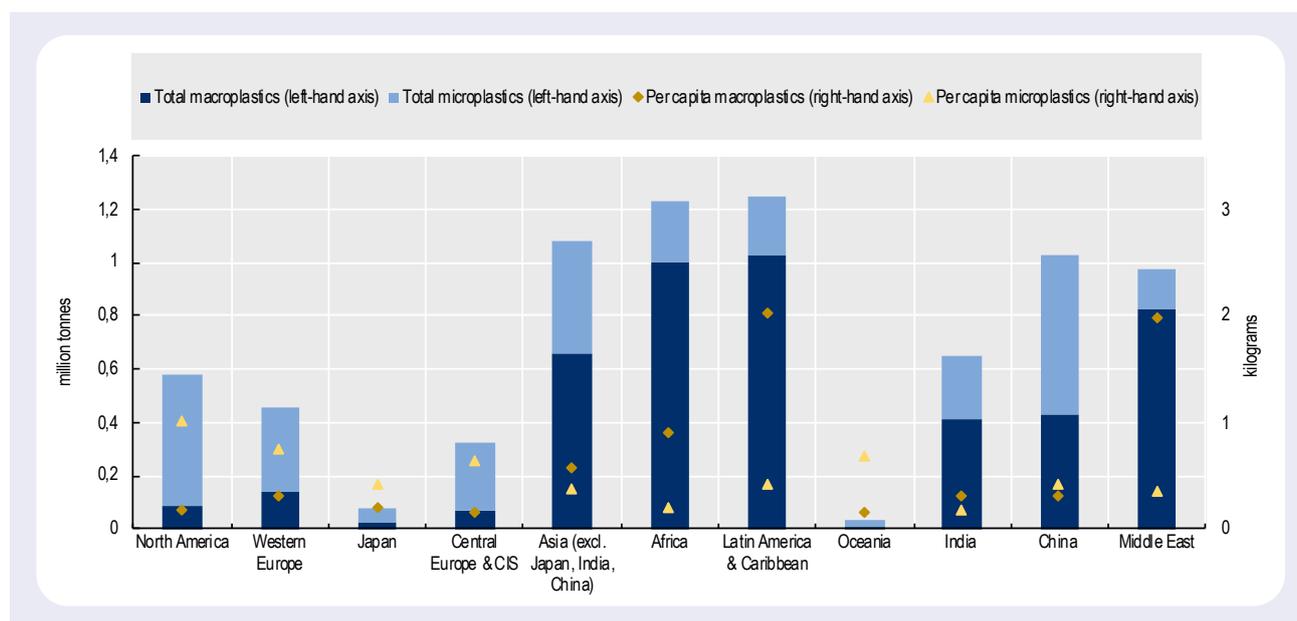


Current trends in microplastics pollution

Continued plastics production, use, disposal, and leakage have led to a steady increase in the amount of plastics in the environment. As scientific knowledge of the risks posed by plastics pollution grows and increasing policy attention is paid to reducing risks posed by plastics pollution, several governments are now looking for ways to also tackle emissions of microplastics into the environment.



Figure 1. Geographic distribution of annual losses of macro and micro-plastics (Mt)



Note: CIS stands for Commonwealth of Independent States. Source: Based on (UNEP, 2018_[1]).

OECD countries have an important role to play in mitigating microplastics pollution. While the mismanagement of plastic waste mainly occurs in emerging economies, OECD countries significantly contribute to the emission of microplastics. North America, Western Europe, and Japan alone account for

almost a third of total microplastic releases into the environment.

In particular, the abrasion of vehicle tyres and the washing of synthetic clothing account for 62% of microplastics releases in these macro regions (UNEP, 2018_[1]).

The challenge of managing microplastics emissions from textiles and tyres



The report focuses on two types of microplastics: microfibrils shed from garments during wear and washing and Tyre and Road Wear Particles (TRWP) emitted during road transport activity.

Microplastics released as a consequence of certain recycling options for end-of-life tyres, notably the use of tyre rubber granulate as infill material for artificial sport turfs, are also within the scope of this report.

Global textile value chains are responsible for substantial environmental and climate impacts, notably high GHG emissions, impacts on freshwater resources, and waste generation. Recent studies suggest that the detachment of fibres occurring during the use and washing of textile products may significantly contribute to microplastics pollution. Synthetic microfibrils have been reported in substantial quantities at all depths of the marine environment, in marine organisms, as well as in air and in agricultural soils where wastewater sludge has been applied.

Road transport is also associated with several environmental impacts, including high energy use, GHG emissions, contribution to air pollution. Microplastics are emitted during road transport as a result of the friction between vehicle tyres and road surface. Generally called Tyre and Road Wear Particles (TRWP), they pollute road surfaces, adjacent soil, or nearby water streams. Additionally, a share of particles are emitted in the fine particular matter size range and may contribute to air pollution.

In addition to risks generally associated to microplastics pollution, concerns specific to microfibrils and TRWP relate to human exposure to airborne particles and the potential toxicity of certain substances added during manufacturing. For both types of pollutants, further research is required to assess their environmental occurrence and to improve our understanding of the hazards posed to ecosystems and human health in realistic environmental scenarios and via different exposure pathways.

The existing policy framework in OECD countries and emerging policy intervention

As a response to increasing concerns over the risks associated with plastics pollution, several OECD and non-OECD countries have introduced measures to mitigate plastics leakage to the environment, notably via

improved waste management policies, bans on frequently littered single-use plastic items, and restrictions on the manufacture and sale of certain personal care and cosmetic products containing microplastics.



Microplastics emitted from textile products and vehicle tyres remain largely outside of the scope of existing policy frameworks, despite accounting for a substantial share of total releases into the environment. This

is mainly explained by the technological complexity of controlling unintentional losses of microplastics occurring the use of products and by the recent nature of research into mitigation solutions.

Yet, as scientific knowledge on the widespread presence of microplastics, policymakers in several OECD countries are becoming increasingly interested in developing policy responses to also manage unintentional emissions of microplastics. Existing policy and industry-led action has generally focused on providing the foundations for comprehensive and evidence-based mitigation frameworks, and often comprises different combinations of the following elements:

- Support for research projects, to close knowledge and data gaps on the occurrence of microplastics in the environment and the environmental and human health risks posed, as well as to develop and compare mitigation solutions;
- Harmonisation of definitions and sampling and characterisation methods for microplastics, in order to facilitate the aggregation of results;
- Sharing of data and information via multi-stakeholder platforms, to support research and facilitate cross-industry collaboration;
- Leveraging consumer education and awareness-raising initiatives to influence consumer behaviour towards the uptake of practices aligned with the sustainable use of products, including to mitigate the emission of microplastics during product use.
- Ad-hoc regulatory interventions, such as product requirements for household, commercial, or industrial washing machines. For instance, Australia and France have introduced measures to phase in microfibre filters on new washing machines (DAWE, 2021^[2]; France, 2020^[3]).



What solutions exist to address microplastics emissions from textiles and tyres?

Several factors related to how a product is designed, produced, used and handled may have an influence on the quantities of microplastics released. Hence, opportunities to prevent or reduce emissions via the uptake of best practices and mitigation technologies exist at all stages of the lifecycle of products.

Identified mitigation actions, summarised in Figure 2, include:

Source-directed interventions, such as the sustainable design and manufacturing of textiles, tyres, and complementary products (e.g. washing machines, laundry detergents, road surfaces, and vehicles), to minimise the tendency of products to contribute to microplastics generation;

Use-oriented interventions, such as the uptake of best use practices (e.g. eco-driving and best laundering parameters) and mitigation technologies (e.g. microfibre filters), to reduce preventable releases into wastewater and diffuse entry points;

End-of-life interventions, such as separate collection schemes and waste management practices, to prevent waste leaking into the environment and potentially contributing to microplastics generation;

End-of-pipe interventions, such as improved wastewater, stormwater, and road runoff management and treatment, to retain the emitted microplastics before these reach water bodies.

Figure 2. Overview of microplastics mitigation entry points and actions (for textiles and tyres)



Policy instruments to mitigate microplastics from textiles and tyres

There are several policy instruments suitable for making improvements in the mitigation of microplastics emissions from textiles and tyres. A selection of relevant policy instruments, categorised according to the product lifecycle stage targeted, is presented below.

Source-directed policy approaches



OBJECTIVES	SELECTED POLICY TOOLS
<p>Manufacture products containing less toxic components and/or with a lower tendency to generate microplastics emissions</p>	<ul style="list-style-type: none"> • Minimum standards, in the form of product or technological standards. • Certification and labelling schemes. • Green public procurement criteria. • Best Available Techniques (BAT). • Economic instruments, such as taxes and mandatory charges. • Voluntary initiatives, such as due diligence approaches and industry commitments.

Use-oriented policy approaches



OBJECTIVES	SELECTED POLICY TOOLS
<p>Reduce microplastics emissions occurring during product use and their release into the environment</p>	<ul style="list-style-type: none"> • Minimum standards for complementary products, such as washing machines, laundry detergents, vehicles, roads. • Restrictions on selected product uses, such as restrictions on road transport activity (e.g. stricter speed limits). • Economic instruments, such as subsidies for the uptake of mitigation technologies or market-based disincentives e.g. vehicle purchase taxes, registration fees, annual taxes, congestion pricing, parking pricing). • Public information campaigns to influence individual behaviour • Consumer-oriented labelling and information schemes.

End-of-pipe policy approaches



OBJECTIVES	SELECTED POLICY TOOLS
<p>Preserve water quality by removing contaminants from used water resources before these are reintroduced into the environment</p>	<ul style="list-style-type: none"> • Regulatory and economic instruments to support the to support improvements in wastewater collection and treatment, such as environmental quality standards (EQS), wastewater treatment standards, subsidies, and tariffs or taxes. • Regulatory and economic instruments to support improvements in road runoff and stormwater collection and treatment, such as EQS, subsidies, and payments for ecosystem services. • Wastewater treatment, proper disposal of wastewater sludge, and the collection and management of stormwater and road runoff.

End-of-life policy approaches



OBJECTIVES	SELECTED POLICY TOOLS
<p>Prevent waste and recycled materials from leaking into the environment</p>	<ul style="list-style-type: none"> • More stringent requirements for the collection and management of used textiles and tyres. • Regulatory interventions (e.g. inclusion in green public procurement criteria) and awareness-raising campaigns to reduce microplastics emissions at the product end-of-life stage.

Policy guidance to address microplastics from textiles and tyres

The most cost-effective way of tackling the issue is likely the implementation of a mix of policy tools targeting different mitigation entry points along the lifecycle of products.

- A focus on preventive options early in the lifecycle of textiles and tyres is likely to generate the largest and most cost-effective mitigation benefits. Improvements in product design and manufacturing aligned with lower microplastics shedding and the implementation of mitigation best practices and technologies during the use phase can substantially reduce emissions.
- Given the diffuse nature of emissions and the variety of entry pathways, measures upstream may need to be complemented by effective end-of-pipe capture solutions in order to alleviate the risk of microplastics pollution.



The mitigation of microplastics pollution is likely to require a strategic prioritisation among possible mitigation interventions as well as a consideration of their full impacts. The following guidance emerges for policy action to manage textile- and tyre-based microplastics pollution:

- **Further research** is required in order to reduce uncertainty, perform more robust risk assessments for microplastics pollution in different environmental media, and inform cost-benefit analyses for different mitigation policy options.
- **International and interdisciplinary cooperation and information sharing** will be key to the **advancement of research and to the standardisation and harmonisation of test methods**, such as test methods for the rate of microfibre shedding and tyre tread abrasion. Further, the development of common databases can reduce time and costs associated with documenting robust policy decisions at national and international levels.
- In the short term, significant progress in microfibre and tyre and road wear particle emission mitigation can be achieved by focusing on **“no-regrets” mitigation options**. These include good practices and technologies which have low implementation costs and low risk for potential unintended consequences (such as environmental burden shifting) and/or which generate **co-benefits** aligned with other environmental policy objectives, such as those addressing the environmental impacts of the textile and apparel sector and of road transport, climate change mitigation, air quality legislation, and improvements in water quality.
- When information on the effectiveness of mitigation measures has improved, additional and more specific policy measures will be needed to mandate, incentivise or encourage the uptake of mitigation technologies and best practices. Some of these policy measures, such as requirements to add microfibre filters to washing machines and consumer-awareness initiatives, are already being explored by governments.

There are important gains to be made by exploiting or adapting measures driven by other policy objectives.

Reductions in passenger vehicle use and shifts towards more sustainable transport modes, generally driven by a need to reduce GHG emissions and air

pollution, can also contribute to TRWP mitigation.

Promoting the production of higher quality and longer lasting textiles and in general curbing fast fashion trends can reduce the high environmental impacts associated with the lifecycle of garments, but often also reduce microfibre generation.

End-of-pipe mitigation options such as improved wastewater treatment technologies or nature-based solutions, primarily designed to manage other risks (e.g. other pollutants, flooding), can generate significant co-benefits for microplastic mitigation.

References

- [7] _ Barrett, J. et al. (2020), "Microplastic Pollution in Deep-Sea Sediments From the Great Australian Bight", *Frontiers in Marine Science*, Vol. 7, <http://dx.doi.org/10.3389/fmars.2020.576170>
- [2] _ DAWE (2021), *National Plastics Plan 2021*.
- [6] _ EMF (2017), *A New Textile Economy: Redesigning Fashion's Future*, Ellen Macarthur Foundation, <http://www.ellenmacarthurfoundation.org/publications>
- [3] _ France (2020), *LOI n° 2020-105 du 10 février 2020 relative à la lutte contre le gaspillage et à l'économie circulaire*, <https://www.legifrance.gouv.fr/eli/loi/2020/2/10/TREP1902395L/jo/texte>
- [4] _ SAPEA (2019), *A Scientific Perspective on Micro-Plastics in Nature and Society*, Science Advice for Policy by European Academics, <http://dx.doi.org/10.26356/microplastics>
- [1] _ UNEP (2018), *Mapping of global plastics value chain and plastics losses to the environment (with a particular focus on the marine environment)*, Ryberg, M., Laurent, A., Hauschild, M.
- [5] _ WHO (2019), *Microplastics in drinking water*, World Health Organisation.



This Policy Highlights is based on the OECD publication *Policies to Reduce Microplastics Pollution in Water: Focus on Textiles and Tyres*.

Microplastics are ubiquitous in the natural environment. This report synthesises the current state of knowledge on the sources, fate and risks of microplastics pollution. It then focuses on two sources of microplastics pollution, textile products and vehicle tyres, due to their substantial contribution to global microplastics emissions and currently largely absent policy frameworks to mitigate them.

Several best practices and technological solutions can be implemented along the lifecycle of textile products and vehicle tyres to mitigate releases to the environment. The report proposes policy insights on measures and strategies that could help minimise microplastics emitted unintentionally from products and their potential impacts on human health and ecosystems.

© OECD 2021

Visit our website:

<http://oe.cd/circulareconomy>

<http://www.oecd.org/water>

Join the discussion:

@OECD_ENV

CONTACTS

Peter Börkey: Peter.Borkey@oecd.org
(Principal Administrator)

Xavier Leflaive: Xavier.Leflaive@oecd.org
(Principal Administrator)

