

How can EU legislation tackle microplastic pollution

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RETH!NK PLASTiC

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Introduction

How can EU legislation tackle microplastic pollution?

With plastic production expected to skyrocket in the coming years¹, microplastic pollution is set to become a runaway challenge if adequate preventive measures are not put in place quickly. Effective solutions that prioritise prevention must be implemented now to prevent microplastic pollution and minimise its impacts on our global ecosystems and climate for the generations to come.

Researchers have been worried about the potential harms of microplastics, small plastic pieces of less than 5 mm, for 20 years² and have accumulated extensive and deeply concerning evidence of negative impacts on marine, freshwater and terrestrial fauna, flora, ecosystems and habitats, and most recently human health³.

Microplastics are pervasive, chronic, persistent and transboundary⁴, altering the functioning of important habitats, and impacting growth, function, behaviour, development, and reproduction of many species^{5,6}. They are also vectors for disease,⁷ invasive species⁸ and antibiotic resistance⁹, representing a risk to global food security and planetary boundaries¹⁰. This pollution is also exacerbating climate change via the release of greenhouse gases (GHG) during the degradation process from macro to microplastics. While uncertainties remain, microplastics are also likely disrupting the biological carbon pump¹¹, and undermining the resilience of the environment and the ocean, one of the main climate regulators of our planet. Finally, the accumulation of microplastics in human bodies is also raising concerns in the scientific community as humans inhale and ingest plastic particles on a daily basis¹². According to recent estimates, microplastics intake by humans may vary from a dozen to 100.000 particles daily¹³.

Part of the reason for the extensive degree of microplastic pollution that now exists is the chronic overproduction of virgin plastics and the unsustainable design of plastic products. Fundamentally, we need to phase down material and resource use to sustainable levels within planetary boundaries and choose carefully which applications we use plastics for¹⁴. Improving the design and composition of plastic products across sectors is a concrete and obvious way forward. For example, LDPE releases significantly more microplastics and greenhouse gases than others when degrading and could be simply excluded from standard uses. Other problematic ones are PP, PC and PE, just to name a few. Similarly, the additives in plastic products that have toxic effects on human, animal and/or plant life and ecosystems could also be removed at the design stage.



Legal grounds for a significant reduction of microplastic emissions

Legal basis and Objective

The primary objective to reduce microplastics emissions of the initiative needs to explicitly protect environment and health to a high degree. Article 192 TFEU should be preferred as a legal basis. Article 114 TFEU is the legal basis for the REACH regulation, for example, but the Court has consistently confirmed that the protection of health and the environment is the main objective.

Article 192 TFEU should be used to give an uncontested power the Member States to go beyond the level of protection agreed upon at EU level in all the sectors where they are capable and keen to do so. This must be the case for all emissions coming from stationary sources, such as industrial emissions¹⁵.

Obligation to adopt measures that significantly reduce microplastics emissions

The EU institutions and States are bound by the European Treaties¹⁶ and by Human Rights law¹⁶ to adopt the necessary measures able to effectively prevent the emissions of and exposure to pollution. These foundational principles must be explicitly included in the law and guide the selection of the most adapted measures.

The scientific evidence available on the persistence, harmfulness, omnipresence and constant increase of microplastic pollution is sufficient to justify the most preventative measures.¹⁸ The growing evidence on the environmental and health harm caused by this pollution confirms the obligation to act, strongly and quickly. In light of the environmental principles and human rights obligation mentioned above, this evidence triggers the obligation to adopt the most stringent and compulsory measures that can be seen as fit.

Voluntary agreements, which have proved over and over to not work¹⁹, should not be considered. The monitoring and enforcement mechanisms created must also reflect this obligation and get inspiration from the most recent laws on the matter.²⁰



II

The need for cross- sectoral and upstream prevention measures at EU level

Proposed horizontal policy recommendations

First and foremost, to effectively decrease the risk and impact linked with microplastic pollution on the environment, virgin plastic production and consumption needs to be reduced to sustainable levels.

This can be done by reducing plastic usage via ambitious production and consumption reduction targets, reconsidering the use and need of plastic products and by phasing-out all single-use plastic products for which more sustainable alternatives exist. This is crucial since they alone make up for 50% of marine litter found on Europe's beaches.

There is also a need to tackle both macro and microplastic pollution in a parallel effort.

Most of the microplastics found in the environment result from the degradation of larger plastic products when exposed to solar irradiation, abrasion or erosion. Even if direct microplastic emissions to the environment were to be prevented entirely, there would still be an increase in microplastic pollution as the degradation of macroplastics already existing and still accumulating would continue to persist. Overcoming plastic pollution therefore necessitates addressing both macro and microplastics.

Preventing macroplastic pollution sources and phasing out single-use plastics still available on the market will reduce microplastics released by degradation.

All sources of unintentionally released microplastics need to be addressed across sectors in a comprehensive manner (not limited to pellets, textiles and tyres) with binding and upstream measures at EU level so as to prevent microplastics at source.

The main sources of secondary microplastics identified to date include road transport, synthetic textiles, agriculture, plastic manufacturing, tourism, fishing and aquaculture and shipping, building and construction.

Introducing a harmonised definition of microplastics

The definition used for the REACH restriction²¹ is a good starting point, but some key changes are needed: “no lower limit” and the inclusion of (bio)degradable polymers, water soluble and liquid polymers.

Addressing plastic pollution upstream at the production stage

This would significantly decrease the occurrence, scale and impacts of microplastic pollution. A legislative framework on microplastic pollution would therefore further reinforce the impact of existing EU policy framework on plastic (plastic strategy, SUP Directive, PPWD) to drastically reduce plastic pollution. Ultimately, to effectively decrease the risk and impact linked with microplastic pollution on the environment, plastic production needs to be reduced to sustainable levels.

Banning intentionally added microplastics in consumer products

This needs to be done as soon as possible, building on existing market restrictions to introduce further bans on intentionally added microplastics such as plastic glitter, sequins and microbeads from all consumer products including carpets, clothing, plastic flowers, flocking plants, cosmetics, children's toys.

Banning the use of plastic granules, flakes, or pellets in the open environment

This should be the case for environmentally harmful applications of these raw materials for school playgrounds or sports pitches.

Scaling up the reuse and repair of equipment and products

Reuse is proven to be more economically and technically effective than recycling. Reusing products, reducing waste and repairing equipment need to be prioritised over the recycling of single-use products. For example, by incentivising the reuse of clothing at both national and European levels.

The environmental costs of microplastic pollution need to be accounted for and included in the price

More stringent measures need to be introduced such as a compulsory environmental risk assessment for all products containing plastics and a requirement for producers to carry out mitigating actions to prevent microplastic emissions, as well as extended producer responsibility with modulated fees.

Mandatory monitoring of microplastic pollution

Mandating the monitoring of microplastic pollution using indicators such as sediment, biota, water, soil and the atmosphere. Funding, promoting and scaling up awareness-raising and citizen science monitoring projects associated with litter and plastic and microplastic pollution.

Environmental footprint assessment

Evaluating and considering the environmental cost of microplastics in all compartments. The roadmap needs to recognize and consider negative externalities, including costs related to air quality, environmental and marine pollution, and public health, food security, etc.

Waste management

Establishing adequate waste management systems must allow for accountability all throughout the system, considering a circular economy approach and overall reducing the volume of plastics put on the market. We cannot fight this pollution by recycling: recycling plastic is currently not effective, technically feasible nor economically efficient and often ends up being exported to emerging economies for treatment.

Extended Producer Responsibility and Corporate Social Responsibility schemes

Implementing EPR and CSR schemes when redesigning plastic products according to a truly circular economic model will play a fundamental role in reducing plastic pollution. For example, setting up EPR systems for textile products incentivises the redesign of products to reduce microplastic emissions through eco-modulated fees.

Two-tier mandatory containment

Introducing two levels of mandatory containment for all facilities handling pellets, powders and flakes: a primary containment barrier around each site and a secondary containment of all identified hotspots within those facilities, using properly maintained capture equipment to prevent spillage.

Capture and filtering technologies

Promoting the use and development of low-impact capture and filtering technologies to protect ecosystems when capturing macroplastic or microplastic in rivers, lakes and freshwater streams.

Mandatory best practice handling

Introducing annual third-party audits for the plastic supply chain, making it mandatory for all plastic manufacturers, converters, recyclers and plastics handling companies to implement best practices to prevent, reduce and phase out microplastics loss for handling and managing plastic raw materials. Companies should provide for regular training and detailed information for staff awareness all along the supply chain.

Open access database of plastic additives

Setting up an open access database listing all additives used in plastic and recycled plastic, including concentrations and CAS numbers, to increase supply chain and business awareness and enable ecotoxicological research.

Mandatory labelling and information for consumers

Requiring the clear labelling of alternatives to conventional plastics from biobased, biodegradable or compostable plastics as well as including specific information on the conditions where they are biodegradable and/or compostable. This includes introducing a “command and control” regulation on mislabelling to ensure that corporate social responsibility and polluter pays principle are fully enforced.

Revision of the Industrial Emissions Directive

The Industrial Emissions Directive should prevent and reduce emissions of both microplastics and nanoplastics into the environment during the production stage. Regulating nanoplastics in the manufacturing and application stages should be encouraged and plastics waste and the resulting incidental microplastic leaks should be managed.

Microplastic inclusion in lifecycle analysis

Life Cycle Analysis and its application, including the Product environmental Footprint methodology, must duly consider both microplastics and nanoplastics.



Recommended policy measures by sector

Pellets, flakes, powders

There is a need to introduce a regulatory system requiring the entire supply chain to adhere to best practice measures for the handling, storage, and transportation of pellets, flakes and powders. According to such a system:

A comprehensive and transparent certification scheme that requires a secure chain of custody must be established

That would include:

- a universal access for all companies regardless of role or trade association membership.
- the annual independent audit of all companies handling pellets, flakes and powders covering implementation of prevention and containment measures.
- the production of publicly-available reports on implemented prevention and containment measures
- site-level certification to ensure 'hotspots' for pollution and 'bad actors' are not allowed to proliferate

Harmonised minimum requirements for pellet handling and management must be established, developed and instituted by the European Union

These requirements should formulate the legal minimum standard of practice for any given actor in the pellet supply chain and include:

- the obligation for best practice handling to be consistently applied such that the risk of spills is reduced to the lowest possible level.
- reporting and public disclosure on types and tonnage of pellets being used, handled, or transported throughout the entire supply chain, including loss estimates.
- the annual training of all handling staff, the display of visual materials on site and the labelling of all pellet flakes and powder packaging and containers mentioning the environmental and toxic impact of pellet spills and the importance of responsible handling.
- restricting the use of unsealed or flexible, non-robust containers during transportation and storage.
- the use of robust capture and containment systems such that containment systems are sufficient to ensure that all pellets, flakes and powders spilt or leaked are captured on-site.

Textile and fashion industry

There is a need to reduce the volume of synthetic textiles being produced and placed on the market, i.e. through setting an EU-wide binding quantitative target for material use and consumption reduction with specific objectives for textile products and support reuse. That reduction needs to be coupled with measures upstream, downstream and horizontal.

Establishing minimum eco-design requirements for textiles and associated manufacturing techniques including:

- Setting legally binding maximum threshold for microplastic shedding and developing manufacturing techniques to select the best performing fabrics at design and production stages of the textile lifecycle.
- Policymakers must develop a robust harmonised test method to identify the materials and garments that release higher quantities of microplastics all along their life cycle and phase out those materials and fibres at the design and production stages.
- Limiting microplastic release at all lifecycle stages and assessing the environmental impacts linked to wet treatment, cutting, dyeing and printing of garments.
- Including a mandatory microplastics warning label highlighting the presence of plastic in textile products and the environmental and toxic impacts of microplastics to inform purchase decisions, similar to the SUP marking requirements.

Microplastic capture

- Mandating the industrial pre-washing with filter systems to capture microplastics throughout the manufacturing phase for newly manufactured textiles and garments during production in and outside the EU.
- Introducing EU legislation to ensure that all washing and drying appliances for both domestic and industrial use but also onboard ships, are equipped with filters and systems to filter greywater.
- Raising awareness, write guidelines on behaviour and disposal of collected filter materials and ensure adequate handling practices.

Inclusion of MP in all policy instruments

- Including additional information on microplastic when communicating the results of a PEF profile, as the PEF methodology currently does not cover microplastics. No need to wait for a harmonised methodology: the criteria should be whether or not the product releases microplastics and should follow a bonus/malus approach.
- A similar approach should be used for EPR systems for textile that can include microplastic shedding through a bonus/malus system, depending on the percentage of synthetic fibres in that product.
- EU taxonomy technical screening for textiles needs to include measures to reduce microplastics pollution.
- Textile industry must be discouraged from using other waste streams for recycled content purposes

Tyres and road transport

Mobility measures to reduce tyre dust emissions

- Setting EU wide reduction targets on road passenger transport and freight transport would reduce microplastic release from car and truck tyres.
- Promoting public transportation would have the same result.
- Ensuring the promotion of rail freight in EU transportation policy would reduce the abrasion of truck tyres.

Ecodesign requirements

- Defining a legal threshold and minimum requirements for tyre abrasion and wear for car and truck tyres is needed to exclude most wearing tyres from the EU market, with increments within the type approval regulation (or its possible iteration in case of a merger between ELVD and type-approval legislation).
- Progressively banning problematic chemicals in tyres such as zinc, cadmium, benzothiazole, chlorinated paraffins, bisphenols, PAH and 6PPD, as well as promoting non-hazardous alternatives.
- Adding tyre abrasion to tyre labelling without delay and establishing a suitable test method at the latest by 2023 are also key measures to be taken, alongside tyre design requirements for tread patterning, carcass, tread stiffness and tread area, and tyre tread materials, such as polymer, filler and additive types and concentrations. At a later stage, the toxicity of the released particles should be integrated in the tyre abrasion rating as well.
- Funding research for alternative tyre designs that help to reduce abrasion and the subsequent release of microplastics into the environment is also necessary.
- Funding research for alternative brake pads and friction equipment for all land vehicles will contribute to reduce the emission of fine particles into the atmosphere.
- Broadening currently foreseen measures is finally needed to address additional sources such as emissions brake, brake pad dust and road abrasion with specific prevention steps.

Tyre reuse

- Prohibiting the reuse of tyres underwater or in the open environment, i.e. as aquaculture seeding, to make artificial reefs, and in children's playgrounds.
- Permitting retreated tyres only if these are SVHC free, which is not currently the case.
- Supporting processes that make it possible for end-of-life tyres to be used as a resource to build new tyres: granulation is not the circular way forward.
- Investigating the environmental and health impacts associated with recycled tyre use in road asphalt is also paramount, given the current success of road surface technologies based on reusing plastic waste.

Soil protection and geosynthetics

Geotextiles and other geosynthetics are increasingly used for soil protection and crop protection applications, yet they degrade into microplastics as a result of erosion, abrasion and UV exposure, to end up in the soil or water. Proposed measures would include:

- Reducing the use of geosynthetics in agriculture, horticulture and soil protection (progressive phase-out) and introducing EU level legislation to phase out the use of synthetic polymers in agriculture, soil protection and horticulture.
- Phasing out geosynthetics and geotextiles used for coastal or riverbank protection and replacing them with plastic free alternatives (wood, concrete...) to prevent the continuous release of microplastics in freshwater and marine waters. Existing structures should be regularly monitored and replaced by plastic free alternatives when ageing or damaged.
- Introducing EU level legislation phasing out the use of intentionally added microplastics in fertilizers and seed and crop protection products in both agriculture and horticulture.
- Setting a visible expiration date for geosynthetics (geogrids, geotubes, geomembranes, geotextiles) and regular maintenance checks for all major coastal protection and riverbank structures to prevent any unintentional release of microplastics through geosynthetics degradation.
- Promoting and developing alternative low environmental impact materials to plastic mulch as well as other geosynthetics used on soil, riverbanks and coasts.²²

Paint and antifoulants

New studies²³ claim that more paint is leaking into the environment than previously thought. Plastic polymers are a key ingredient in many forms of paint and flakes can leak into the environment through normal wear and tear and removal. The building sector is by far the largest contributor, but the anti-fouling coatings applied to ships - known to be a source of heavy metals - are also a prominent and overlooked source of microplastics²⁴.

- Since dissolved polymers used in solvent-based paints are not considered microplastics by the ECHA restriction and both end up as secondary microplastics in the environment after film formation, they need to be covered under the initiative addressing unintentional release.
- Systemic change in the use and management of paint is necessary.
- Establishing stricter reporting and requirements for microplastics polymers and quantities present in paint.
- Developing best practices to mitigate the leakage of microplastic pollution from paints and antifoulants into the environment.
- Restricting the use of open-air blasting, incentivising the development of new technological solutions. Increasing the use and efficacy of dust extraction systems during maintenance and repair.
- Improving waste collection systems in shipyards, for construction and demolition waste and in buildings.

Plastic recycling

- Mandating the containment of recycling facilities is needed to prevent both pellet and other microplastic loss in water and soil.
- Setting initial reduction targets on the release of microplastics by recycling facilities followed by binding regulations to achieve zero microplastic emissions in the longer run.
- Creating an open access database for all chemical additives introduced in recycled plastic, including their concentration and CAS numbers.
- Mandating the disclosure of recycling facilities' life-cycle assessments, including the release of microplastics, especially for chemical recycling technologies.

Plastic packaging

Much of the single-use packaging is unnecessary. We need a systemic shift, with mandatory measures to support packaging free options and the uptake of reusables and incremental improvement of reuse systems efficiency to make reuse and refill the norm.

- Setting targets and promoting reusable, refillable, packaging-free options and networks.
- Introducing an EU-wide ban on easily fragmentable plastic materials such as oxo-plastics and synthetic polymers in foam.
- Setting measures to prevent overpackaging in consumer products and professional delivery services throughout Europe.
- Implementing deposit refund schemes (DRS) at least for beverage packaging including plastic bottles, metal cans and glass bottles across Europe, with minimum requirements on how it should be effectively operated.²⁵ Ensuring that such schemes account for reusable and refillable packaging, and are also being implemented for other relevant packaging types.
- In the short run, regulating all packaging, notably food contact packaging, to ensure that they are toxic-free by design throughout their lifecycle, i.e. free from all potentially hazardous substances including phthalates, bisphenols, mineral oils, PFAS and unintentionally added substances.
- In the longer run, banning potentially hazardous polymers and chemicals from food packaging in the EU as well as colourants in plastic packaging.
- Introducing the systematic marking of single-use products remaining on the market with a label to inform consumers of environmental impacts, recyclability and adequate disposal.
- Financially incentivising the promotion of bulk and refill areas in supermarkets and of bulk sale and packaging-free networks.

Fisheries and aquaculture

- Assessing and monitoring the concentration of microplastics in both wild fisheries and aquaculture products (fish and seafood).
- Banning toxic chemicals in fishing gear, as well as in complex synthetic compositions.
- Mandating the marking of fishing gear to reduce the discarding of nets and to enable the localisation, identification, recovery and reuse of waste gear, in line with the FAO voluntary guidelines.
- Mandating the systematic reporting of lost fishing and aquaculture gear to public authorities in order to facilitate data collection and recovery of lost gear.
- Encouraging technological innovation for the development of low impact solutions for systematic tracking of large fishing gear which is more prone to loss and drifting. Similar tracking systems should be mandated for aquaculture gear and facilities.
- Introducing tax incentives for professional fishers who are part of 'Fishing For Litter' schemes in Europe. These programmes must not incentivise active but rather passive fishing for litter activities.
- Supporting circular business models enabling value retention through reuse, repair and remanufacturing before recycling.
- Subsidising the recycling of ghost nets and other ALDFG into predetermined standard products, provided they do not contribute to spreading toxic chemicals.
- Conducting risk assessment for all plastic material retrieved from the ocean before it is recycled.
- Promoting the circular design of fishing gear via the use of low-impact, sustainable and durable materials as well as of natural fibres or ceramic in fishing gear, traps and pots.

Shipping and cruise industry

- Establishing regulations to prevent the overloading of cargo ships and mandating the adequate stowage of pellets containing containers below deck onboard ships.
- Regulating the release of microplastics in greywater for all ships and vessels (commercial, transport, research, etc).
- Introducing an EU ban on intentionally added microplastics to hull paints, marine coatings, sealant joints and cleaners used for hull scrubbing.
- Mandating the systematic reporting of containers lost at sea via the use of tracking devices on maritime containers and creating an open access EU database on container loss incidents.
- Applying the "polluter pays" principle to shipping companies, holding them accountable for the clean-up and retrieval of containers lost at sea, where substantial fines should be imposed for those which are not retrieved.

Water and wastewater treatment

- Including biomedica in the scope of upcoming policy measures with mandatory obligations for wastewater treatment plants to prevent and report biomedica spills into the environment.
- Amending the EU Urban Wastewater Directive to incorporate the assessment of microplastics.
- Setting reduction targets in the short run for microplastic release from effluent and by-products (fat, sludge etc) of water and wastewater treatment plants and introducing regulations to achieve zero microplastic emissions in the longer run.
- Regulating the monitoring of water and wastewater treatment plants to ensure that microplastics are not released into the environment through equipment malfunction or poor maintenance practices (e.g. properly sealed pipelines, secured external tank walls, grating system at influent and effluent stages etc).
- Introducing new EU regulation to ensure that new buildings have microplastic filtering systems installed between greywater and sewage systems.
- Plastics recycling requires further attention concerning the enhanced risks of the generation of incidental nanoplastics during recycling of nanoplastic-containing items and from recycled plastic.

Waste imports and exports

- Banning the export of all plastic waste to countries outside of the EU, with certain exceptions including EFTA countries.
- Fully transposing the Basel Convention plastic waste amendments within the Union without any derogation for Y48, PVC, PC, PS and PUR, including fractions of plastic waste.
- Facilitating the circular economy model through mandating the sorting of waste by material before export within the EU and EFTA.
- Creating a custom fee per metric tonne of plastic material exported within the EU and EFTA.

IV

Proposed recommendations on pollution monitoring, research and awareness-raising

Further research and monitoring of microplastic pollution is needed, yet we would suggest prioritising the following recommendations to follow an ecosystem based approach and focus on upstream solutions rather than wasting resources to develop end of pipe clean-up and capture technologies.

Monitoring and research

- Contributing to the establishment of an open access repository for microplastic research.
- Funding microplastic research which follows an ecosystem-based approach for monitoring and assessing pollution, with the use of specific indicators and long term monitoring programmes for the assessment of microplastic pollution.
- Funding inter-calibration exercises focusing on different environmental matrices to improve the quantification and identification of microplastics in the environment.
- Adapting fisheries monitoring research programmes to assess microplastic accumulation in marine biota.

Awareness-raising and education

- Incorporating environmental literacy principles, including plastic and microplastic pollution, in education programmes and curriculums.
- Funding, promoting and upscaling citizen science and participatory science monitoring projects associated with plastic and microplastic pollution.
- Supporting and monitoring the development of awareness-raising campaigns at national level on key plastic pollution issues such as reducing consumption, reuse and repair.
- Including the environmental consequences of plastic pollution on anti-litter signs.

Conclusion

The EU Action Plan 'Towards Zero Pollution for Air, Water and Soil' states that, by 2030, the EU should reduce plastic litter at sea by 50% and microplastics by 30%. Commission President Ms Von der Leyen stated in her State of the Union speech and in her subsequent 'Letter of Intent' that, among the five new legislative proposals the Commission will publish in 2022, one is the "Legislative proposal to reduce the release of microplastics in the environment and to restrict the addition of microplastics to products", showcasing how microplastics is now high on the political agenda.

In order to achieve this, an integrated approach is needed at the EU level to prevent microplastic pollution, with complementary and mandatory regulatory measures across all responsible sectors, to generate the changes needed in plastic production and consumption and reduce harmful microplastic release at source. Such a framework should be binding and based on the most adequate legal base for environmental policy that is 192 TFEU. We urgently need to phase down material and resource use to sustainable levels within planetary boundaries and choose carefully which applications we use plastics for.

Reducing volumes of microplastics released is a positive first step, but microplastics' toxicity (ecotoxicity and increasingly human health toxicity²⁶) must also be included in legislative measures, which is not the case right now. Microplastics contain and absorb high concentrations of hazardous chemicals. It is key to work on the elimination of potentially hazardous plastic additives and toxic additives (heavy metals, plasticizers, pesticides...) in the design and production of plastic products. We urge the European Commission to consider effective measures to address this at source across all legislative proposals of the EU Green Deal.

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Rethink Plastic, part of the Break Free From Plastic movement, is an alliance of leading European NGOs working towards ambitious EU policies on plastics. It brings together the Center for International Environmental Law (CIEL), ClientEarth, Environmental Investigation Agency (EIA), European Environmental Bureau (EEB), European Environmental Organisation for Standardisation (ECOS), Greenpeace, Seas At Risk, Surfrider Foundation Europe, and Zero Waste Europe. Together they represent thousands of active groups, supporters and citizens in every EU Member State working towards a future free from plastic pollution.

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1. Global plastic production has been increasing exponentially since the 1950s, with over 200 million tonnes produced in 2000, 368 million tonnes in 2019, and a forecasted production equal to over 500 million tonnes by 2025 and 650 million by 2030 (Heinrich Böll Stiftung, Plastic Atlas 2019).
 2. Lim, 2021; Rothstein, 1973
 3. Stothra Bhashyam, S., et al., 2021
 4. Green, D. et al., 2017; Huang, Y., et al., 2021
 5. Rochman CM, et al. 2016; Borrelle, S. B., et al, 2017
 6. Anbumani, S., et al. 2018; Sussarellu R, et al. 2016; Pedà, C., et al. 2016
 7. Bowley, J., et al. 2020
 8. Audrézet, F., et al 2021
 9. Arias-Andres, M., et al. 2019
 10. Arp, H. et al. 2021
 11. Shen, M., et al. 2020
 12. The World Health Organization estimated that outdoor air pollution was responsible for 4.2 million deaths globally in 2016, microplastics are likely responsible for part of this number.
 13. Nor, N. H. M., et al. 2021
 14. Seas at Risk, ECOS, EEB, Surfrider - How EU policy can tackle microplastic pollution, 2022
 15. Commission's recent proposal for a revised Directive on Industrial Emissions - Art. 192 chosen as legal basis: EUR-Lex - 52022PC0156R(01) - EN - EUR-Lex (europa.eu)
 16. Article 191.2 TFEU specifying the principles of EU law on which it must be based: the precautionary principle, prevention principle and that environmental damage should as a priority be rectified at source and that the polluter should pay. Treaty on the Functioning of the European Union, Articles 191(2) and 192
 17. According to the most recent report of the UN special rapporteurs on Human rights and the environment, focusing on non-toxic environment, A/HRC/49/53, see [G2200448.pdf \(un.org\)](#)
 18. See the approach followed by ECHA to justify the need for an EU wide restriction in the Annex XV report for the restriction of intentionally-added microplastics.
 19. Roger A., 2009
 20. [ClientEarth, Strengthen accountability: Align REACH with best practices](#) for a description of best practice on enforcement, access to justice and sanction
 21. ECHA 2019: "material consisting of a solid polymer containing particles, to which additives or other substances may have been added, and where ≥ 1 % w/w particles have:
 - (i) all sizes $1 \text{ nm} \leq x \leq 5 \text{ mm}$,
 - (ii) for fibres, a length of $3 \text{ nm} \leq x \leq 15 \text{ mm}$ and a length/diameter ratio >3
 22. Includes geotextiles (used in construction, agriculture, horticulture and coastal protection), geomembranes (agriculture and construction), geotubes (coastal protection) and geogrids (agriculture and coastal – riverbank protection).
 23. Paruta O. et al. , 2022
 24. Dibke et. al. 2021
 25. Zero Waste Europe, 2021, It's time to acknowledge the role of Deposit Refund Systems (DRS) in achieving a Circular Economy for beverage packaging in the EU <https://zerowasteurope.eu/press-release/its-time-to-acknowledge-the-role-of-deposit-refund-systems-drs-in-achieving-a-circular-economy-for-beverage-packaging-in-the-eu/>.
 26. Wang, Q., et al. 2021

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