Combating plastic pollution: a collective effort




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CHAIRMAN'S MESSAGE

Plastics are a vital resource for our societies. Light, solid and inexpensive, their mechanical and aesthetic properties make them our preferred alternative to other materials, particularly in applications such as water or gas piping, building and vehicle construction, healthcare and hygiene, as well as packaging, including that used for food preservation.

Their ease of use and low cost have led to an explosion in the quantities produced and consumed. In the absence of waste treatment systems across the globe significant, albeit often diffuse, quantities of plastic-based products are being released into the terrestrial and aquatic environments.

Global plastic pollution has become a matter of concern for society. It poses potential risks to ecosystems, flora as well as fauna, and human health.

How do we solve this problem stemming from the increase in plastic consumption, its formulation, and the inadequacy of plastic waste collection, recycling and treatment systems in most countries around the world?

Companies, in particular EpE members, are taking action by measuring their plastic footprint, limiting the use of non-essential plastics in products, eco-designing new plastics, organising the collection and recycling of end-of-life plastics, using recycled plastics, and so on. They are working on technologies and innovations that could facilitate plastic recycling and production from new circular materials (for example, biomass).

As with other environmental challenges, the deployment of solutions will need to be decided with public authorities at global and national levels in order to shape collective behaviour, contain the rebound effects of innovations, reduce the quantities present in the environment, support the development of recycled products as well as other feedstocks, and limit single-use plastics to applications for which there is no better alternative.

The international treaty against plastic pollution under negotiation, which is expected to culminate in an agreement by the summer of 2025, is a first step toward collective governance.

EpE companies are working forthwith on the technical, organisational and governance solutions needed to reconcile respect for planetary boundaries with social prosperity.

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INTRODUCTION

On 18 January 2022, scientists from the Stockholm Resilience Center (SRC) confirmed the crossing of a new planetary boundary, with the emission of novel entities into the biosphere[1] "because annual production and releases are increasing at a pace that outstrips the global capacity for assessment and monitoring"[2]. SRC scientists drew special attention to **plastics**, underlining their exponential production and the multitudinous chemicals making them up.

Plastics and plastic particles are now found in all environmental compartments of the planet. They result from the production, transport and use of plastics, and from poor management of their end of life. Plastics are composed of a polymer to which other chemicals are added (over 10,000 different substances are recorded for all plastics[3]). These degrade, change and combine in the environment, sometimes with harmful effects depending on their properties. Once the plastics are discharged, it is very expensive to "clean up" the environment by removing those elements, or only possible to do so partially and with difficulty. In addition to the technological, technical, scientific and economic complexity of such an operation, plastics are present everywhere, especially in areas unreachable by humans (e.g. the seabed). They can come in microscopic sizes[4] and may contain chemicals that last almost indefinitely in the environment.

Moreover, plastic production, transport and end-of-life management produce impacts on environments and resources. According to the baseline scenario of the Organisation for Economic Cooperation and Development (OECD), which assumes that current policies on plastics are maintained over time, "plastics-related greenhouse gas emissions are expected to account for 5% of global emissions in 2040 (2.8 billion tonnes of carbon dioxide equivalent)"[5].

Lastly, plastics and some chemicals comprising them have been found in the human body, with many suspected adverse effects.

Plastic pollution is thus a global issue arousing growing interest from the general public, businesses, public authorities at national, European and international levels, and the scientific community. For this reason, negotiations have been under way since 2022 to draw up a binding international treaty to reduce plastic pollution.

The issues raised by plastic pollution are multi-faceted, and solutions are often difficult to implement (changing the economic model) and vary according to geographic region (difference between waste-producing and waste-importing countries), economic sector and the type of plastic being targeted. Indeed, because of their remarkable properties and low production costs compared to other materials, plastics have enabled great technological advances and become indispensable in many economic sectors, including health, transport, construction, textiles, and packaging in particular (40% of global plastic production), while facilitating international trade in all products. Many have no alternatives today and managing their end of life is difficult, especially for developing countries. Moreover, at all stages of their lifecycle plastics have a significant economic impact. In 2021, the plastics industry in Europe, which accounts for only 14% of global plastic production, employed 1.5 million people across 52,000 businesses, and generated more than 400 billion euros in revenue[6]. How to change this overall dynamic?

To explore potential answers to this challenge, in 2023 forty large corporate members of the French association Enterprises pour l'Environnement (EpE) shared ideas with each other and their stakeholders in the Health & Environment Committee to identify, understand and respond to health, environmental and economic issues related to plastic pollution. This publication provides an update on the insights gained and the work carried out by companies on this issue.

The first chapter of this report describes the context and issues related to plastic pollution. The second and third chapters, based on the best practices of EpE member companies and of some of their stakeholders, sets out solutions which have been identified and deployed to better understand and remedy this pollution. One of the lessons learned from these actions is that a systematic response to plastic pollution is essential, and one which calls for the joint mobilisation of public and private players across the value chain.

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1 SRC, "Safe planetary boundary for pollutants, including plastics, exceeded, say researchers", 18 January 2022.
2 Persson (L.) *et al.*, "Outside the Safe Operating Space of the Planetary Boundary for Novel Entities", *Environ. SCI.Technol.* 2022, N°. 56, p. 1510.
3 UNEP, Chemicals in Plastics - A technical Report, May 2023, p. 2.
4 90% of plastics in the seas and oceans are less than 5 mm in diameter. Eriksen (M.), *et al.*, "Plastic Pollution in the World's Oceans: More than 5 Trillion Plastic Pieces Weighing over 250,000 Tons Afloat at Sea", *PLoS One*, 2014, n° 9 (12).
5 OECD, Policy Scenarios for Eliminating Plastic Pollution by 2040, 2024. According to ADEME figures, the emission factor is between 2 and 3 tonnes of CO_2 equivalent per tonne of plastic.
6 Plastic Europe, "The plastics transition", roadmap summary, 2023.

1

A global health, environmental and economic concern

The first synthetic plastics appeared in the beginning of the 20th century and, from 1950, found applications in many articles and economic sectors, with global production soaring from two million tonnes a year to 438 million tonnes in 2018[7]. Plastic production could indeed double by 2050.

What are the reasons behind the sharp rise in the production and use of plastics, and the consequences of the pollution they produce for health and the environment? What is the response of public authorities to this global challenge? What are the risks, challenges and opportunities for business?

1 The pervasiveness of plastics in our daily lives and the environment

In the space of 70 years, the remarkable properties of plastics have made these materials indispensable in many fields, while also making them particularly difficult to dispose of and persistent in the environment.

1.1. Materials with remarkable properties on which human activities heavily depend

A plastic is "a polymer - to which additives or other substances are added - capable of serving as the main structural component of final materials and articles"[8]. These synthetic polymers can be composed of carbon atoms derived from hydrocarbons (fossil fuel polymers), or wholly or partly from biomass (minimum 25% to be designated "bio-based polymers")[9]. Today, **99% of polymers come from fossil fuel**.

Synthetic polymers include:

- thermoplastics which, when heated to the right temperature, become malleable again and can therefore be reused (recycled). These account for about 80% of plastics;
- thermosets that cannot become malleable again under the effect of heat and are therefore not, or only slightly, recyclable (e.g. wind turbine blades);
- biodegradable polymers which can, under certain conditions, be degraded by living micro-organisms.

To these different polymers are added[10]:

- intentionally, auxiliary components designed to improve their physico-chemical properties (e.g. plasticisers, fillers, flame retardants, antioxidants) and/or aesthetic properties (e.g. dyes) so that they are fit for their intended use;
- unintentionally, other substances such as solvents, cleaning agents or impurities from the manufacturing or recycling process (legacy substances).

There are thus **hundreds, even thousands, of different plastic formulations**.

The production and use of plastics has soared in recent years because of the remarkable properties of these materials: they can be flexible or rigid; they are light, resistant to shocks and corrosion, stable, and insulating; they have a long service life and their manufacturing cost is relatively low (particularly for fossil fuel polymers derived from virgin material). These qualities have driven significant technological advances across many sectors, including medicine, electronics, aerospace, construction, clothing, footwear, and sports, so much so that plastic has gradually become an essential material in many fields. For example, in an opinion dated April 2023 on the international plastic treaty under negotiation, France's Economic, Social and Environmental Council (ESEC)[11] noted that in the medical sector "there is no viable alternative to plastic available on a large scale"[12]. In the automotive sector, the use of plastics has considerably reduced the weight of vehicles and consequently lowered their carbon dioxide emissions (CO_2).

7 Bolo (P.) and Préville (A.), "*Pollution plastique : une bombe à retardement?*", Report on behalf of the Parliamentary Office for the Assessment of Scientific and Technological Options (OPECST), 10 December 2020.
8 Article 3(2) of Commission Regulation (EU) N° 10/211 of 14 January 2011 on plastic materials and articles intended to come into contact with food.
9 Bolo (P.) et Préville (A.), "*Pollution plastique: une bombe à retardement?*" Report on behalf of the Parliamentary Office for the Assessment of Scientific and Technological Options (OPECST), 10 December 2020, p. 11.
10 UNEP, "Chemicals in Plastics – Infographics", 2023, p. 1.
11 France's ESEC is the Republic's third constitutional assembly and comprises civil society organisations (employers, trade unions, associations). It advises the French government and parliament, and participates in drawing up and assessing public policies in its areas of competence. EpE participates in its work.
12 Roux de Bézieux (S.) and Van den Broeck (N.), "*Vers un traité international sur la pollution par les plastiques : enjeux, options, positions de négociations*", opinion of the French Economic, Social and Environmental Council (ESEC), April 2023, p. 19.

Plastic has accordingly become the third most manufactured material in the world behind cement and steel. Its main applications include packaging, building materials, automobiles, electrical and electronic equipment, sanitary and household products, toys and children's products, textiles, aquaculture and fisheries, as well as medical equipment.

However, these very same properties are actually behind the pollution caused across the plastic lifecycle.

1.2. Macro-, micro- and nanoplastics present in the air, water and soil

Plastics found in the environment come in various sizes and from different sources (Figure 1).

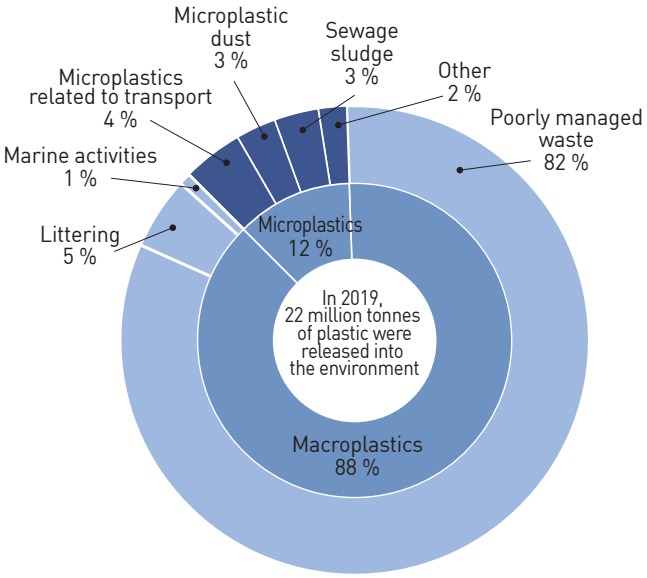

Figure 1 / Chart proposed by France's ESEC to illustrate the origin of plastics found in the environment in 2019, based on OECD figures[13].

Macroplastics are bigger than 5 mm and the most visible. Their presence in the environment is mostly due to poor management of their end of life. According to the OECD, in 2019, 460 million tonnes of plastics were produced, of which 353 million tonnes became waste and 22 million tonnes released into the environment[14]. This waste is mainly made up of single-use plastics which, like all plastics, have a very long lifespan and will therefore continue to accumulate in the environment. Not only do macroplastics accumulate, they also degrade into micro and nanoplastics that do not fit into any of the biogeochemical cycles (unlike wood, cement or concrete), and so will never disappear.

Microplastics are plastics measuring between 1 µm and 5 mm. They come in different shapes (fibres, pellets, fragments, microbeads, etc.) and usually fall into two categories:

- primary microplastics, which are manufactured for different uses such as plastic microbeads found in cosmetic products and plastic pellets (also known as nurdles) intended for use in the manufacture of other products. Their presence in the environment is mainly caused by leakage during their use, production or transport;
- secondary microplastics, which are derived from the degradation of macroplastics in the environment, as well as the wear and tear of certain articles during their use and maintenance. In a 2020 report by the Parliamentary Office for the Assessment of Scientific and Technological Choices (OPECST), MP Philippe Bolo and Senator Angèle Préville cited the example of tire wear particles (about 5.86 million tonnes a year) and plastic textile fibres released during the washing of clothes (between 18,000 and 46,000 tonnes a year)[15].

13 Roux de Bézieux (S.) and Van den Broeck (N.), "*Vers un traité international sur la pollution par les plastiques : enjeux, options, positions de négociations*", opinion of the French Economic, Social and Environmental Council (ESEC), April 2023, p. 12, Figure 1.

14 OECD, "Plastic pollution is growing relentlessly as waste management and recycling fall short, says OECD", 22 February 2022.

15 Bolo (P.) et Préville (A.), "*Pollution plastique: une bombe à retardement?*", report on behalf of the Parliamentary Office for the Assessment of Scientific and Technological Options (OPECST), 10 December 2020, p. 15.

Lastly, **nanoplastics** are plastics measuring between 1 nm and 1 µm. These particles are therefore invisible to the naked eye and research on their presence and behaviour in the environment is still in its infancy. Nanoparticles are likely derived from the degradation of macro- and microplastics in the environment, as well as the wear and tear of certain articles during their use and maintenance.

These different plastics are found in all environmental compartments:

- **water,** whether fresh or marine[16], surface or underground. Plastic particles enter the water cycle and travel all over the planet;
- **soil** where, according to recent studies[17], the quantities of microplastics found are if not greater at least equal to those found in rivers, seas and oceans;
- **air,** with microplastics even nanoplastics in suspension that can travel long distances by atmospheric transport and reach remote regions[18]. As well as being inhaled through breathing, these particles in suspension can then fall back into various fresh or marine water bodies, onto the ground, on roofs, on food, and on clothes and hair. Ultimately, they will end up in urban sewage systems or other water bodies due to rain, water runoff into soil or clothes washing.

Although much information is still lacking on the behaviour of plastics in the environment (especially micro- and nanoparticles), scientific literature concurs that they are found everywhere.

Yet the quantity of plastics produced, used and released into the environment continues to increase.

1.3. Increasing amounts of plastics produced, used and released into the environment

Plastics are divided into seven main groups: polyethylene terephthalate (PET), high density polyethylene (HDPE), polyvinyl chloride (PVC), low density polyethylene (LD), polypropylene (PP), polystyrene (PS), and all other types of plastic (e.g. polyurethane, polycarbonate). These plastics have different uses depending on the sector of activity. The biggest users are packaging (40%), building and construction (around 20%), and increasingly electricals and electronics.

Plastic production rose 79% between 2000 and 2015 and is expected to double by 2050. The OECD forecasts that the global amount of plastic used will climb from 460 million tonnes in 2019 to 1,231 million tonnes in 2060[19].

Growing plastic production and the resultant stockpiles pose several problems:

- the plastics produced are in the main **fossil fuel polymers** derived from virgin materials;
- **single-use, short-lived plastics** account for 35-40% of plastic production. But their share is growing sharply, with the OECD predicting a 30% increase (about 70 million tonnes) between 2021 and 2025[20]. Currently, 81% of plastic products end up as waste in less than a year;
- **end-of-life management of plastics** is therefore a major challenge. Only 9% of plastic waste in the world is recycled, 19% is incinerated, 50% of plastic finishes up in landfills and 22% is sent to uncontrolled landfills, burned in open pits or released into the environment[21]. Developing countries are particularly concerned. Five countries are said to be responsible for more than half the plastic waste found in marine waters: China, Indonesia, Thailand, the Philippines and Vietnam. Paradoxically, it is not these countries that use the most plastics. In fact, the opposite is true. According to Fondation de la Mer[22], a Chinese uses 66 kg of plastics per year, a European 150 kg and an American 252 kg. Even in rich countries, end-of-life plastics can be improved. In the EU, only 49% of plastic waste is recycled (40% is incinerated and 11% landfilled). This figure drops to 25% in France. Moreover, the United States and Europe export a proportion of their plastic waste to developing countries. The OECD forecasts that the volume of plastic waste will triple by 2060 to reach one billion tonnes[23].

In light of all these facts, the question arises as to the impact of plastics and their life cycle on ecosystems and human health.

16 Plastic waste accounts for 85% of marine litter. UNEP, "From Pollution to Solution: A global assessment of marine litter and plastic pollution", report, October 2021.
17 For example: Piehl (S.) *et al.*, "Identification and quantification of macro- and microplastics on an agricultural farmland", Science Report, 2018, n° 8, 17950.
18 Evangeliou (N.) *et al.*, "Atmospheric transport is a major pathway of microplastics to remote regions", Nature Communications, 2020, 11, 3381.
19 OECD, "Global Plastics Outlook: Policy scenarios to 2060", OECD Publishing, Paris, 2022.
20 Landrigan (P. J.) *et al.*, "The Minderoo-Monaco Commission on Plastics and Human Health", Annals of Global Health, 2023, 89(1): 23, p. 11.
21 OCDE, "Global Plastics Outlook: Economic Drivers, Environmental Impacts and Policy Options", Policy highlights, 2022.
22 The Association relies on OECD, UN and EU data.
23 OCDE, "Global Plastics Outlook: Policy Scenarios to 2060", Editions OCDE, Paris, 2022.

2 The health, environmental and societal impacts of plastics

The impact of plastic pollution on human health and the environment goes a long way beyond the plastic debris found in the stomachs of marine animals, though these by far attract the most media attention.

Through air, water, soil, food, and everyday articles and products, we are chronically exposed in the long term to plastic particles that are able to accumulate in our bodies. Exposure to micro- and nanoplastics and to certain chemical substances that may be part of their composition (bisphenol A, phthalates, per- and polyfluoroalkyl substances [PFAS], etc.) are suspected of having several effects on human health, including endocrine disruption, decreased fertility, cardiovascular disease, and lung and liver cancer[24]. Exposure to plastics, together with daily exposure to a range of other chemicals can, through accumulation and/or "cocktail effects", have an adverse impact on the environment and human health.

In soil, plastics interact with wildlife, impacting their health and ultimately threatening food security. As for the species present in water and on land, plastic particles affect their microbiota, which can result in their physiology being altered - a development also observed through *in vitro* testing of human molecules[25].

In addition to the risks associated with exposure to plastic particles, the plastic lifecycle can affect human health and the environment:

- **production:** like any industrial activity involving the production of materials, the extraction and transformation of primary fossil fuel feedstocks can impact health, the environment (discharges into water, air and soil, effects on fauna and flora), and the climate. According to the European Parliament, "in 2019, plastics generated 1.8 billion tonnes of greenhouse gas (GHG) emissions, or 3.4% of global emissions, with 90% of these emissions coming from their production and conversion using fossil fuels"[26]. Production is an even greater challenge since only 14% of plastics are produced in the EU. A large proportion of the remainder comes from China, the United States, the rest of Asia, and the Middle East, which do not have the same requirements as Europe with regard to the environment and working conditions;
- **use:** of the 13,000 chemicals that can be used in plastics, 3,200 substances have been identified as potentially hazardous to human health[27]: flame retardants, PFAS, bisphenols, phthalates, certain biocides, etc. The same is true of recycled plastics. The result is that humans are exposed to these chemicals (25% of children's plastic toys contain hazardous substances[28] and plastic particles on a daily basis. The challenge is even greater for plastic products imported from outside the EU in which the additives present are not always known;
- **end of life:** a large proportion of plastic waste is still neither collected nor treated, thereby directly affecting the environment. Moreover, most plastics are landfilled or incinerated, sometimes in conditions likely to impact human health or the environment (water, air[29], soil pollution, social risks associated with arduous working conditions, and human rights risks). This is especially true of developing countries who also have to bear the brunt of the informal economy formed around waste. Recycling too, be it mechanical or chemical, can negatively impact the environment through greenhouse gas emissions, increased water and energy consumption, and water, air and soil pollution near facilities.

Plastic pollution therefore exacerbates the **triple global crisis** of climate change, biodiversity loss and pollution, with serious consequences for human health.

In a March 2023 report by the Minderoo-Monaco Commission focusing on the impact of plastics on human health[30], a group of experts agreed that in 2015 the social cost of premature deaths from plastic production alone exceeded $250 billion worldwide[31]. It should be noted that 64% of these costs were recorded in Asia (35% in China), and only 20% in the United States and the EU combined. What about the rest of the plastic lifecycle? In the United States, the health costs of illness, disability and premature death caused by just three chemicals used in plastics[32] were estimated at $920 billion in 2015[33].

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24 UNEP, "Chemicals in Plastics – A Technical Report", mai 2023, p. 26.
25 INRAE, "*Quand les microplastiques s'installent à la table du microbiote des petits et des grands*", 6 October 2022.
26 European Parlement, "Plastic waste and recycling in the EU: facts and figures (infographic)", 2024.
27 UNEP, "Chemicals in Plastics – Infographics", 2023, p. 3.
28 Aurosano (N.) *et al.*, "Chemicals of concern in plastic toys", *Environment International*, January 2021, Vol. 146 106 194.
29 For example, open-air plastic combustion releases a range of toxic chemicals and particles such as dioxins, furans and mercury, among others.
30 An interdisciplinary committee of scientists, clinicians and policy analysts from around the world coordinated by the Global Observatory on Planetary Health at Boston College.
31 Landrigan (P. J.) *et al.*, "The Minderoo-Monaco Commission on Plastics and Human Health", Annals of Global Health, 2023, 89(1): 23, p. 99.
32 Polybrominated diphenyl ethers (PBDEs),which are suspected to affect neurodevelopment, bisphenol A (BPA) known to be an endocrine disruptor, and DEHP, a phthalate considered carcinogenic, mutagenic and toxic for reproduction.
33 Landrigan (P. J.) *et al.*, "The Minderoo-Monaco Commission on Plastics and Human Health", Annals of Global Health, 2023, 89(1): 23, p. 102.

Yet there is a lack of knowledge about the behaviour of plastic particles in water, air and soils, as well as their impact on biodiversity and human health, in particular. For example, of the 13,000 chemicals found in plastics, only 7,000 have been examined for their harm to human health[34].

As a result, the issue of plastic pollution and the measures to be taken to remedy it are drawing increasing attention from scientists, the general public, national, European and international bodies, and businesses.

3 A challenge identified by government and business

There is scientific consensus over the societal damage caused by plastic pollution. Public authorities and businesses are increasingly faced with, and active on, these issues. This section sets out the regulatory moves made in this area at national, European and international levels in recent years, as well as the risks plastics pose for businesses and the potential benefits of the solutions companies bring to bear on the problem.

3.1. A regulatory framework under construction to tackle plastic pollution

National authorities, in particular the French government, European bodies and international organisations have, over the last twenty years, adopted and implemented a series of measures to better control the end of life and toxicity of plastics, and even limit the use of those deemed non-essential. The various treaties, regulations, legislations, and public policies are sectoral or cross-cutting, focus on plastics or other products, and deal with all or part of the plastic lifecycle. In the face of increasing pollution, a growing number of regulations have been produced over the past few years to address the issue.

1) At **national** level, France is one of the first countries to legislate on the circular economy and, over the past decade, has adopted a series of regulations to better manage plastics. To name but one, the 2020 anti-waste and circular economy law (or AGEC law) includes a large number of plastic-related measures to be implemented between 2021 and 2040:

- **better information for consumers and recyclers** on the composition of plastics, in particular the presence of hazardous substances, along with other environmental characteristics of products such as the incorporation of recycled material;
- **promotion of bulk distribution** for all consumer products, and reuse of all packaging, e.g. containers and cutlery used for meals and beverages consumed at catering establishments (2023);
- **ban of intentional addition of microplastics** to medical devices (2024) or cosmetic rinse-off products other than exfoliating and cleaning products (2026). Similarly, new washing machines will have to filter plastic microfibres (2025);
- **improved recovery and recycling** with, for example, progress towards a target of 100% recycled plastic by 1 January 2025;
- **end to the marketing of single-use plastic packaging** by 2040 (with an intermediate reduction stage of 20% in 2025), gradual bans of some single-use plastics such as straws, disposable cutlery, expanded polystyrene boxes, confetti, halving of the quantities of non-recyclable manufactured products marketed before 2030 (including plastics), and halving of the number of single-use plastic bottles on the market by 2030;
- **reform of the extended producer responsibility** (EPR) scheme with the addition of new sectors that will help improve plastic recycling targets;
- **support for eco-design**, in particular through the adjustment of contributions paid by marketers to eco-organisations based on the environmental performance criteria of their products.

Other states have also adopted regulations to better manage plastic pollution. OPECST conducted a survey of the embassies of 179 countries in France. Of the 38 responses received, 31 countries have adopted laws to limit plastic pollution. Of these, 80% prohibit single-use plastics, 70% lay down recycling requirements and 50% prohibit plastic bags[35].

2) The **European Union** initially focused on plastics from the perspective of waste with the adoption in 2008 of the waste management hierarchy. It then broadened its scope of intervention by adopting in 2018 the European strategy for plastics in a circular economy under which "all plastic packaging in the EU market shall be recyclable by 2030, single-use plastic consumption shall be reduced, and the intentional use of microplastics shall be limited"[36]. Other noteworthy regulations already adopted or in the process of adoption include:

34 UNEP, "Chemicals in Plastics – Infographics", 2023, p. 3.

35 Bolo (P.) and Préville (A.), "*Pollution plastique : une bombe à retardement?*" report on behalf of the Parliamentary Office for the Assessment of Scientific and Technological Options (OPECST), 10 December 2020, p. 276.

36 European Commission, "Plastic waste: a European strategy to protect the planet, defend our citizens and empower our industries", 16 January 2018.

- directive (EU) 2019/904 on **reducing the impact of certain plastic products on the environment**, which sets a target of 90% collection of plastic bottles by 2029 and lists single-use plastic products in connection with which Member States must commit to: (1) reducing their consumption, (2) prohibiting their marketing and (3) implementing campaigns and measures to raise consumer awareness of the use, composition and end-of-life management of those plastics;
- regulation (EU) 2023/2055 amending annexe XVII of REACH[37] to **prohibit the sale of microplastics** and products to which microplastics have been intentionally added. A timetable for implementation has been agreed with exemptions for certain products;
- the adoption by the European Parliament on 23 April 2024 (prior to final approval by the Council) of the regulation establishing a framework for setting **eco-design requirements** for sustainable products;
- the adoption by the European Parliament on 24 April 2024 (prior to final approval by the Council) of the **regulation on packaging and packaging waste**, which includes a range of measures to reduce, reuse and recycle packaging. For plastics, this includes the ban of certain types of single-use packaging from 2030 and the setting of new targets for incorporating recycled plastics;
- the adoption of Parliament's position in view of the trilogue negotiations on the proposed regulation to **prevent plastic pellet losses** in an effort to reduce microplastic pollution.

European regulations not focused on waste or plastics may also be mentioned, such as the Corporate Sustainable Reporting Directive (CSRD), which requires financial and non-financial companies to publish sustainability reports in accordance with European Sustainability Reporting Standards (ESRS). The ESRS E2 "pollution" standard in particular, as well as E3 "marine aquatic resources", are partly concerned with microplastics pollution. Similarly, recent and ongoing changes in the directives on drinking water, wastewater, and water body management in the EU include microplastic monitoring measures.

3) At **international level**, several texts deal with plastics either through waste management (London Convention 1972, Marpol Convention 1973, 1982 United Nations Convention on the Law of the Sea, 1989 Basel Convention), or through certain chemicals (Rotterdam Convention 1998, Stockholm Convention 2001). More recently, a non-binding agreement on the management of chemicals and waste internationally was adopted in Bonn on 29 September 2023. Although these texts are important, they only cover some aspects of the plastic lifecycle, or do not even specifically deal with this material. OPECST, accordingly, has underlined the need for a "holistic approach to the plastic lifecycle (including production, consumption, transport, recycling, and the waste pollution generated at each stage of the lifecycle) with binding reduction targets"[38].

On 2 March 2022, the United Nations Environment Assembly (UNEA) adopted a landmark resolution to develop a legally binding international instrument to end plastic pollution across the plastic lifecycle[39]. As a result, five sessions of the Intergovernmental Negotiating Committee (INC)[40] were scheduled between late 2022 and late 2024 (Figure 2) with the aim of adopting the treaty in 2025.

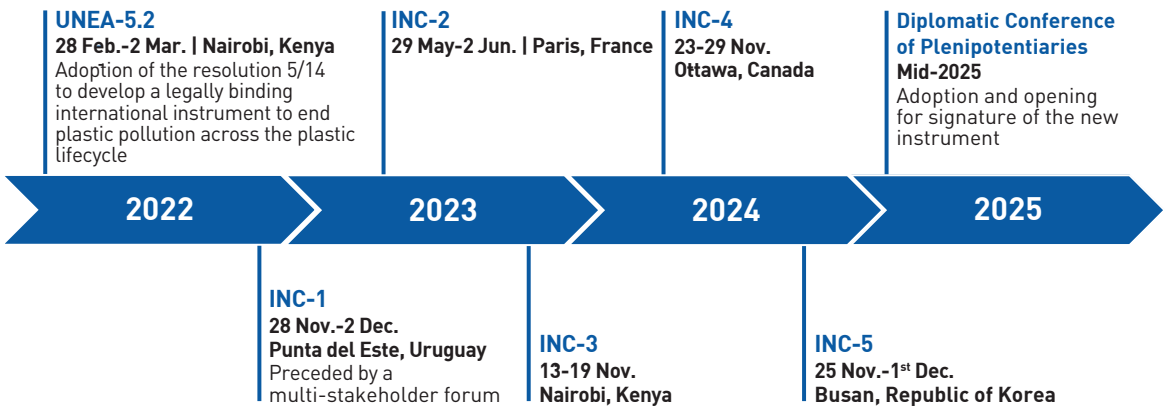

Figure 2 / Different stages of development of the international treaty to end plastic pollution.

37 Regulation (EC) 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the registration, evaluation, authorisation and restriction of chemicals (REACH), establishing a European Chemicals Agency.
38 Bolo (P.) and Préville (A.), *"Pollution plastique: une bombe à retardement ?"*, report on behalf of the Parliamentary Office for the Assessment of Scientific and Technological Options (OPECST), 10 December 2020, p. 135.
39 https://digitallibrary.un.org/record/3999257?v=pdf.
40 International Negotiating Committee (INC).

This led to the creation of the **High Ambition Coalition for a Plastic Treaty** (HAC)[41], a grouping of 66 states, including the EU and its member states, which seeks to obtain the most ambitious treaty possible covering the entire plastic lifecycle. The HAC aims to end plastic pollution by 2040 via three strategic objectives:

- limit plastic consumption and production to sustainable levels;
- develop a circular economy for plastics that protects the environment and human health. This involves focusing on hazardous chemicals or chemicals of concern in plastics;
- ensure environmentally sound management and recycling of plastic waste.

This was the backdrop to the adoption on 11 April 2023 by France's ESEC of its opinion regarding the treaty.

The big producers of fossil products and/or plastics (Iran, China, Russia, India, Saudi Arabia) have launched the Global Coalition for Plastics Sustainability which calls for limiting the scope of the treaty to plastic consumption and end-of-life management[42].

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France's ESEC recommendations for the global treaty project to end plastic pollution: consensus of civil society in favor of ambitious measures

In preparation for the second round of United Nations negotiations toward this treaty, the French Economic, Social, and Environmental Council (ESEC) unanimously adopted twenty ambitious recommendations caried by Sabine Roux de Bézieux and Nathalie Van Den Broeck to end plastic pollution[43].

The organizations represented at the French ESEC (companies, trade unions, associations, foundations, environmental NGOs, artisans) have reached a consensus on measures related to the entire life cycle of plastic, focusing on responsibility and sustainability.

Alongside the key recommendations put forth by the French ESEC, some of them have been taken up by the negotiating States, such as:

- **reducing production trajectories:** Encouraging a decrease in plastic production;
- **seeking viable and sustainable alternatives:** Promoting innovation to find plastic alternatives;
- **banning single-use plastics:** Including a principle prohibition of disposable plastics in the future treaty;
- **public awareness campaigns:** Educating consumers to foster responsible behavior.

With unanimous support from organized civil society, it is now the responsibility of all stakeholders to accelerate the transition toward a world with **"zero plastic pollution in nature by 2040"**.

While only one last session of negotiations is planned, many points of divergence remain over a number of issues, including the treaty's scope (all or part of the plastic lifecycle), financing (funding arrangements, use of existing funds or schemes such as EPR), levels of restriction to be introduced, definition of certain terms (e.g. sustainable production and consumption), setting or not of targets to cut primary plastic polymer production[44], etc.

Nevertheless, many states have reaffirmed their commitment to adopt ambitious measures to combat this pollution. At the last plenary session in Ottawa, the EU delegation submitted, on behalf of 33 countries and 34 civil society organisations, its declaration "Bridge to Busan: declaration on primary plastic polymers"[45], reasserting that the mandate of UNEA Resolution 5/14 covers the entire plastic lifecycle, including primary plastic polymer production.

41 https://hactoendplasticpollution.org/fr/.
42 IISD, "What to Expect at Plastics INC-4", 22 April 2024.
43 *https://www.lecese.fr/travaux-publies/vers-un-traite-international-sur-la-pollution-par-les-plastiques-enjeux-options-positions-de-negociations.*
44 Further information: Chabason (L.), Parmentier (R.) and Leal Maldonado (I.), "*Négociations sur le futur traité plastiques : lueurs d'espoir à Ottawa*", IDDRI, 16 May2024.
45 https://www.bridgetobusan.com/home-fr.

In addition to INC-4, climate, energy and environment ministers from the G7 countries (United States, Japan, Germany, France, United Kingdom, Italy and Canada) issued a press release on 30 April 2024[46] in which they pledge "to take ambitious measures across the plastic lifecycle to end plastic pollution", and call on "the global community to do the same, with the aim of cutting and, where appropriate, restricting global production and consumption of primary plastic polymers".

While many regulatory changes have indeed occurred in recent years or are ongoing, their application is hampered by national technical and technological capabilities and strong economic challenges. Businesses have every interest in anticipating these changes so as to transform the associated risks into opportunities.

3.2. Plastic pollution: challenges for business

The extent of plastic pollution and its consequences for human health and the environment are a growing concern for business. This concern is reflected in the Business Coalition for a Global Plastic Treaty[47], formed in September 2022 by more than 80 organisations, including companies from across the plastic lifecycle such as Kering, financial institutions including BNP Paribas Asset Management[48], and non-governmental organisations (NGOs).

Plastic pollution undoubtedly poses risks for economic players:

- **regulatory:** the increasing number of international, European and national regulations on this issue can pile on costs and create legal uncertainty for companies, especially if they fail to anticipate the transformation of their activities;
- **legal:** the number of plastics-related lawsuits is growing. For example, in 2022 Surfrider Foundation Europe, ClientEarth and Zero Waste France gave notice to nine French food and retail companies to reduce their use of plastics on the basis of French due diligence legislation. Similarly, on Monday 23 September 2024, the State of California announced that it was taking legal action against the US oil and gas company ExxonMobil for "misleading the public about the recyclability of plastic"[49]. A 2022 Minderoo Foundation report entitled "The Price of Plastic Pollution: Social Costs and Corporate Liabilities" considered that "the short-term (2022-2030) risk of corporate liability associated with plastic pollution is significant and expected to exceed $20 billion"[50]:
- **financial:** plastic pollution is a growing concern for investors too. For instance, with the support of OFi Invest AM and Surfrider Foundation Europe, in 2020 Macif engaged with 20 companies present in its investment portfolios encouraging them to address the issue and improve their practices[51];
- **reputational:** the pollution caused by plastics and its impact on human health and the environment, which includes risks for the climate arising from the fossil origin of plastics, are attracting mounting criticism. The issue receives coverage from NGOs and environmental associations in their various studies[52], legal actions and media campaigns.

On the other hand, anticipating regulatory changes or taking a proactive stance on tackling plastic pollution can present opportunities for companies: innovations, creation of new partnerships and sectors[53], carbon footprint reduction, better understanding and control of the plastic footprint, better image among consumers and investors, new markets, new technologies, new products and services, and so forth.

Accordingly, several companies have embarked on individual or collective discussions and actions to reduce plastic pollution. The task, however, is difficult and there is no single solution, as the issues raised by plastics are diverse and tricky, ranging from the resources used for their production, the substances composing them, and their complexity as well as recyclability, to their lifespan and use, the crucial role they play in some public-interest sectors, the lack of alternatives, the availability of recycling sectors and technologies, and so on. The solutions go beyond recycling to encompass the entire plastic value chain.

The following two chapters accordingly explore the various initiatives being implemented by EpE member companies, or under consideration, across the plastic lifecycle, starting with actions to define and assess the risks posed by the plastics produced, used and/or disposed of by companies.

46 https://www.g7italy.it/wp-content/uploads/G7-Climate-Energy-Environment-Ministerial-Communique_Final.pdf.
47 https://www.businessforplasticstreaty.org/.
48 https://www.businessforplasticstreaty.org/endorsers#financial-institutions.
49 Alvarez (C.), "*ExxonMobil au cœur d'un procès inédit sur la pollution plastique*", 26 september 2024.
50 Merkl (A.) and Charles (D.), "The Price of Plastic Pollution: Social Costs and Corporate Liabilities", Minderoo Foundation, 2022.
51 For further information: EpE, "Biodiversity: awarding value and taking action", October 2023, p. 2023.
52 For example, Surfrider Foundation and Zero Waste France, "*Les entreprises et la déplastification: Il est temps de se jeter à l'eau*", report, September 2023.
53 EpE, "Partnerships: cornerstone of the circular economy", in association with ESCP Business School, June 2021.

2

Understanding and analysing plastic pollution for more effective action

How a company responds depends on its understanding of plastic pollution, the sources of that pollution and the impact of plastic particles on human health and the environment. In this respect, businesses have two roles. One is to contribute to public research and support the actions of public authorities, experts and local stakeholders. The other is to identify the sources of plastic releases related to their activities, while improving their understanding and knowledge of the behaviour of the plastic products they market.

1 Contributing to the identification of plastics and their sources in an area

Many stakeholders believe it is necessary to increase knowledge and give greater consideration to scientific views in order to combat environmental pollution. To this end, UNEA adopted Resolution 5/8 in March 2022 seeking to establish by late 2024 an **international science-policy platform "on chemicals, waste and pollution"**[54]. The platform will follow the model of the Intergovernmental Panel on Climate Change (IPCC) and of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). Its aim will be to produce a periodic report which takes stock of global chemical pollution of the air, water, soil and living organisms. The reports will be valuable sources of information for governments, public bodies, local authorities, local stakeholders, and businesses for putting in place action plans to combat the various pollutants. Since business data is essential for the reports to be relevant, its availability will perhaps need to be ensured in the long term by regulatory means.

In its 2023 opinion, France's ESEC called for "scientific research to be placed at the core of the [international plastic pollution] treaty's governance so that decisions are based on objective, harmonised and shared data". The opinion calls for this future "IPCC for chemicals, waste and pollution" to be integrated and upgraded in the future treaty (recommendation #14)[55].

In addition to these actions which fall more within the scope of the public sector, the private-sector companies can contribute to enriching knowledge and supporting local authorities in their fight against plastic pollution. For example, CARSO group will help the Grand Est Region to draw up an inventory of the microplastics found in the region's water bodies so as to determine pollution sources and, ultimately, to implement effective prevention and reduction measures.

With regard to wastewater, the collaborative project run by Veolia in Toulon harbour has helped to identify microplastic sources, examine the typology and quantity of microplastics found there, and assess the effectiveness of treatment at wastewater treatment plants (WWTPs).

Feedback from such projects not only shows the predominant role played by local stakeholders in the fight against plastic pollution, but also helps companies to become aware of their contribution to this pollution. On this last point, RECORD[56], a network bringing together large industrial groups (EDF, Engie, GRDF, Renault Group, SNCF, Séché Environnement, Suez, TotalEnergies and Veolia), public bodies, and researchers, is building an inventory of knowledge and methodology to determine **how much industrial processes contribute to plastic pollution**[57].

Once the sources are identified, the most suitable measures (additional treatment at WWTPs, regulatory framework to limit the presence of microplastics in industrial discharges, preventive measures for users and consumers, etc.) can be put in place by local stakeholders, and by companies in their role as producers, transporters, users of plastic and/or marketers of plastic-based products.

54 For more information: https://www.unep.org/oewg-spp-chemicals-waste-pollution.
55 Roux de Bézieux (S.) and Van den Broeck (N.), "*Vers un traité international sur la pollution par les plastiques : enjeux, options, positions de négociations*", opinion of the Economic, Social and Environmental Council (ESEC), April 2023.
56 https://record-net.org/.
57 https://record-net.org/catalogue/en-savoir-plus/266.

Tracking and identifying microplastics in continental waters to determine sources and prevent releases

CARSO group, whose mission has always been to contribute to healthier world by providing advanced analytical services to its clients, has for many years been supporting regional health agencies, water agencies, and water producers/distributors/contractors such as Veolia, Suez, Saur, and many others. The results of these analyses enable stakeholders to make informed decisions on issues such as pesticide, pharmaceutical, and perfluorinated contaminations, or water potability, while assisting them with emerging issues.

Regarding plastics, the French Grand Est Region has launched a strategy to accelerate the transition towards a circular plastic economy, considering its entire life cycle, from design to use and recycling. In this context, the Region launched a call for tenders, won by CARSO group, to carry out an inventory of microplastic pollution in its watercourses. A pilot site was chosen at the Steinsau Dam for a period of 18 months.

CAR, CARSO group's local subsidiary with expertise in water sampling, will deploy a pumping system combined with cascade filtration on site and set up a Manta net system using boat towing (similar to studies conducted in coastal environments) in order to carry out additional surface samples. Its subsidiary LSEHL has developed a qualitative and quantitative analysis method using RAMAN spectroscopy and a database of aged microplastics to adapt to experimental conditions, thus increasing the precision of polymer identification. The study will allow the detection of all 11 polymers (PA, PC, PE, PET, PMMA, PP, PS, PTFE, PU, PVA, and PVC) recommended by the AFNOR XP 90-968-1:2023 standard and the annex of Directive (EU) 2020/2184 on the quality of water intended for human consumption.

Based on this assessment of plastic residues in surface waters, the Region, with the help of CARSO group, will then attempt to determine their origins. It also intends to respond by setting up awareness-raising and prevention campaigns, developing tools to address illegal dumping, and producing communication materials to facilitate the educational dissemination of information. Informing also means educating.

Steinsau Dam.
©Thomas Claude / SKY EYE

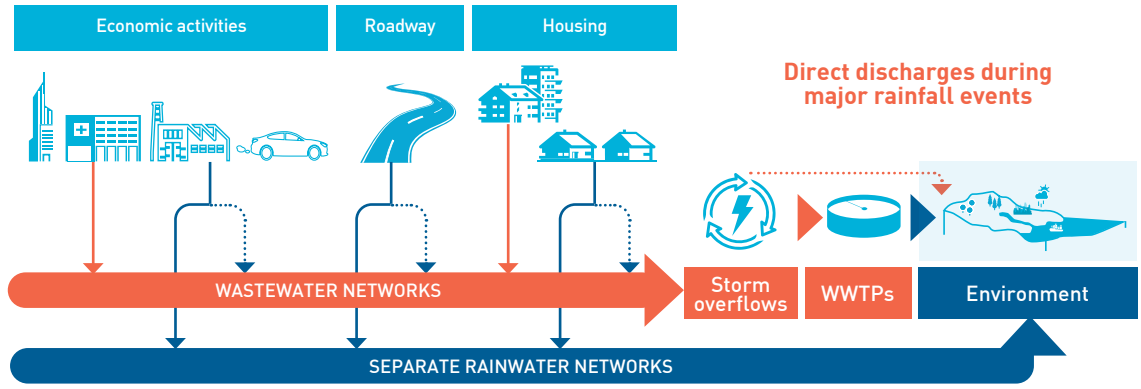
An innovative approach to diagnosing microplastic emitters in a given area

Microplastics (MP), plastic particles smaller than 5 mm and larger than 1 µm, are abundant in the environment. They are emitted from a wide range of sources linked to human activities (domestic, urban and industrial).

In order to identify these sources, Veolia set up a territorial diagnosis of microplastics and applied it to the Toulon harbour area as part of the MEDITPLAST collaborative project co-financed by the Rhône-Méditerranée-Corse Water Agency. MP and tire residues were sampled and analysed using state-of-the-art techniques in raw and treated wastewater, wastewater and rainwater networks, and in the marine environment.

The results show that:

- the nature of the economic activity has an impact on the type and quantity of MP in wastewater;
- although originally not designed to treat this pollution, wastewater treatment plants (WWTPs) are very efficient (up to 99.9% of MP removed). As a result, small quantities of MP are discharged into seawater;
- tire residues are predominant in terms of mass concentration compared with MP;
- rainwater is the main source of MP and tire residues compared with treated wastewater. For example, the studied rainwater catchment areas in the Toulon watershed (which account for only 24% of total rainfall per year) drain 17 times more PM and 12 times more tire particles annually than the discharges from three Toulon's WWTPs.



Diagnosis of microplastic emitters in a given area.
©Veolia

Managing MP emissions at source upstream of WWTPs and treating rainwater are therefore effective preventive measures for combating pollution by MP and tire residues (road washing). It is essential to include them in a global approach to this pollution.

A territorial diagnosis of MP makes it possible to identify the emitters in a given area. It is therefore an essential tool for local policies to target and prioritise the reduction solutions to be implemented. Because they know their area, and because they are responsible for the water and wastewater network, local players have a key role to play in the fight against this pollution.

2 Anticipating the environmental and health impact of plastic products put on the market

Most companies carry out studies on the products they design and manufacture before releasing them on the market in order to assess their potential health and environmental impacts. Some may also conduct further studies once their products are released on the market to confirm, invalidate or fine tune the results of the preliminary assessment in light of changes in use, new scientific and technological knowledge or the discovery of new pollutants. This is the approach adopted by BIC Group for its lighters. The studies are essential for developing suitable measures to prevent or mitigate plastic pollution.

BIC-SEA project: Analyze and understand the future of lighters at sea and their impact on the environment

Objectives

The BIC-SEA project aims to analyze and understand the future of lighters at sea and their impact on microfauna and macrofauna. The study focuses on three main aspects: abiotic degradation of plastics, biological colonization with the biodegradation, and analysis of lighter toxicity. A BIC lighter is made of polyoxymethylene (POM). Most competitors' lighters use different polymers.

Characterization of abiotic degradation

Analysis of abiotic degradation highlights the importance of ultraviolet (UV) exposure as the main factor in POM degradation.

Results: Under the action of UV, POM undergoes photo-oxidation, to decompose into CO_2 and water. Thus, after degradation (over a period of 40 to 50 years), POM almost completely disappears. The polymers in other lighters do not degrade in the same way. Cracking is observed, with the generation of microplastics and nanoplastics, but no conversion to gas.

Biological colonization and biodegradation study

This study checks if lighters can serve as carriers of pathogenic elements and assesses their potential for biodegradation at sea.

Results: POM lighters do not act as carriers for pathogens and do not undergo biodegradation at sea. After 365 days, the lighters continue to float, ensuring prolonged exposure to UV light, leading to gradual degradation.

Material toxicity

Toxicity analysis of lighters includes evaluation of the effects of each component on microfauna and macrofauna, considering interactions between the various components.

Results: Before ageing, POM has a low toxicity. However, certain dyes significantly increase the toxicity of lighters. Metals and lighter surface treatments are far more toxic than POM. The combined toxicity of a complete lighter is around 200 times greater than POM alone, due to cocktail effects between the various components.

Next steps:

1. **The Continuum project** studies the path of lighters along the land-river-sea continuum, extending research to freshwater and land. Objectives cover:
   - continuing research on the land-freshwater-sea continuum.
   - development of a predictive model for lighter diffusion along the land-sea continuum.

   Final results are pending.
2. The implementation of test results from the BIC-SEA project in industrial design and manufacturing.

Conclusion

The BIC-SEA project highlights the challenges associated with the degradation and toxicity of lighters at sea. Recommendations and future actions aim to reduce these impacts through modifications to lighter composition and better management of their life cycle. A thorough understanding of these processes is essential to develop strategies to reduce the environmental impact of these products.

As well as performing individual actions, some companies may coalesce around a common approach and set of goals to nurture knowledge in a sector, drive stakeholders to push for solutions that protect the environment and human health, and positively influence regulation. This is notably the approach adopted by the top ten global tire manufacturers as part of the Tire Industry Project (TIP)[58], which is co-managed by Michelin under the aegis of the World Business Council for Sustainable Development (WBCSD).

Research into tire wear particle emissions: an individual and collective effort by manufacturers

Tire wear particles, also known as TRWP (tire and road wear particles), are generated by friction between the tire and the road surface. This phenomenon is a physical consequence of the tire's grip on the road, and can be aggravated, for example, by driving habits, the type of road surface, and even tire pressure levels.

TRWP have been a focal point for the Michelin group for several years: in 2021, Michelin tires emitted 28% less wear particles on average than their competitors[59]. The group is continuing its research in order to reduce wear particle emissions even further and to develop new materials that are more respectful of the environment.

At the same time, Michelin is speeding up its collective research effort within the Tire Industry Project (TIP), an initiative led by the CEOs of the world's ten leading tire companies, representing over 60% of the global market, and operating under the aegis of the World Business Council for Sustainable Development (WBCSD). For almost 20 years, the TIP has been carrying out joint studies and facilitating dialogue with stakeholders on subjects such as the industry's impact on the United Nations' Sustainable Development Goals.

With regard to wear particles, the TIP is studying all aspects of TRWPs, including their emission, their potential impact, their emission into the environment, or their deterioration over time. In all these respect, tire wear particles differ from the usual microplastics from bottles, packaging, and textiles. Their study is a rapidly expanding field, which is why the TIP is continuing to fund and to freely share the studies carried out by acknowledged experts.

The TIP also undertakes partnerships to assess solutions that are capable of limiting tire emissions, or the spread of the particles once emitted.

Lastly, Michelin supports the definition of ambitious tire abrasion thresholds, in order to achieve the objectives of the Euro 7 standard for vehicles. The European tire industry is promoting alignment with the UN's testing method and future abrasion limits.

3 Calculating and reporting one's plastic footprint

In addition to assessing the impact at the product use and end-of-life stages, some players such as Nathalie Gontard[60], research director at INRAE (National Research Institute for Agriculture, Food and the Environment) and a global plastic specialist, France's ESEC, and Fondation de la Mer are calling for the adoption of the **"plastic footprint"** concept to "assess the real impact of plastic on the environment throughout its lifecycle" (recommendation #3 of the 2023 ESEC opinion). To assist them in this process, the Plastic Footprint Network (PFN)[61] seeks to harmonise plastic footprint assessment methodologies and promote the adoption and extension of a single, updated framework for assessing and mitigating the environmental impact of plastic use. Members and participants of the network include Kering, Decathlon, Ellen MacArthur Foundation, WWF, WBCSD, to name but a few.

58 https://tireindustryproject.org/.
59 ADAC, "Tyre wear particles in the environment", December 2021.
60 Gontard (N.) *et al.*, "Recognizing the long-term impacts of plastic particles for preventing distortion in decision-making", *Nature Sustainability*, 2022 (5), pp. 472-478.
61 https://www.plasticfootprint.earth/.

Reducing our plastic footprint: an achievable goal

The Fondation de la Mer has analysed sectoral roadmaps in Europe to show the way forward

In a study conducted in 2023, the Fondation de la Mer introduces the term **"plastic footprint"** to illustrate the impact we leave on Earth. Drawing from OECD data and various European Union roadmaps, the foundation demonstrates that Europeans could halve their consumption of virgin plastic by 2060.

However, achieving these ambitious EU trajectories requires rigorous monitoring and measurement tools. While companies already assess their carbon footprint and are beginning to incorporate elements related to water and biodiversity, a plastic footprint indicator could encompass the following elements:

- **single-use plastics** entering and leaving the company (such as packaging and disposable utensils);
- **plastic leakage** into the environment during product manufacturing or transportation;
- **end-of-life plastic** management: reuse, recycling, and unmanaged portions;
- **plastic lifespan:** longer product durability or reuse would improve the indicator.

Without strong commitments, the Fondation de la Mer warns of dire projections for 2060[62]: 290 tons of plastic waste would be dumped into nature every minute, with a significant portion ending up in the ocean.

The process of embedding the plastic footprint concept in companies could be speeded up by a number of European and French regulations. In particular, the **CSRD** encourages businesses to identify their use of, dependency on and risks from pollutants across their value chain (upstream as well as downstream). On microplastics, should the company believe the issue meets the "materiality" criterion within the meaning of the Directive, it would be required to meet the disclosure requirements of ESRS E2 regarding their volumes "**generated or used** in production processes or purchased, and then released from the company's facilities in the form of emissions, discharges or products, or as part of products or services"[63]. The text states that 'microplastics can be produced unintentionally as a result of wear of larger plastic articles, such as car tires and synthetic textiles, or deliberately manufactured to be added to products for specific purposes'. Companies that produce or use microplastics or those that market products or services which generate microplastics will thus have to question the materiality of this issue to their activities and, where appropriate, quantify the microplastics they generate or use.

Companies may also be required to identify environmental and health risks related to plastics and microplastics as a result of their activities under French **due diligence legislation**. For example:

- tire wear particles as well as tire end-of-life are among the environmental risks identified by Michelin in its risk mapping ("risk of air and water pollution" and "risk of our raw materials for the environment")[64];
- "Plastic: plastic waste and depletion of the resource" is one of the six main risks resulting from its activities identified by BIC Group[65]. Plastics have also been identified among the top five risks associated with the group's supply chain;
- plastic waste is included in "pollution and waste", one of the risks identified by the environmental risk mapping of Hermès International's vigilance plan[66];
- several key players from the agri-food sector have also integrated plastic into the environmental and supplier risk mapping of their vigilance plan.

Under due diligence requirements, some companies may well be required to deepen their knowledge of the quantity of plastics/microplastics they use, generate and/or release across all or part of their value chain, and of the potential impacts on the environment and human health caused by this.

62 La Fondation de la Mer, "*Vers la fin de la pollution par les plastiques dans l'océan ? Réduire notre empreinte plastique*", study, 2023.
63 Disclosure requirement E2-4 – pollution of the air, water and soils (AR 20).
64 Michelin, "*Plan de vigilance 2023*", published May 2024.
65 BIC Group, "Universal Registration Document 2023".
66 Hermès, "Vigilance plan", 2022 financial year.

Plastic reporting, therefore, is gradually increasing through regulations as well as voluntary initiatives from the private sector. For example, since 2018 the Ellen MacArthur Foundation Global Commitment[67] has enabled companies to report progress made in plastic pollution. More recently, CDP[68] published a questionnaire on the plastic footprint reduction strategy[69], to which more than 2,500 international companies have already responded.

Identifying the plastics or microplastics used, generated or released, including by accident, characterising their behaviour in nature and their impact on health and the environment, indeed calculating the plastic footprint of activities are actions undertaken by a number of companies in the search for answers to the problem of plastic pollution. Such actions may be taken prior or in addition to the development and implementation of the prevention and mitigation measures described in the next chapter.

67 https://www.ellenmacarthurfoundation.org/global-commitment-2023/overview.
68 Carbon Disclosure Project: https://www.cdp.net/en.
69 https://www.cdp.net/en/plastics.

3

Acting across the plastic lifecycle to prevent and reduce pollution

There are hundreds even thousands of different plastics whose composition and use vary from sector to sector. Some plastics are essential and without substitutes, while others may be deemed "non-essential". Not all have the same societal and environmental impact.

Plastic pollution, therefore, has to be tackled sector by sector, by type of plastic and by use, based on the common goals of restraining production and use, and transitioning from a linear production-use model to a circular economy. The ISO 59004 standard[70], adopted in April 2024, states that in the context of a circular economy "the inflow of virgin resources is kept as low as possible and the circular flow of resources remains as closed as possible in order to minimise waste, losses and discharges produced by the economic system".

As a result, EpE member companies have started to implement actions aimed at rethinking plastic production, use and consumption, reducing the environmental footprint of these materials and the risks they pose to human health, and improving end-of-life plastics.

1 Factoring plastic sufficiency into the production, use and consumption of plastics

As with all pollution, precautionary, preventive and rectification measures that combat damage to the environment and human health at source are preferable to remedial measures. Some of the first possible actions could therefore be directed at reducing the production, and/or use and consumption of plastics. Such measures are among the most difficult for companies to implement, but they are also the most effective.

1.1. Open debate on reducing plastic use and production

Many players - including the High Ambition Coalition (HAC) states, France's ESEC, the Ecological Transition Agency (ADEME)[71], and NGOs such as Surfrider Foundation, Fondation de la Mer and the No More Plastic Foundation - promote the planning and implementation of measures to cut the production and use of all plastics (whether virgin, recycled, or bioplastics) in economic activities across the value chain, as well as the application of circular economy principles. In an information note published in April 2024, ahead of INC-4, the Tara Ocean Foundation holds that a minimum 50% reduction in plastic production globally by 2040 compared to 2021, through the introduction of worldwide quotas for monomer production, could be achieved without disrupting the economy[72].

The challenge lies in rationalising the use of plastics. OPECST has proposed a list of criteria for consideration for identifying plastics whose production should be reduced: **quality** (which takes into account the toxicity of their additives), **avoidability**, **lifespan**, **risk of leakage** into the environment, and **substitutability**. The OPECST criteria could be supplemented with proposals concerning alternative products to be put on the market. Since it is important not to replace single-use plastics with alternatives that have a greater impact on the environment (due to their composition, disposal processes, or resources used for their production)[73], policymakers will need to take into account the lifecycle of those products and include consumers in the discussions[74].

70 https://www.iso.org/obp/ui/fr/#iso:std:iso:59004:ed-1:v1:fr.
71 ADEME, "*Accompagner les industriels vers le 'zéro plastique inutile'*", dossier, June 2023.
72 Tara Ocean Foundation, "International treaty on plastic pollution – Intergovernmental Negotiating Committee INC4", Policy brief, 2024.
73 Alvarez (C.), "*Alternatives au plastique : les solutions (parfois) pires que le remède*", Novethic, 12 August 2019.
74 See triangle of cooperation, p. 9 of the EpE study "Milestone 2030 of the ecological transition", December 2023.

Discussions at EpE's Health & Environment Committee with external experts have identified the following avenues for rationalising plastic use:

- preparation of a **comprehensive plastic assessment across the entire value chain** (including packaging, other plastics used, plastics used by suppliers and subcontractors) to obtain a quantified evaluation of the volumes of plastics used. The review mirrors the plastic footprint mentioned in chapter 2;
- based on this review, development of a **reduction pathway** that includes action plans and resource allocations in line with set targets, along with annual performance monitoring (similar to the business decarbonisation process).

Some companies have already put in place policies to reduce the use of plastic based on specific targets. Kering, for example, has taken action to reduce its plastic footprint at various levels.

In 2021, Sanofi took steps to remove plastic from the secondary packaging of its medicines[75], starting with vaccines[76].

Other companies are thinking about how to extend the life of their products. For example, Iliad Group has worked hard on the design and overall production process of its Freebox® in order to extend its lifespan and facilitate its repackaging and recycling[77].

KERING

Zero PVC et zero single-use plastic packaging by 2025

Kering implements an environmental strategy, reflected in its Kering Standards[78], which define its commitment to the responsible use of plastics and the reduction of microfiber emissions into the environment.

Since 2012, Kering has adopted a "zero PVC" policy and set a goal to achieve "zero single-use plastic packaging" by 2025. To this end, the group's brands are encouraged to eliminate plastic materials from packaging and prioritize alternatives such as cardboard or reusable solutions. Additionally, the group requires that the chemicals used meet strict standards (such as MRSL – Manufacturing Restricted Substances List).

Given the diversity of available alternatives, Kering regularly organizes internal working groups to discuss the challenges encountered during operational implementation, evaluate standards and certifications, and assess their environmental performance.

Microfiber pollution is a major concern, both for the environment and human health. Thus, the group has implemented measures to reduce the use of chemicals and minimize the release of microfibers in garment production processes. In partnership with The Microfibre Consortium[79], Kering participates in projects aimed at measuring, mapping, guiding, and reducing microfiber leakage levels.

Finally, through its Material Innovation Lab (MIL), Kering supports its brands in the eco-design of their products. Although synthetic materials are rarely used by the group, the MIL references solutions composed of renewable or responsible resources, such as ECONYL® and certified recycled polyester.

This approach could be adopted by all business sectors for all types of plastic. It raises fundamental questions about economic models (e.g. switching from selling products to providing services), about the usefulness of and need for certain plastics (e.g. single-use packaging), and more broadly about the environmental impacts of a product's entire lifecycle and not just its end of life. The latter point is particularly important in the search for alternatives to plastics. This thinking is fully embedded in the ongoing work carried out by many companies particularly in connection with their CO_2 emissions and the environmental footprint of their product and innovation portfolio.

75 The outer or secondary packaging contains the medicine, the primary packaging (in direct contact with the product), and the instructions for use.
76 L'Usine Nouvelle, "*Emballage : Sanofi se veut pionnier du sans plastiques à Val-de-Reuil*", 15 November 2023.
77 https://www.iliad.fr/fr/actualites/article/economie-circulaire-le-groupe-iliad-agit.
78 https://www.kering.com/api/download-file/?path=KERING_STANDARDS_V6_0_FR_230e151a7e.pdf.
79 https://www.microfibreconsortium.com/.

For example, in the automotive sector Renault Group launched the Zity car-sharing service in 2017[80] and continues to examine mobility solutions through a dedicated entity, Mobilize, which it set up in 2021[81].

Imerys, on the other hand, has carried out a comparative lifecycle analysis (LCA) of perlite and kaolin, two minerals used in cosmetics as substitutes for plastic microbeads and microplastics respectively. The findings show that, for most environmental indicators, the use of minerals has a smaller impact than plastic on climate change and in particular fossil resource depletion[82].

Other companies have begun to develop alternatives to the throwaway model. For example, the startup Kokpit (now Atelier des Langes), winner of the 2022 EpE Young Environment Award, offers parents a service to supply and clean washable diapers. Workshops are also being organised to raise awareness about alternatives.

Amalthéa offers cosmetic products in reusable and refillable containers.

Some companies are focused on pooling their resources. In Germany, food brands have agreed to use identical returnable glass jars, which has helped increase the volumes produced and used, optimise logistics, and reduce costs.

Investors, too, have a signifcant role to play. In 2023, a plastics initiative by the Dutch Association of Investors for Sustainable Development (VBDO), comprising over 185 investors ($10,000 billion in assets), issued a joint statement calling on companies to adopt a more radical approach to reducing their reliance on plastics[83].

The desire to reduce plastic use and production has also been supported or encouraged in recent years by various pieces of European and national legislation dealing directly or indirectly with this issue (see chapter 1).

More specifically, reduction obligations or even bans on use, target the issue of packaging plastics, single-use plastics and intentionally added microplastics.

There are several ways to reduce the use and production of certain plastics:

- **learning to do without single use.** This does not mean substituting plastic with another single-use material such as paper or cardboard which also cause environmental and human damage. Rather, it involves investing in solutions that call into question all levels of linear automation (produce-use-throw) from design and production to logistics and distribution. In the food sector, for example, bulk and reuse are promising solutions;
- **learning or encouraging pooling.** Pooling food containers would allow them to be used by all brands, thus reducing the costs to produce and reuse them. The search for common solutions enables companies to identify measures that are easier to implement. Thus, the role of partnerships is crucial for developing new types of models[84];
- **identifying and using alternative materials to plastics** which have a lower environmental and health impact across their lifecycle. For instance, making analogous materials from seaweed or banana skins;
- **choosing the right monitoring tools** that factor in the total amount of plastics used and track clear, time-bound reduction targets;
- **supporting appropriate and ambitious regulations** under which all players have the same obligations.

Action by businesses and public authorities will be effective only if consumers accept the called-for cuts and adapt their behaviour and practices. It is essential, therefore, to bear this in mind when introducing new measures.

1.2. Raising awareness, informing and encouraging consumers to move towards plastic sufficiency

Individuals do not lack the means to limit plastic pollution at their own level. In choosing the services and products they buy, their lifestyles, or their direct relationship with marketers, individuals and consumers can influence businesses, gear themselves up to cut their use of plastics and, at the very least, reduce their impact on the environment by accepting the changes and restrictions proposed by companies.

Consumers can also opt for bulk products rather than packaged ones, use reusable containers, favour repairs, buy second hand, extend the life of their furniture, clothes and decorative objects, manufacture their own hygiene and maintenance products[85], and more.

80 https://zity.eco/en/.
81 https://www.mobilize.com/.
82 https://www.imerys.com/product-ranges/imercare-blur.
83 VBDO, "Call on investors: sign our investor statement on plastics", 28 March 2023.
84 EpE and ESCP "Partnerships: cornerstone of the circular economy", June 2021.
85 For example: Dupuy (C.) and Terreur Graphique, "Plastic Tac Tic Tac", 2022.

A plethora of alternatives to plastics, in particular single-use plastics, and plastic footprint reduction solutions exist, but their adoption is hampered by several obstacles:

- cost: repair, for instance, can be more expensive than buying a new product;
- appeal: second-hand goods can still have negative connotations, especially as gifts;
- constraints: for example, to switch to bulk, washable diapers or manufacturing one's own hygiene and maintenance products requires a fair amount of logistics and behavioural changes;
- insufficient knowledge of alternatives.

Consumers and individuals alike thus need to be informed of the existence of alternatives, made aware of these approaches, and even supported in the transformation of their habits. Businesses have a role to play not only by marketing the new products or services, but also by gearing their marketing and communication campaigns towards making these alternatives more attractive. To this end, the digital product passport, which will be mandatory from 2026 for some 30 product categories including textiles and plastics, will provide valuable information on the sustainability and circularity of products. The Green Claims Directive, currently under discussion[86], will prevent misleading claims about the environmental footprint of certain products and/or their circularity. Businesses could also organise workshops on their own to make consumers aware of the alternatives they offer, or even consult their customers on the most attractive alternatives.

Local initiatives such as the Zero Waste Family[87] have also emerged, providing people with access to documentation, workshops and conferences to support them in this transformation. Lastly, local authorities, because of their proximity to inhabitants and the household waste management services they deliver to them, have a crucial role to play in raising public awareness and urging people to question their habits and what they buy so that they produce less waste. By way of incentive, Suez is offering local authorities new types of contracts no longer based on the volume of waste collected, but on reduction targets.

© Zero Waste Family

86 The EU Council adopted its position on 17 June 2024 based on the Green Claims Directive, paving the way for trialogue negotiations over the coming months.

87 https://www.famillezerodechet.com/.

From volume to value: a paradigm shift with waste management performance contract

While an average French person produces 582 kg of waste every year[88], waste prevention is a key environmental challenge for local authorities. To reach a target of 15% less household waste produced by capita by 2030 than in 2010, the economic model for waste management needs to evolve. That is the objective of **waste performance contracts** designed by the French Agency for Ecological Transition (ADEME). They rely on a collaborative approach between local authorities and operators, allowing to **move from a focus on tons collected to targets for reducing the volume of residual household waste**, thus reversing the model and the economics of the contract.

From 2022, SUEZ has been implementing this model with Greater Montauban area. The municipality has set itself the target of reducing the amount of household waste produced in the area by 10% by 2028. SUEZ has committed to reduction targets of -12% for household waste, -35% for bulky waste, -15% for green waste and -2% for selective packaging collection.

It is a **new model of waste prevention, and of an eco-responsible economy of use rather than consumption,** leading to **reduce waste production at source** as well as **improve sorting and recovery, especially for plastics**. Several actions are being implemented:

- awareness-raising campaigns to help citizens sort their waste. The "Mon Service Déchets" app provides residents with easy access to information on waste management and offers tips on how to sort and reduce waste;
- support for the creation of a recycling center to encourage donation and reuse;
- collection and recovery of biowaste;
- removal of illegally dumped waste.

After Montauban, which was the first reference, Limoges, La Rochelle and Nîmes have chosen to switch to this new business model. In Limoges, to take things a step further, the smart waste meter designed by SUEZ, will be deployed and tested by 2025 in three sectors of the urban area, involving 15,500 households. This first innovative initiative launched on the 16 December 2022 will lead **to track, objectivize and anticipate waste production by users** thanks to electronic chips installed on their bins. The data collected will be used by Limoges not only to inform citizens on their waste production but also to fine-tune awareness campaigns while focusing on areas that need improvement. Last but not least, in the UK, SUEZ, as the contractor for Greater Manchester's waste and resources management services, has committed to the delivery of 54 social value commitments as well as improving the recycling rate and reuse by creating a dedicated platform, the Renew Hub[89].

Awareness-raising campaign for the Greater Montauban waste management performance contract.

In controlling the production of plastics and/or products containing plastic released on the market, companies are key players in the fight to reduce the pollution caused by these materials. It is up to them, individually or collectively, to invent the business models that will make cutting plastic production profitable. If necessary, they can solicit the cooperation of public authorities.

Individuals can also contribute to this fight through their consumption choices and sorting actions. However, not all plastics can be removed and/or replaced. This means action must be taken at other levels to reduce their impact on health and the environment.

88 Source: French Agency for Ecological Transition (ADEME).
89 https://www.suez.co.uk/en-gb/our-offering/success-stories/our-references/the-renew-hub-delivering-re-use-on-an-industrial-scale.

2 Reducing the environmental footprint and health impact of plastics

Due to their special properties, not all plastics are replaceable and sometimes an alternative may have if not a greater then at least an equivalent impact on human health and the environment[90]. That is why the fight against plastic pollution is leading to thinking and action to reduce the environmental and health footprint of these materials at all levels. How do companies integrate these considerations into plastic design and production? What actions and ideas do they implement to limit plastic leakage to the environment?

2.1. Designing more environment-friendly plastics

The integration of environmental considerations into the design stage of a product or service, otherwise known as **eco-design**, is the prime driver across all business sectors, particularly in the field of plastics[91]. According to France's Ministry of Ecological Transition and Territorial Cohesion, eco-design "consists in integrating environmental protection into the design of goods or services. It aims to reduce the environmental impacts of products across their lifecycle, from raw material extraction to their production, distribution, use and end of life"[92]. The ideas discussed in the previous section on the use of alternative materials form part and parcel of this approach.

Several solutions have been identified to reduce the environmental footprint of plastics, including their **carbon footprint**.

1) Lightweighting products released on the market by reducing the amount of plastics used and/or changing the type of plastics used. This has in fact been practised for many years in PET water bottles. Over the last 25 years, they have been lightened by about 40% without reducing their performance.

The carbon footprint of plastics can also be reduced by **limiting the amount of virgin fossil fuel polymers used**, as BASF and TotalEnergies have done.

2) Switching to **bio-based polymers**, i.e. polymers made up of at least 25% of products derived from biomass (cane sugar, corn starch, potato starch, etc.). Employing such plastics would help reduce the amount of primary fossil fuel feedstocks used.

Yet only 1% of polymers today come from biomass. There are three major obstacles to the development of bio-based plastics:

- with a few exceptions (biodegradable plastics), they have the same lifespan and degradability as fossil fuel polymers once released into the environment. Moreover, the same additives can be found in them;
- their manufacture raises questions over the production and use of their feedstocks: deforestation, competition with the food and energy sectors, soil pollution, water use, etc.;
- they cost much more and the market is not ready for a change in business model.

That is why product lifecycle analysis, the development of suitable systems and thinking on biomass governance[93] need to be factored in to avoid unwanted edge effects. In response to these challenges, several projects have emerged, including the Ecobiocap programme[94] to manufacture food trays on a semi-industrial scale using a biopolyester matrix from industrial effluents. Similarly, the Bio-Speed consortium[95], which was launched in 2014 and comprises Forvia, Michelin, BIC, Lego, Danone and L'Oréal, aims to step up the development of technologies for producing bio-based materials.

3) Using **recycled raw materials (RRMs)**. This would help reduce GHG emissions by between 75% and 92% compared to virgin plastics. The Circular Plastic Alliance's 2025 target of incorporating 10 million tonnes of recycled plastics would avoid 20 million tonnes of CO_2 equivalent compared to virgin plastic. Manufacturing plants often combine these three solutions (lightweighting, biosourcing, and RRM use).

90 For example, PFAS substances have been found in paper and bamboo straws, common alternatives to plastic straws, which makes them just as polluting for the environment and harmful for health: *https://www.radiofrance.fr/franceinter/des-polluants-eternels-decouverts-dans-la-plupart-des-pailles-en-papier-et-bambou-selon-une-etude*-1465622.

91 The AGEC anti-waste and circular economy law also requires marketers to draw up a five-year prevention and ecodesign plan (PPE) and submit it to the eco-body in charge of the EPR scheme concerned.

92 https://www.ecologie.gouv.fr/politiques-publiques/leco-conception-produits#.

93 On this point, see Tutenuit (C.) and Férey (P.), "*Quels besoins de gouvernance pour les différents usages de la biomasse ?*", ESEC opinion of 24 May 2023.

94 INRAE, "*Nouveaux emballages alimentaires à base de déchets agro-industriels*", 23 May 2016.

95 EpE, "Partnerships: cornerstone of the circular economy", in association with ESCP Business School, June 2021, p. 30.

Circularity of plastics: actions and ambitions

Faced with the environmental challenges posed by certain plastics, BASF intends to reduce or limit their use, and encourage their reuse and recycling. In short, to achieve a circular economy for plastics.

Chemicals are upstream of 96 % of European manufacturing production. Its innovations therefore play a key role in transforming the value chains of the sectors it serves, such as cosmetics, healthcare and the automotive industry.

BASF has therefore incorporated circular economy objectives into its roadmap and is developing a portfolio of solutions adapted to the entire life cycle of these materials, from their sourcing to their recycling, via their production:

- **biosourcing:** since 2013, BASF has been marketing the patented Genomatica process, which enables the production of high-quality sugar-based textile fibers, replacing polyester fibers, which are more difficult to recycle. For industrial applications, BASF has also developed Elastollan® N, a biosourced thermoplastic polyurethane. With these two processes, BASF is reducing its need for fossil raw materials;
- **incorporation of renewable raw materials (RRM)**: BASF's Biomass Balance (BMB)[96] approach enables RRM to be blended with materials of fossil origin, without impairing the technical quality of the products while reducing their environmental impact. For example, some plastics are manufactured using materials derived from **biomethane** from recycled waste, thereby reducing greenhouse gas emissions. In addition to the 1.2 million tonnes of RRM already in use, BASF aims to process 250,000 tonnes of **waste-based** RRM every year from 2025 onwards;
- **biodegradable plastics:** they offer solutions for a wide range of applications for industry and consumers alike. BASF has developed Ecovio® bioplastic, a polymer grade derived from Ecoflex® and composed mainly of polyactic acid (PLA), derived from corn starch. Certified compostable and biosourced, Écovio is used in France for mulching film. Its decomposition time is equivalent to that of a banana peel, i.e. four weeks;
- **extending the lifespan of plastics:** BASF compares the properties and environmental impact of all materials to select those best suited to their intended use. For example, BASF uses polyurethane elastomers (TPU) in the design of flexible hoses, giving them high resistance to abrasion[97];
- **chemical recycling:** BASF has been developing chemical recycling techniques for over 30 years, notably through the ChemCycling™ project.

The challenges raised by the circular economy are not confined to the recycling of raw materials: BASF is committed to new models of growth, and to a circular economy integrated at all levels. The Group's products are now designed to save energy, virgin resources and fossil fuels, and support customers' circularity paths.

96 By convention, the BMB approach assigns the biomass in a reactor to the by-products that best valorise this origin.
97 https://plastics-rubber.basf.com/global/en/performance_polymers/industries/pp_automotive/products/elastollan.html.

Developing a circular economy for plastics

Setting up circular loops helps to reduce the environmental footprint of plastics through appropriate end-of-life management. By giving value (as a raw material) to waste, recycling helps to reduce resource extraction by keeping plastics in the production/use cycle that would otherwise be incinerated, landfilled or escaping into the environment, particularly in less developed countries.

TotalEnergies offers its customers the **RE:clic range of circular polymers**:

- **RE:use,** polymers containing mechanically recycled plastic from end-of-life consumer goods and industrial waste;
- **RE:build,** polymers manufactured by chemical recycling, which converts waste materials that cannot be mechanically recycled into raw materials. Chemically recycled polymers have properties identical to those of virgin polymers, making them suitable for the most demanding applications, including food contact;
- **RE:newable,** polymers derived from bio-based products such as vegetable oils and used edible oils. Produced from ISCC PLUS-certified renewable raw materials, these polymers reduce the carbon footprint of final products.

By 2030, TotalEnergies aims to produce 1 million tons of circular polymers per year.

TotalEnergies also works with its stakeholders to reduce the global footprint of plastics:

- development of solutions designed to reduce the amount of material needed for packaging and enable recycling of plastic waste at the end of its life;
- participation in the **Operation Clean Sweep® (OCS) program**, aimed at eliminating any risk of plastic pellets being lost to the environment. The OCS program includes independent third-party certification of the processes put in place to prevent losses. TotalEnergies aims to have all its sites in Europe and the USA OCS-certified by 2024 and is committed to having all new sites certified within two years;
- support for regulatory initiatives such as the ban on certain single-use plastic applications, or the International Maritime Organization (IMO) circular aimed at reducing the risk of losses in the oceans.

Many companies are working to incorporate recycled plastics into new products. For example, Patagonia, Ecoalf, and Adidas are transforming some plastic waste into clothing (e.g. 15 plastic bottles to make a fleece).

In Europe, however, less than 10% of recycled plastics are incorporated into production, the main user being the construction industry. A major stumbling block is the persistence of too many constraints:

- **lack of local** circular economy sectors;
- the **cost of RRMs** compared to virgin plastics. The market is extremely competitive, with the cost of petro-sourced plastics being highly volatile, unlike recycled plastics which have stable though high prices. The challenge is even stiffer because as citizens people demand recycled products, but as consumers they are often reluctant to pay more;
- **regulatory requirements**, in particular for packaging coming into contact with food. Two regulations identify the components allowed in plastics (whether virgin or recycled) and establish migration levels to food, with limits being set for each substance. Depending on the type of polymer used, these standards can be more or less difficult to apply (different barrier properties and migration coefficients). Other criteria too have been set. In the case of PET, for example, at least 95% of incoming waste must be from food PET;
- **the heterogeneity of the incoming plastic waste stream** and therefore of the quality and composition of RRMs. For this reason, Forvia created MATERI'act[98], its dedicated sustainable materials subsidiary tasked with reducing CO_2 emissions from the group's products by up to 85%. The key drivers studied include recycled plastic integration and biomass use. Thanks to this facility, Forvia can guarantee the performance of automotive parts produced from renewable raw materials;
- the issue of **inherited substances** present in recycled plastics which can be toxic to human health. This was particularly evident in certain additives found in children's toys that had been derived from the incorporation of RRMs[99];

98 https://www.materiact.com/fr.

99 For example: Guzzonato (A.) *et al.*, "Evidence of bad recycling practices: BFRs in chlidren's toys and food-contact articles", Environmental Science, 2017, Vol. 7, pp. 956-963.

- the **carbon footprint of recycled plastics** can at times be greater than that of virgin fossil fuel polymers. For example, in late 2023 Lego Group announced that it was eliminating the use of PET recycled from bottles to manufacture its products because, according to Tim Brooks, Vice President in charge of sustainable development at the Group, "it would otherwise have resulted in higher carbon emissions over the life of the product"[100]. The carbon costs of collecting diffuse waste is the main driver here.

In these circumstances, regulations can be a powerful tool. The first mandatory requirements on the use of RRMs in packaging will come into force in 2025, forcing recycled plastic streams to be channelled into packaging.

While recycling is essential to the circular economy, it is only a catalyst for supplementing actions to promote sufficiency, reduce consumption, and ensure eco-design for products and services placed on the market. In fact, all actions related to plastic eco-design go beyond carbon footprint reduction since they help cut the quantity of resources used, limit the intentional addition of microplastics, prevent product degradation into microplastics (see boxes BIC, p. 25 and Kering, p. 31), extend the lifespan of products, and reduce the impact of their chemical compounds on the environment by removing problem additives. This last point is at the core of the International Plastics Treaty negotiations because, beyond its environmental benefit, this measure would also protect human health.

2.2. From eco-design to "safe and sustainable by design"

In its opinion of April 2023, France's ESEC proposed to ban **groups of additives that are toxic and harmful to health and the environment** (recommendation #9). The HAC states talk about "guaranteeing design criteria and standards for plastics to ensure sustainability, recyclability and safety, thus enabling a circular economy for plastics that protects the environment and human health"[101]. In May 2023, UNEP published the Chemicals in Plastics technical report which provides an overview of the chemicals found in plastics and their impact on human health and the environment, while proposing a series of remedial measures[102].

In this context, it would be useful for businesses to factor in the concept of **essential use**. This concept, defined in 2024 by the European Commission but yet to be incorporated into a normative text, would make it possible "to assess whether it is justified, from a societal point of view, to use the most harmful substances". The Commission continues that "the use of a particularly harmful substance is essential for society if both of the following criteria are met: 1) such use is necessary for health or safety, or critical for the functioning of society, and 2) there is no acceptable alternative"[103]. Use may be deemed essential when "the technical function of a substance is critical for the provision of infrastructure, services or maintenance – e.g. energy conversion, mobility, transport, healthcare, digital technologies or services – or for the provision of infrastructure and equipment needed to ensure the defence and security of society".

The essential use concept thus raises a number of questions. For example, adding PFAS to plastics can make them extremely resistant and therefore reusable, yet these substances are criticised today for the environmental and health risks they pose.

Eco-design is gradually evolving into the **"safe and sustainable by design"** concept, which aims to factor in both environmental protection and human health[104]. On 8 December 2022, the European Commission published a recommendation on establishing a European assessment framework for "safe and sustainable by design" chemicals and materials[105].

This voluntary action-oriented approach aims to:

- steer the innovation process towards the green and sustainable industrial transition;
- substitute or minimise the production and use of substances of concern in line with existing and upcoming regulatory obligations (e.g. REACH);
- minimise the impact on health, climate and the environment during sourcing, production, use and the end of life of chemicals, materials and products.

All these developments are part of a broader ongoing discussion taking place on a global scale. In 2023, a new roadmap for global chemicals management was adopted in Bonn[106]. This new international framework calls for a transition to safer and sustainable chemical alternatives, responsible chemicals management in certain

100 Fabre Soundron (M.), "*Lego abandonne le plastique recyclé car il augmente ses émissions de carbone*", Novethic, 25 September 2023.
101 https://hactoendplasticpollution.org/fr/.
102 https://www.unep.org/resources/report/chemicals-plastics-technical-report.
103 European Commission, "Guiding criteria and principles for the essential use concept in EU legislation dealing with chemicals", Commission Communication C/2024/2894, 26 April 2024.
104 European Commission, "Safe and sustainable by design".
105 https://eur-lex.europa.eu/legal-content/FR/TXT/PDF/?uri=CELEX:32022H2510.
106 https://www.chemicalsframework.org/.

sectors (industry, agriculture, health, etc.), and **improved transparency and accessibility of data** on those products and their risks. At the same time, the conference adopted the Bonn Declaration for a planet free of harm from chemicals and waste, in which members commit themselves to "preventing exposure to harmful chemicals, phasing out the most harmful ones where appropriate, and enhancing the safe management of such chemicals where they are needed"[107].

In the same vein, a collective of organisations brought together by Veolia since 2021 published in January 2024 a note calling for action to implement sustainable and responsible chemistry through a **"chemical transition"**[108]. According to the 40 contributors (chemists, industrial corporates, NGOs, financial players, representatives of public authorities, citizens etc.), sustainable chemistry is a pillar of the ecological transition. For the working group, Veolia has developed the SPC (supply – depollution – circularity) tool which aims to facilitate the adoption of a systemic approach to chemistry (Figure 3).

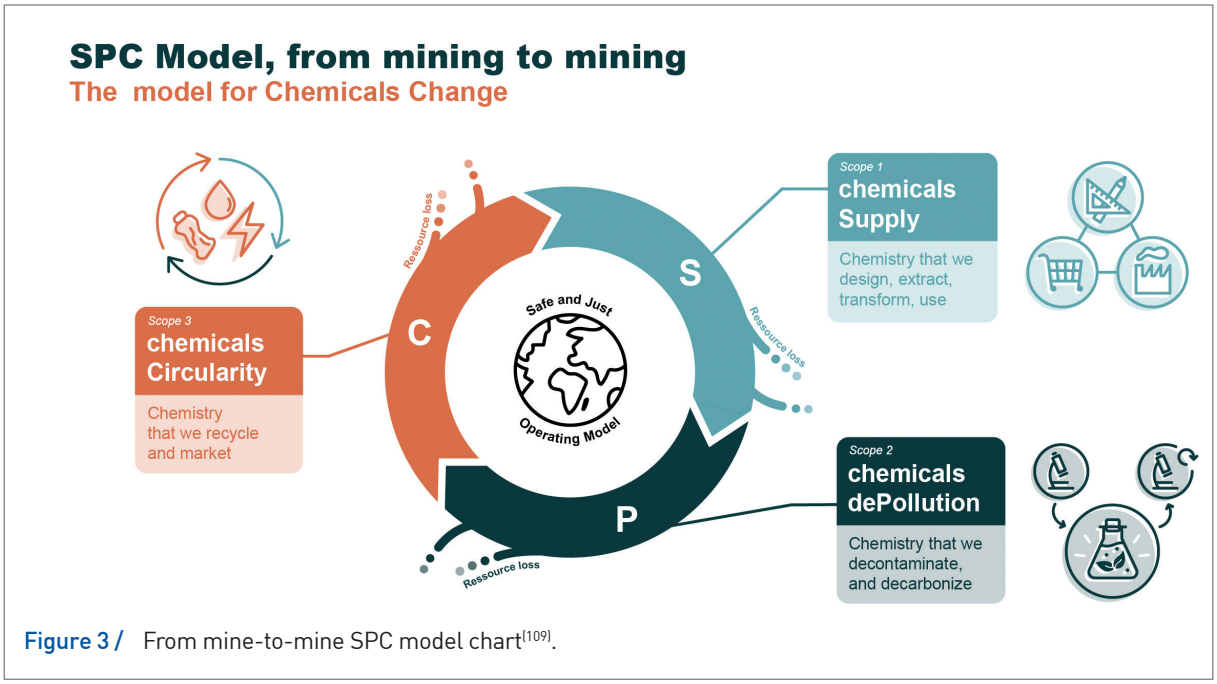


Figure 3 / From mine-to-mine SPC model chart[109].

The last few years have seen the emergence of several initiatives:

- in Europe, as part of the Green Deal and the EU Chemical Transition Pathway;
- in the United States, with notably Change Chemistry[110];
- other discussions on traceability and transparency (e.g. digital product passport), chemical footprint based on Veolia's SPC model, polluter pays principle, etc. In 2023, 50 institutional investors and their representatives, managing or advising on assets worth more than $10,000 billion, launched an initiative to address health and environmental issues related to the use of harmful substances. The Investor Initiative on Hazardous Chemicals (IIHC) encourages manufacturers to increase transparency and stop producing forever chemicals[111].

The global chemicals movement could, in the long run, have an impact on additives found in plastics, and more generally on global plastic production. Consequently, some EpE member companies have also begun to address these issues (see BIC p.25 and Kering p.31 boxes).

107 https://www.chemicalsframework.org/bonndeclaration.
108 https://www.soscience.org/chimie-durable-transition-industrielle-ecologique/.
109 SoScience, Attali Associates and Veolia, "*La transition chimique. Une proposition globale pour accélérer la transition industrielle et écologique*", collaborative memo, December 2023, p. 37.
110 https://member.changechemistry.org/about-us.
111 ChemSafe, "Investors launch initiative to tackle chemical pollution crisis", 14 February 2023.

2.3. Preventing plastic leakage and releases into the environment

In addition to the measures developed so far, the prevention of plastic pollution involves limiting plastic discharges into the environment. Containing leakage encompasses design (reducing or eliminating addition of microplastics to certain consumer products), end of life (discussed in the next section), and use, while limiting the release of plastic pellets into the environment involves both production and transport.

The AGEC law of 2020 and its implementing decree of 2021 provided for measures to be put in place at facilities producing, handling and transporting industrial plastic pellets to prevent the risk of their dispersion in the natural environment. While necessary, these measures are only national in scope and do not solve the problem.

The issue of plastic pellets or "mermaid tears" found on beaches, among others, is a growing concern for the public and government authorities. In France, this is evidenced by the increasing number of complaints filed by elected representatives of coastal areas and local water and natural habitat pollution associations. Their aim is to identify the origin of these nurdles and prevent intentional or accidental spills. In early 2023, France's Ministry of Ecological Transition and Territorial Cohesion launched a procedure to this effect.

Since 1991, various companies in the plastics sector have set up the international voluntary initiative, **Operation Clean Sweep** (OCS)[112]. Supported by PlasticsEurope[113], this voluntary charter offers a toolkit of best practices to prevent accidental pellet pollution, based on six commitments:

- improve the organisation of facilities to prevent and treat spills;
- create and publish internal procedures to achieve zero loss of industrial plastics;
- train employees and hold them accountable for the prevention, containment, clean-up and disposal of spills;
- make regular performance audits;
- comply with all applicable local and national regulations on the containment of industrial plastics;
- encourage partners (contractors, carriers, distributors, etc.) to pursue the same aims.

In 2022, PlasticsEurope and EuPC[114] developed, in consultation with certification bodies, experts, professional associations, NGOs and policy makers, the **OCS Europe certification scheme**. The aim of this project is to monitor and document company compliance across the plastics supply chain with the requirements for preventing plastic pellet losses to the environment, based on the six commitments of the OCS initiative. Many companies, such as TotalEnergies (see box, p. 37) and Arkema, have undergone this certification.

Committed to ocean protection, in 2019 AXA partnered with Cedre, an international centre of expertise in combating accidental water pollution, to offer the latter's industrial pollution management expertise to all its policyholders. Cedre is currently working on a guide, co-funded by AXA and TotalEnergies, on the prevention of accidental nurdle spills.

112 https://www.opcleansweep.eu/.
113 Association representing plastic manufacturers in Europe.
114 Association of European Plastics Converters.

Preventing pollution by plastic pellets to preserve oceans and aquatic environments

As an insurance company, AXA recognises the crucial role of the oceans and the importance of preserving them to mitigate the effects of climate change. Protecting them ensures the sustainability of natural resources, prevents environmental damage to property and communities, aids in the energy transition efforts, and provides economic stability. While the oceans are essential for global trade, providing shipping routes for vital resources, any negative impact on ocean health induced by such activities, such as pollution or habitat degradation, can have significant economic impacts, including potential liabilities for insurance companies.

One of the threats to the oceans is plastic pollution. According to the WWF, if global plastic production doubles by 2040 as projections suggest, plastic debris in the oceans will quadruple by 2050. At this rate of growth, plastic pollution will lead to significant ecological risks in many marine areas. Some plastic pollution hotspots, such as the Mediterranean, the East China Sea, the Yellow Sea, or the Arctic Sea ice, are already exceeding the ecologically hazardous threshold for microplastic concentrations.

Since 2019, AXA has partnered with Cedre, an international centre of expertise in the fight against accidental water pollution. This has allowed AXA to use their more than 40 years of expertise to support policyholders. More recently, AXA teamed up with Cedre to help finance the development of a prevention guide on plastic pellet (nurdles) pollution for impacted industries.

Plastic pellets are a major source of microplastic pollution, with around 230,000 tons of plastic pellets ending up in the oceans every year. They are often released into the environment due to mishandling throughout the supply chain. As a result, they are increasingly littering beaches around the world, as well as suffocating the seabed, and being mistaken for food by marine life. These plastic pellets cause as much damage as oil spills but are still not being classified as dangerous.

While the scale and impact of plastic pellet pollution is serious, the problem is entirely preventable. By distributing this plastic pollution prevention guide developed by Cedre to its policyholders, AXA will be able to raise awareness throughout the value chain, helping stakeholders prevent the risks associated with plastic pellet pollution.

Microplastic beads harvested in just a few hours on an Atlantic beach.
© Sciences et Avenir

Improving Response to Accidental Releases of Industrial Plastic Pellets

In the dual context of ongoing negotiations for the development of a binding international treaty aimed at reducing plastic pollution, and the regular and widely reported observations of their arrivals on coastlines, industrial plastic pellets represent a significant environmental issue. This polymer material, produced in the form of powders, granules, or flakes, is used as an intermediary in the manufacturing of plastic products. Associated with ever-increasing production and consumption, pellets are now transported in large quantities by land and sea worldwide.

In recent years, several significant maritime accidents (notably the sinking of the X-Press Pearl in 2021 in Sri Lanka, for which Cedre[115] participated in a UN-led assistance mission[116]) have resulted in the release of large quantities of pellets into the sea, highlighting the new challenges posed by these products. Due to their small size (typically 3-5 mm), their number (approximately one million pellets per 25 kg), and their lightness (most of the pellets produced float), they have a high capacity for dispersal in the environment, making their recovery complex, tedious, and costly.

Cedre, an international expertise center in response to accidental water pollution, has been working for several years on the issue of pellet pollution to improve knowledge and clean-up practices in case of accidental spills. To this end, significant scientific and technical watch has been conducted, behavior studies have been carried out, chemical and toxicity analyses have been performed, and recovery equipment have been tested in Cedre's experimental facilities, which are specially adapted to prevent any release into the environment.

The expertise developed by Cedre is made available to authorities, industry, and international bodies (e.g. International Maritime Organization, OSPAR Convention, Bonn Agreement) with which it collaborates. Currently, Cedre continues its work by preparing an operational response guide for pellet releases, whether on industrial sites or in the environment. This good practice guide will be available at the end of 2024 in both French and English, to assist the various stakeholders involved in responding to pellet releases into the environment[117].

Release of pellets in Cedre's experimental area to study their behavior and test recovery techniques.
©Cedre

115 https://www.cedre.fr.
116 https://www.cedre.fr/Ressources/Accidentologie/Accidents/X-Press-Pearl.
117 For more information: Cedre Information Bulletin n°. 45, https://www.cedre.fr/en/Resources/Publications/Cedre-Information-Bulletin/n-45.

In addition to nurdles, there are textile microfibres (see Kering box, p. 31), plastic microbeads in certain cosmetics, tire wear particles (see Michelin box, p. 26) and biomedia.The latter are plastic brackets used in wastewater treatment plants to culture bacteria active in biological wastewater treatment. However, as point source or chronic discharges of biomedia into aquatic environments have been observed in Europe since 2010, mechanisms have been developed to help companies prevent and reduce such discharges[118].

For a more cross-cutting approach, the **Plastic Leak Project** (PLP)[119] offers a science-based methodology to map, measure and predict plastic leakage across the value chain. The project, led by Quantis and Environmental Action[120], is based on a partnership with 35 public, private and scientific organisations such as WBCSD, Citeo, PlasticsEurope, Adidas, Decathlon, and WWF among others. The PLP recently brought out a methodological recommendations guide for companies to support them in the implementation of effective strategies and actions against plastic leakage.

Similarly, in 2021 Fondation de la Mer and Bureau Veritas, with the support of France's Ministry of the Sea and a contribution from Engie, introduced the **Ocean Approved®** label to recognise companies' commitment to factor in and improve their impact on the ocean[121]. This certification implements the ten ambitions of UN Sustainable Development Goal (SDG) 14 related to aquatic life. Actions undertaken by companies, in particular to prevent and reduce all types of marine pollution, including from plastics, are assessed - and recognied as a best practice by the UN.

3 Optimising end-of-life plastic management

To limit the release of plastic waste directly into nature, the first priority is to prevent waste generation and collect the waste produced. Subsequently, the focus is on recovery of the waste collected in line with circular economy principles and the waste management hierarchy[122]. This includes, in sequence, material recovery (recycling and composting), energy recovery (incineration and methanisation) and, as a last resort, disposal by incineration (without energy recovery) or landfilling.

Optimising management of their end of life thus involves accelerating the production of recyclable or biodegradable plastics, implementing and mobilising the necessary systems and technologies to collect and recycle waste, and preventing their export to third countries that do not have the technical and organisational resources to manage them. The last section describes the actions taken by EpE member companies on each of these three fronts.

3.1. Designing plastics for their end of life

Eco-design focuses on the entire lifecycle of a product to reduce its environmental footprint. It therefore focuses as much on reducing the environmental impact of plastics during their production and use, as it does on their end of life. In fact, depending on the type of polymers and additives used, plastic waste is more or less easily recovered. The way it is managed thus affects its environmental footprint.

Aware of the challenges associated with the recovery and disposal of plastics, companies such as BASF (see box, p. 36) have begun to design **biodegradable polymers**. These plastics are classified in the category of "bioplastics" next to bio-based polymers. Biodegradable plastics, which may also be biobased, are designed for degradation by micro-organisms under certain conditions, thus reducing, in theory, their persistence in nature.

There are, however, a number of limitations:

- at present most biodegradable plastics put on the market can be degraded only in industrial composters[123], which not all local authorities possess, or under conditions that are not profitable for composting plants;
- due to their biodegradability, such plastics cannot be recycled and therefore many end up being incinerated;
- it has not been demonstrated that such plastics, when present in natural environments, have a smaller environmental impact than others.

118 Surfrider Foundation Europe, "*Pollution des plages et des cours d'eau par les biomédias, utilisés dans le traitement des eaux usées*", 2nd edition, December 2023.
119 https://quantis.com/fr/nos-clients/notre-impact/initiatives-en-developpement-durable/plastic-leak-project/.
120 US non-profit environmental defence organisation: https://environmental-action.org/.
121 https://www.bureauveritas.fr/besoin/label-ocean-approvedr.
122 Hierarchy defined by directive 2008/98/CE of the European Parlement and the Council relating to waste dated 19 novembre 2008.
123 For example: ADEME, "*Biodégradabilité en compostage domestique et industriel des sacs plastiques biodégradables en compostage domestique et des sacs en papier*", final report, April 2019.

The development of biodegradable plastics is thus a solution for non-replaceable plastics in addition to eco-design and prevention, but should not be seen as a complete solution because it addresses only partially the health and environmental issues raised by such materials[124].

For other plastics, the solution most studied and invested in by public and private players is **recycling**. Recycling denotes "any recovery operation whereby waste, including organic waste, is reprocessed into substances, materials or products for the purposes of its original function or for some other purpose"[125]. Based on the circular economy, the idea is to build virtuous loops that help reduce wholly or partly the need to use virgin raw materials.

Not all polymers are recyclable and, depending on the additives and materials added to the final product, polymers which were initially recyclable may no longer be recyclable. The design of articles thus determines their recyclability by sorting facilities.

Packaging plastics, which account for about 40% of plastics produced, are commonly distinguished from speciality plastics. **Plastic packaging** is the core of this issue. Mainly designed to be used only once and then discarded, it often consists of several layers of materials and other inputs for marketing purposes (colourings, inks, glue, etc.). However, the addition of all these components makes some of it very difficult to recycle. Of all the plastic packaging on the market, only 35% is recyclable. Design as a way to improve recycling rates is thus a vital priority.

Industrial players have started to work on simplifying their packaging. Multiple factors must be taken into account, including packaging size (and sometimes the quantity of products it contains), type of polymers used, usefulness of the packaging in relation to the product, means of communicating legal and mandatory information (particularly restrictive for certain products such as medicines), all the aesthetic and marketing aspects related to the product's packaging, and so on. Besides questions of cost, this approach is difficult to implement since it concerns equally a company's purchasing department and suppliers, R&D and marketing department, and even the legal department. That is why in 2023 PAPREC, a French industrial and household waste collection and recycling company, launched the Circle Lab, a service to support companies to design packaging for improved recycling.

124 INRAE, "*En finir avec les idées reçues sur les plastiques*", 3 July 2023.
125 Article L. 541-1-1 of the Environment Code.

Plastic packaging in the cosmetics and luxury goods industry: awareness and tailor-made support for eco-design

The issues and constraints related to ecodesign and end-of-life of products and packaging, particularly plastics, whether they are imposed by regulation or requested by the consumer, affect all business sectors.

Among them, the cosmetics and luxury industry is a particularly active and challenging one. It faces various issues such as: the impact of the decor (label and metallization) on recycling, the management of multi-layer/multi-component packaging or the sorting of small and dark packaging...

How to reconcile consumer demands, marketing issues, materials innovation and life cycle optimization challenges? How to integrate and evaluate the sortability and recyclability of a product in an overall approach to assess its environmental impact?

In 2023, PAPREC launched CIRCLE LAB by PAPREC, a service aimed at helping brand-owners with these issues. In one year, several renowned players in the cosmetics and luxury goods sector have benefited from these services, notably through the development of training programs and adapted tests (site visits, assessment of collection, sorting & recycling performance, creation of specific recycling schemes...) using the industrial park of PAPREC.

Optimization plastics life cycle is the result of an approach involving all actors in the value chain. To this end, PAPREC supports companies in improving their understanding of collection, sorting and recycling processes and in anticipating/evaluating the impact of their design choices (choice of materials and additives, size and shape...).

In a sector of activity constantly seeking innovation and facing increasingly knowledgeable consumers, cosmetics and luxury goods manufacturers are also systematically adopting a "tailor-made" approach, which allows them to understand, to target and prioritize issues and to validate packaging optimizations through tests or the development of dedicated end-of-life management processes.

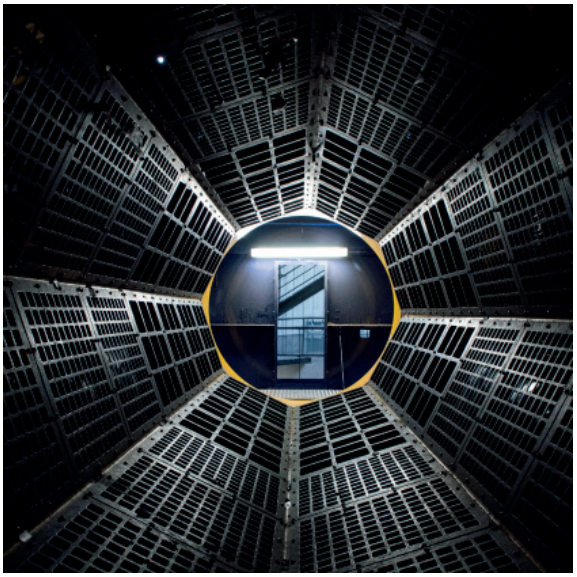


Photo of a trommel used in many sorting centers to separate packaging by size.

The recycling of **speciality plastics** can also be complex due to the use for which they are intended. That, for example, is true of wind turbine blades, which generate a large amount of composite waste. By the 2030s, there will be about one million tonnes of wind farm waste: 50% from end-of-life wind turbines, and 50% from the manufacturing stages. Many materials are used in the production process of turbines, including consumables which are discarded after the infusion or production of each blade. Today, this production waste is incinerated or buried.

Under the ZEBRA project, Arkema and many other players across the wind energy value chain such as Engie and Suez have teamed up to rethink the design and construction of wind farm infrastructure in order to reduce its environmental footprint and facilitate its recycling. The project's partnerships have been and are a key driver in this process of change as they allow for better understanding and anticipation of customer needs and markets, customer support solutions, collaboration with suppliers, operator training, exchange of expertise with recyclers, and so on. It is indeed very difficult to force sustainable development initiatives. The challenge of deploying these recycling techniques therefore consists in striking an economic balance between the use of RRMs and the use of virgin materials. This is why amending authorisations to take into account end-of-life wind turbines would reduce the competitive disadvantage where technical solutions exist.

A breakthrough innovation for recycling wind turbine blades: the ZEBRA project

Elium® resin

With its **Elium® liquid thermoplastic resin** and structural adhesives, Arkema offers a breakthrough innovation in the composites market.

Elium® resin was designed from the very beginning to facilitate recycling:

- its thermoplastic nature allows mechanical recycling;
- the acrylic polymer on which Elium® resin is based is one of the rare plastics that can be easily depolymerised: at temperature, the building blocks of the material are separated. After distillation, this recycled monomer can be reincorporated into a new resin without any loss of properties.

This type of recycling can be carried out with production waste or end-of-life parts, such as wind turbine blades.

ZEBRA project

The wind energy industry faces several challenges to secure its place in the global energy supply:

- improving yields and increasing competitiveness;
- demonstrate the reliability and cost-effectiveness of offshore wind power;
- meeting the challenges of social acceptability;
- addressing the impact on biodiversity.

In addition to these well-known challenges, there is also the issue of managing the composite waste generated during production and at the end of the blades' life. These are mostly made of reinforced thermosetting resins, which are difficult to recycle and generate little value when recovery is envisaged. Yet the amount of composite waste from the wind industry is expected to reach millions of tons by 2035.

Launched in September 2020, the ZEBRA (Zero wastE Blade ReseArch) project is a unique partnership bringing together Arkema, Canoe, Engie, LM Wind Power, Owens Corning and Suez and coordinated by the IRT Jules Verne. The aim of the project is to demonstrate **the technical, economic and environmental relevance** of full-scale thermoplastic wind turbine blades, using an eco-design approach that includes recycling.

After a year of development, the first 62m and then 77m thermoplastic blades were produced at two LM Wind Power sites in Spain.

The **shear web**, a structural element of the 77m blade, was manufactured using recycled **Elium® resin**, a significant proof of concept for the use of recycled resin:

- ZEBRA blades have passed validation tests at LM Wind Power's test center in Denmark;
- Suez has demonstrated that its existing dismantling facilities are also suitable for processing thermoplastic blades. The dismantled materials were fed into various recycling processes to validate their technical feasibility.

The results of the LCC (life cycle costing) and LCA (life cycle assessment) studies led by Engie will be published in 2024.

First thermoplastic wind turbine blade with Elium® resin.
Courtesy of LM Wind Power

Elium® composite waste before compounding.
Courtesy of Arkema, © Maxence Peyras

3.2. Improving used plastic recycling

Plastic recycling faces many obstacles which explains why the recycling rate is so low worldwide[126]. Low economic appeal, collection-related difficulties, lack of sorting systems, low availability and traceability of resources, technical and technological constraints of recycling, and recycled plastic quality are some of the obstacles to be overcome with the levers of action which the various players in the value chain have identified.

1) Improving plastic waste collection and sorting. In France, the amount of per capita plastics incinerated (responsible for the bulk of fossil emissions from incinerators) in highly urbanised areas is almost 40% higher than that in semi-urban areas. The difference in fossil CO_2 emissions between the two amounts to 40 kg per capita each year. Sorting at source is therefore a priority and a vital step in sending waste for suitable treatment, thereby avoiding as far as possible its disposal via landfill or incineration. Sorting relies on two specific factors: awareness-raising, education and incentivising individuals and professionals to sort their waste, and establishing suitable facilities.

As far as the first factor is concerned, for some ten years French lawmakers have been working to facilitate sorting by harmonising instructions for household packaging and introducing mandatory labelling that conveys information on the methods for sorting and disposing of waste from a product (Triman logo and info-sorting).

Figure 4 / Example of Triman and info-sorting signs.

Moreover, some local and regional authorities have adopted incentive pricing, which contains a variable component in the calculation of the household waste collection fee or levy based on the quantity or even the type of waste produced by each household. Household and similar waste performance contracts offered by Suez are also mechanisms to encourage sorting.

Similarly, the AGEC law has stimulated much thinking and discussion on the possibility of implementing a nationwide deposit return scheme for plastic bottles. Although the government has not yet adopted this measure, some players have gone ahead and implemented local schemes. For example, Coopérative U and E.Leclerc have set up a deposit return system in some of their Ile-de-France stores with the aim of encouraging people to sort and bring bottles back.

EU lawmakers have also adopted a number of legislative texts seeking to increase plastic collection and recycling (see chapter 1). The regulation on packaging and packaging waste provides for the mainstreaming, by 2029, of deposit returns for plastic bottles and cans. Packaging, however, is not the only product of concern. There are ongoing discussions, for example, on the collection and management of textile waste which is already being partially undertaken by charities and specialised channels[127].

Regarding the second factor, the AGEC law has added eight new extended producer responsibility sectors, some of which will affect plastic recycling: building products and materials for the construction sector, toys, sports and leisure goods, DIY and gardening goods, chewing gum and disposable sanitary textiles. EPR schemes make companies contribute financially to separate collection, as well as to waste treatment and prevention efforts. The new schemes supplement those already in place, such as EPR for household packaging[128], tires, textiles, shoes and household linen. EPR has a positive impact on the capture and storage of plastic waste, spurring the development of an important market for French companies in charge of collecting, sorting and recycling plastics. Yet France lacks sound recycling systems.

In other parts of the world, waste collection, sorting and treatment is not as, or not at all, institutionalised, which makes waste collection and management even more difficult.

2) Improving plastic recycling processes. Recycling is a waste treatment process allowing new products to be reintroduced into the consumption cycle. It gives a second life to an article, product or substance. Currently, recycled plastic waste is mainly treated by **mechanical recycling** through which waste is collected, sorted, crushed, washed, and remelted to make pellets.

126 The recycling rate reflects the recyclability of plastic waste, its collection and its treatment.
127 For example: EEA, "Management of used and waste textiles in Europe's circular economy", Briefing, 21 May 2024.
128 https://www.citeo.com/faq-la-rep-emballages-menagers.

This recycling process has several limitations:

- not all plastic waste, especially composites, is mechanically recyclable;
- it does not remove all additives and/or substances added unintentionally;
- the type of output polymer obtained is determined by the incoming materials. However the waste stream recovered is highly heterogenous;
- it therefore requires a homogeneous stream of incoming plastics, sorted to a high level of purity;
- it affects the properties of the polymer, which limits the number of times plastics can be recycled and its types of use.

Many companies, including Suez, are therefore working to optimise the processes and technologies in place with the aim of improving the quantity, diversity and quality of mechanically recycled plastics.

Innovation for plastics recycling

Only 9% of plastics generated globally is recycled[129]. SUEZ expertise in the various plastics recycling processes, whether industrial, agricultural or by household, enables to produce high-quality recycled plastic. SUEZ covers **all the chain to produce a quality secondary raw material** and thus limit the use of virgin resins, to support circular economy and resources preservation.

After collection (with different types of containers), waste sent to the sorting center are sorted using leading-edge technologies to be recovered as recycled raw materials. Advanced separation techniques enable waste to be transformed into directly usable products (pellets, flakes and powders) to give them a second life.

Innovation is a key lever to deploy solutions maximizing performance and address circular economy challenges:

- QUALIWASTE® is an innovation program dedicated to the development of innovative solutions for **waste characterization**. It covers the whole value chain of waste businesses: from collection, to sorting, recycling and energy recovery. SUEZ ambitions to support the customers in improving their knowledge and traceability of waste flows by partnering with startups or developing internal solutions. The objectives are to maximize performance of the group's core businesses, improve the quality of service and develop innovative service offers. As an example, QUALIWASTE® Collection is a solution using **Artificial Intelligence** to map municipal sorting quality in order to support local authorities in their prevention and awareness campaigns. AUTODIAG® is a solution for municipal waste sorting centers in order to ensure top level quality secondary raw materials;
- Plast'lab® is SUEZ's specialized laboratory that **analyzes, tests and characterizes recycled plastic materials** in order to formulate the ideal composition of recycled plastic to manufacture the product desired by industrial customers, as well as to anticipate new requirements.

In addition, **chemical and physico-chemical plastic recycling** technologies are under development. They enable the recycling of plastics for which there are no, or few, solutions to date. Chemical recycling helps decontaminate recycled plastics by removing undesirable additives or substances, process mixed plastics (depending on the technology), and obtain RRMs compatible with all types of use, including food packaging.

Unlike mechanical recycling, few chemical recycling technologies are currently available on an industrial and commercial scale. In collaboration with RECORD and ADEME, Deloitte has carried out two studies to better understand the opportunities and limitations of chemical recycling.

129 Source: OCDE.

Context, challenges, opportunities and limits of new recycling technologies

For several years, the development of new recycling technologies has been booming with the aim of treating feedstocks which are difficult to recycle and producing better quality plastics, when mechanical recycling cannot meet market demands[130] .

This dynamism is reflected in the arrival of numerous processes on the market (solvolysis, pyrolysis, gasification, dissolution) and the launch of multiple partnerships between green chemistry start-ups and key players of the value chain, in order to accelerate the scaling up of these technologies. Numerous communications have announced investments in future plants, which should become operational in the next few years.

While these technologies are promising and serve greater circularity of plastics, their potential to reach commercial scale remains to be demonstrated: most of them are still at pilot or demonstration scale. The success of these processes can be influenced by several parameters. Technical, economic and environmental performances will be key, and the scale of the associated benefits has yet to be confirmed. Securing access to waste feedstocks of sufficient quality and volume over time is also critical. It is essential to build the entire value chain, from the supply of plastic waste to the production of the recycled material.

The industry also faces a lack of definitions and harmonization of regulations on new recycling technologies, for example around the use of the mass balance approach. Indeed, the current and future regulatory context needs to be clarified: it should encourage the development of new recycling technologies as a complement to mechanical recycling and facilitate investment decision-making.

In order for chemical recycling to be developed on an industrial scale, many hurdles remain to be overcome: value chain issues (securing adequate resources), technology regulation and acceptability, and market development and take-up. Building the value chain, from sourcing waste to purchasing recycled materials, is vital to support the development of this sector. This can be done by forming partnerships with recyclers during product manufacture/design, as in the ZEBRA project. Similarly, Citeo, TotalEnergies, Recycling Technologies, Mars and Nestlé have teamed up to develop a chemical plastic recycling sector in France.

All these technologies raise questions about their environmental performance. Chemical recycling allows for the recycling of a wider spectrum of plastics than mechanical recycling, but at the cost of a bigger CO_2 and energy footprint. The environmental benefits depend on resource availability and composition, the type of technology used, and the methodologies/indicators taken into account. Similarly, while chemical recycling allows greater decontamination of resources, it does not remove all pollutants either[131]. That is why it is essential to know the composition of the resource used. The specifications for incoming waste are therefore almost as demanding as those for mechanical recycling. On this issue, Séché Environnement has made significant strides to optimise the traceability of plastic waste from supplier to end customer.

Lastly, there are questions concerning the traceability of the contents of chemically recycled plastics incorporated into new products. Recycled products are in fact mixed with new materials under the mass balance approach. While this method ensures that a proportion of RRMs is used in the overall manufacture of products put on the market, it does not provide an accurate understanding of the content of RRMs in each product[132]. On this point, the European Commission is in the process of adopting an implementing decision on the inclusion of chemically recycled plastic in the calculation of the RRM incorporation rate.

130 ADEME and Deloitte, "Plastic waste deposits that can be treated by chemical and physico-chemical recycling in France", November 2022 and RECORD and Deloitte, "Chemical and physico-chemical recycling of plastic waste", June 2022.

131 Secretary General for Environmental Planning (SGPE), "*Économie circulaire : Point sur l'avancée des travaux*", July 2024.

132 See Collet (P.), "*Recyclage par pyrolyse du plastique (2/5) : l'Europe planche sur sa formule du Mass Balance*", ActuEnvironnement, 11 June 2024.

Accelerating circular economy thanks to plastic waste traceability

Séché Environnement, a major player in waste management, has launched an innovative project to boost circular economy by enhancing waste traceability for complex plastics.

The company has embarked on an ambitious investment program, supported by ADEME, the French Agency for Ecological Transition, via the ORPLAST call for projects. It aimed to extend sorting and preparation for recycling of almost 3,000 tons of plastic packaging that has been decontaminated. Investments cover the entire value chain, from waste sorting to the manufacturing of plastic flakes, guaranteeing the safety of the recycled material.

In addition, the company has invested in advanced traceability technologies, guaranteeing transparent and complete management, from supplier to end customer (e.g.: the deployment of connected information systems with *Track Déchets*[133], as well as connected scales). These tools make it possible to follow every stage, from sorting to final treatment, reinforcing the chain of responsibility for all those involved. Finally, educational programs aimed at encouraging eco-responsible behavior are deployed, focusing on the importance of responsible management and proper traceability of plastic waste.

These initiatives generate a number of significant benefits, including improved recycling rates and the proper disposal of hazardous residues, thus reinforcing the environmental and health safety of waste management. In addition, this approach contributes to combat illegal practices, to make data on waste flows more reliable and to simplify the administrative management of traceability at both national and local levels.

Extending traceability – currently mandatory for hazardous waste only – to non-hazardous waste would represent a considerable step forward for the management of waste, particularly plastics. This systemic approach by waste batch would help to reduce the dilution of pollutants during the recycling phases, while also reducing the flow of plastic waste that is not recycled, abandoned, or subjected to illegal practices.

3) Encouraging the use of recycled plastics. In Europe, the main challenge for plastic recycling is economic:

- the European Investment Bank estimates that €7-9 billion in investment are still needed by 2025 to meet the Circular Plastics Alliance's target of 20% recycling. Seven billion euros are to be invested just for chemical recycling by 2030;
- the market is extremely competitive and the cost of RRMs from chemical recycling will be significantly higher than from mechanical recycling, which is itself higher than the price of virgin plastics. Companies, therefore, have no economic incentive to use recycled plastics to manufacture their products without a proper value being awarded to them by the end market;
- the lack of resulting outlets for the use of recycled plastics reduces the value of plastic waste and therefore discourages investment in recycling systems. Thus, while in some sectors recycling is desired by the consumer, in many others the driver is mainly regulatory (incorporation obligation). This makes it difficult to anticipate and implement suitable solutions. To develop recovery systems, players need to be encouraged over time to invest and innovate (term and scope of contracts with eco-organisations, regulations, taxation, etc.);
- imports of recycled plastics are allowed. Given the high price of recycled plastic materials in Europe and the upcoming restrictions on the inclusion of RRMs, players fear that the food packaging industry will turn to recycled products from non-European markets (e.g. food grade rPET made in China) to lower the manufacturing cost of its products;
- as some companies have done for carbon, an **internal plastic price** that factors in the negative environmental externalities of recycled plastic materials is a line of approach to make their incorporation, the reduction of plastic production and/or the search for alternatives more attractive. For example, in a 2023 report WWF believes that the costs associated with plastic lifecycle impacts "are eight times higher in low- and middle-income countries than in high-income countries"[134]. Taking this difference into account could benefit European recyclers.

133 https://trackdechets.beta.gouv.fr/.
134 WWF, "Who pays for plastic pollution?", Report 2023.

Public authorities, therefore, have a vital role in organising economically viable systems through financial support at the early stages of development or the establishment of a regulatory framework in favour of the circular economy (in particular through EPR). In addition, creating partnerships is crucial to better exploit resources, secure supplies and outlets, organise sectors, conduct research projects, test industrialisation potential, and create new value chains[135]. In this connection, Société Générale is leveraging innovation to combat plastic pollution, particularly by facilitating the development of local collection and recycling systems for these materials.

SOCIETE GENERALE

A holistic approach to tackle plastic pollution

Société contributes to fighting plastic pollution by rolling out various projects ranging from the structuration of innovative financial solutions, as well as workplace environment, philanthropy and awareness-raising initiatives...

Financial innovation serving plastic collection and reuse.

A partnership[136] was concluded between Unilever Nigeria and Bridges Outcomes Partnerships with the aim of supporting the social enterprise Wecyclers in the develomment of plastic waste collection in Nigeria. This was made possible through the issuance of a "development impact bond", the first corporate-backed impact bond, structured by Société Générale. Weycyclers plans to collect over 30 000 tons of plastic waste in the next 5 years, create more than 700 jobs across the country and raise the incomes of the workers sorting the waste.

In 2023, Société Générale acquired a stake in the PoleStar[137] fund, the only private debt fund in Europe dedicated to the circular economy, which supports mid-sized companies (MSEs) in building their first waste recovery plants.

Building on these experiences, the group intends to create a "Plastic Outcome Based" fund whose ambition, to transform plastic recycling in developing countries into a circular economy model, has already been rewarded by the Outcomes Accelerator in 2024[138]. This prize finances the feasibility study of the project.

A new partnership to contribute to the removal of plastic pollution from the oceans.

The Ocean CleanUp[139], an international non-profit project, develops and scales technologies to rid the world's oceans of plastic through a dual strategy: cleaning up the plastic already in the oceans, and intercepting trash flowing in rivers to stop it reaching the oceans. As a key "Mission Partner", the Société Générale financially contributes to the non-profit's activities, supporting the NGO's mission to clean up plastic pollution in oceans and rivers worldwide.

Banning single-used plastics from the workplace.

Following the decision to ban single-use plastics from employee's work environment by 2025, plastics (food and non-food) have already disappeared from the premises operated by the group in France and continue to decrease in the rest of the world.

Using ESG awareness as a major lever to make transformation effective.

Société Générale has launched a vast ESG acculturation program with conferences on plastic, water and the circular economy. With the aim of sharing this knowledge with external stakeholders, an episode of the group's "2050 investors" podcast was dedicated to "Life in plastic, un-fantastic"[140] to explore concrete ways to reduce plastic.

135 EpE, "Partnerships: cornerstone of the circular econom", in association with ESCP Business School, June 2021.
136 Société Générale, "Investing for impact: What will it take?", June 28th, 2023.
137 Société Générale, "Circular economy: Societe Generale takes a stake in Polestar Capital Circular Debt Fund", September 20th, 2023.
138 Outcomes Accelerator, "Outcomes Accelerator Cohort 2 Winners Unveiled at Outcomes Finance Alliance Summit in Zurich", May 22nd 2024.
139 https://theoceancleanup.com/.
140 https://insight-public.sgmarkets.com/podcasts/la-vie-sans-plastique?lang=fra.

As with carbon credits, a **plastic credit** market is gradually emerging on a global scale. For each amount of plastic produced, an equal quantity of plastic waste is collected and recycled. For example, Removall Carbon offers a credit per additional tonne of collected or recycled plastics[141]. More specifically, it acts as a link between owners of collection/recycling projects in the countries of the South, the certification body Verra, auditors and the end customer. The credits are used to finance plastic waste collection projects in particularly exposed regions (Asia and Africa). To obtain credits, companies are required to measure their plastic footprint and identify the drivers for reducing it (cutting plastic use, eco-design, creation of recycling systems, etc.), prior to obtaining compensation. Through this system, companies commit to limiting plastic pollution and increasing their circularity. They use plastic credits as an investment, beyond their supply chain, in reducing the pollution caused by the inevitable waste they produce. For the time being, the plastic credit market is voluntary, but it could participate in the financing mechanisms included in the International Plastics Treaty under negotiation. Plastic credits are indeed seen as a prerequisite for the deployment of EPR schemes in those countries.

The question is not just one of developing national collection and recovery systems, but also of dealing with the export (legal and illegal) of a large proportion of plastic waste from the countries of the North to the countries of the South.

3.3. Preventing plastic waste exports

Since January 2018 China, previously the main destination for plastic waste from the rest of the world (especially from the G7 countries), has been gradually cutting imports before introducing an all-out ban in January 2021. Plastic imports then switched to the countries of Southeast Asia and Africa. For example, between January and April 2018 Thailand's plastic waste imports increased 70-fold[142]. However, these countries are unable to manage, let alone recycle, the waste.

According to the HS (Harmonised System) customs code, administered by the World Customs Organisation (WCO), waste is deemed plastic waste when it falls into category 3915 "waste, shavings and scrap of plastic materials". Accordingly, all plastic waste falls into this category, whether hazardous, recyclable or derived from recycled plastics. Collaboration with the WCO to include plastics and their subcategories in the information required by the HS code would increase the transparency and traceability of such products.

The transport of plastic waste is permitted under certain conditions that vary from one regulatory framework to another. Under the Basel Convention, exports of plastic waste to non-member countries are prohibited, unless otherwise agreed bilaterally. The Convention also distinguishes between hazardous and non-hazardous, recyclable and non-recyclable, plastic waste. Such exports are allowed by the OECD, but they are subject to stricter control procedures than exports to OECD member countries. In the European Union, exports to non-OECD and non-EU countries are strictly prohibited. Lastly, exports of (all types of) plastic waste to developing countries will probably be subject to binding provisions under the International Treaty on Plastic Pollution.

In this context, the Plastic Scrap Ban initiative adopted by CMA CGM since June 2022 sends a strong message to its counterparts and allows the issue to be raised with the World Trade Organisation.

141 https://www.removall-carbon.com/fr/plastique-biodiversite/.
142 Heinrich Böll Stiftung, La Fabrique Écologique and Break Free From Plastic, "Atlas du Plastique", 2020.

A pioneering decision to combat plastic pollution

As a global player in maritime, land, air, and logistics solutions, the CMA CGM Group acts daily to develop more sustainable economic exchanges, respectful of both people and the planet. As part of its long-standing commitment to environmental preservation, the CMA CGM Group made a pioneering decision, at the One Ocean Summit in 2022, to stop transporting plastic waste on its ships. This decision aims to combat illegal recycling channels by preventing plastic waste from being sent to destinations where it cannot be sorted, recycled, or recovered.

To ensure the effectiveness of this measure, several actions have been implemented:

- installation of a rule in the internal booking acceptance system that leads to the automatic rejection of such bookings;
- raising awareness among sales teams to ensure that they understand the rule so that they can explain and promote this decision to customers;
- monitoring and controlling the declarations of already loaded bookings;
- launching a customer support initiative in Indonesia called "Easy recycling". This service allows customers to leave their used packaging in return containers heading to the CMA CGM depot in Cakung (Indonesia), where they will be collected and sorted for recycling. Eventually, CMA CGM aims to extend the service to other countries.

This decision, and its implementation over the past two years, is part of a broader approach by the Group to combat plastic pollution and contribute to a circular economy, by supporting projects and international associations such as Plastic Flamingo[143] or Plastic Odyssey[144], or by implementing a comprehensive waste management program on its owned ships.

Additionally, aware of the issues related to plastic pollution and the problem of container losses at sea, CMA CGM voluntarily and systematically loads plastic pellet containers in the hold to avoid any incidents. Finally, the Group supports the IMO (International Maritime Organization) position on labeling plastic pellet containers to identify them more easily and regularly exchanges with shipowner associations, such as Armateurs de France, and with competent authorities to collectively reduce the risk of container losses at sea.

143 https://www.theplaf.com/.
144 https://plasticodyssey.org/en/.

CONCLUSION

A revolutionary material, since 1950 plastic has permeated all economic and everyday products, ranging from those made by heavy industry to household and hygiene items. It is present in transport, construction, textiles, food, healthcare, children's toys, and so forth. In 70 years, annual synthetic plastic production has jumped from 2 million tonnes to 438 million tonnes and could double by 2050. Plastic's remarkable properties (soft or rigid, lightweight, impact and corrosion resistant, stable, insulating, long lifespan and low manufacturing cost) have made it the third most manufactured material in the world after cement and steel.

Given its heterogeneous composition, resistance and endurance, plastic is difficult to eliminate, remains highly mobile and persistent in nature, and poses a problem for the environment and human health. As a result, plastics are found in all environmental compartments of the planet in varying sizes.

Plastic pollution is therefore closely related to the triple global crisis of climate change, biodiversity loss and pollution. Over the past twenty years, national, European and international authorities have adopted various texts directly or indirectly targeting plastics over all or part of their lifecycle. The latest is the International Treaty on Plastic pollution which is still under negotiation. Consumers and individuals are also involved in this issue, leading to the emergence, in recent years, of several alternative products or services to plastic use.

Businesses, too, are paying increasing attention to the issue. In this, they are impelled by a risk reduction rationale (regulatory, legal, financial and reputational risks), an economic rationale in view of the opportunities that a transition to plastic sufficiency could create, and a climate rationale - a smaller plastic footprint could, in some economic sectors, help meet the decarbonisation commitments made for 2030 and 2050.

The work carried out by the EpE Health & Environment Committee in 2023 revealed a number of complementary actions that companies have already implemented with the aim of:

- **understanding, examining and assessing** their dependence on plastic across the value chain, its different uses, its potential leakage and release points into the environment, its recyclability, and the toxicity of additives present in its composition. Their actions are useful to help better understand the products on the market, increase transparency in the composition of plastics, and identify drivers available for plastic footprint reduction;
- **rethinking plastic design, production and use for the purposes of sufficiency and reduction.** This raises questions about business models, the usefulness of and need for certain plastics, and the environmental impacts across the product lifecycle, especially where alternatives are sought. Work to this end has already been carried out by many companies, particularly regarding the reduction of their GHG emissions or the environmental footprint of their product portfolio. Companies also have the means to support and encourage consumers to move towards plastic sufficiency through the products they market and supporting communication;
- **reducing, from the design phase, the environmental and health impact of essential plastics** without relevant alternatives along the lines of the circular economy. This means adopting eco-design or a 'safe and sustainable by design' approach which integrates thinking on the toxicity of additives to human health, as well as using more feedstocks from recycled plastics;
- **limiting plastic leakage to the environment** during production and transport. Several initiatives by private players acting alone or in partnership with public, scientific and non-governmental organisations have been launched, including OCS Europe certification, the Plastic Leak Project, Ocean Approved®, etc.;
- **improving management of end-of-life plastics.** This involves promoting and increasing the reuse, repair and reutilisation of plastics, accelerating the production of recyclable or biodegradable plastics, developing and deploying the necessary systems and technologies to recycle them, and preventing the export of plastic waste to third countries which do not have the technical and organisational capability to manage it.

This publication has demonstrated that there is no single solution and that all actors in the plastic value chain have a part to play and should continue their ongoing efforts to reduce this pollution.

The implementation of solutions is nevertheless fraught with hurdles. The testimonials and feedback from member companies highlight that **the operating and financial costs of reducing plastic use**, for example in packaging, can be quite high and that, moreover, the development of recycling and the use of RRMs is still hampered by market constraints.

How can companies, individually or collectively, surmount these obstacles? Several lessons may be drawn from the work performed by them:

- **plastic formulation** is a powerful driver for improving end-of-life plastics. Simplifying the composition of plastics (avoiding multi-layer materials, reducing the addition of chemicals, etc.) facilitates their recycling, both technically and economically. Conversely, because of their particular composition, biodegradable plastics cannot be recycled and their degradation in the environment causes environmental issues. Thus, it is essential that companies continue to build on the collective or individual initiatives taken by them to eco-design plastics with their entire life cycle in mind;
- **sectoral approaches** can help set common targets, enrich knowledge in a sector, drive all players to act in favour of environmental protection and health, and influence regulation in ways that enhance effectiveness without any competitive disadvantage;
- **the creation of partnerships across the value chain** of a product is a suitable approach to improve and guarantee its circularity through better understanding and anticipation of market needs, customer support, collaboration with suppliers, operator training, exchange of expertise with recyclers, and so on;
- **in Europe, the main challenge for plastic recycling is economic.** Today, plastic waste is a low-value product, which discourages investment in recycling systems and the incorporation of RRMs into new products put on the market. Public authorities thus have an essential role to play in channelling investment into recycling, either through financial incentives or through obligations to incorporate plastics from recycling that reflect the volumes available.

In view of the health and environmental challenges posed by plastics and the ongoing changes in standards, actions to reduce plastic pollution are expected to multiply in the coming years. In this regard, a combination of solutions, applied sector by sector, appears to be the most effective approach.

List of illustrations

Abbreviations and acronyms

ADEME	*Agence de la transition écologique* (Green Transition Agency)
AGEC	*Loi anti-gaspillage pour une économie circulaire* (Anti-Waste Law for a Circular Economy)
CSRD	Corporate Sustainability Reporting Directive
ERP	Extended Producer Responsibility
ESEC	*Conseil économique, social et environnemental* (Economic, Social and Environmental Council)
ESRS	European Sustainability Reporting standards
GHGs	Greenhouse Gases
HAC	High Ambition Coalition
INC	Intergovernmental Negotiating Committee
LCA	Lifecycle Analysis
RRM	Recycled Raw Material
OCS	Operation Clean Sweep
OECD	Organisation for Economic Co-operation and Development
OPECST	*Office parlementaire d'évaluation des choix scientifiques et technologiques* (Parliamentary Office for the Evaluation of Scientific and Technological Choices)
PET	Polyethylene Terephthalate
PFAS	Per- and Polyfluoroalkylated
PP	Polypropylene
PS	Polystyrene
SPC	Supply – dePollution – circularity
TIP	Tire Industry Project
WBCSD	World Business Council for Sustainable Development
WWTP	Wastewater Treatment Plant

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About EpE

Association française des Entreprises pour l'Environnement (EpE), set up in 1992, brings together around sixty major French and international companies who share their best practices and work together to better integrate the environment into their strategies and operations. Its raison d'être - **one planet and a prosperous world** - sums up the resolve of its members to lead their own green transition as well as that of society, and to ensure that economic development compatible with planetary boundaries is socially accepted, indeed desired. EpE is the French partner of the World Business Council for Sustainable Development (WBCSD).

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Combating plastic pollution: a collective effort

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accenture
GROUPE ADP
AIRFRANCE
Air Liquide
AlixPartners
Amundi ASSET MANAGEMENT
apave
ARKEMA
AXA
BASF We create chemistry
BCG BOSTON CONSULTING GROUP
BIC
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