



Towards greater plastics circularity

Addressing social and environmental spillovers in the plastics sector

This briefing is one of a series assessing social and environmental spillovers associated with the EU's circular transition. Sections 1 and 2 summarise the material flows associated with the consumption of plastics, and their principal environmental and social impacts. Section 3 outlines some of the key EU policies and legislation to enhance circularity in the plastics sector, together with some international level developments. Sections 4 and 5 map the potential positive and negative environmental and social spillovers of these policies, respectively, both inside and outside the EU. Section 6 concludes with some initial policy recommendations for future plastics policy and legislation.

Material consumption in the European Union (EU), including consumption of plastics, is high and rising, creating significant environmental and social impacts along the value chain from raw material extraction to treatment of waste plastics both inside and outside the EU.

The EU has in place a range of policies and legislation of relevance to the production, use and waste management of plastics, with the potential to slow and reduce this material throughput and mitigate the associated environmental and social consequences. This includes actions related to the collection and recycling of plastic, reduction of plastic consumption, promotion of the use of recycled plastic material, reduction of plastic waste exports, and reaction to emerging issues

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related to plastics and plastic pollution. In addition, there are several important international developments of relevance to the pursuit of more sustainable plastic use, both globally and in the EU.

However, all circular economy policies can have positive as well as negative environmental and social spillovers, both inside and outside the EU, which should be carefully assessed in policy design.

This briefing maps out some of the principal spillovers that may be associated with the pursuit of greater circularity in the plastics sector and discusses some policy recommendations to consider when seeking a socially and environmentally just transition to greater circularity for plastics.

1. Material flows in the plastics sector

A global snapshot

Plastics are an integral part of today's society, included in everything from packaging and textiles to vehicles and electronics. They are extremely useful materials, and yet their production, use and disposal are associated with a number of environmental and social impacts.

Globally, annual plastics production doubled between 2000 and 2019, increasing from 234 million tonnes (Mt) to 460 Mt (OECD, 2022a). One estimate suggests that if plastics related policies do not change, economic and population growth may cause global plastics **consumption** to almost triple from around 460 million tonnes (Mt) in 2019 to 1,231 Mt in 2060 (OECD, 2022b). Although the use of recycled (secondary) **feedstocks** to produce plastics is increasing, it is likely that by 2060 most plastics will still be made from primary plastics (i.e. virgin material), with recycled plastics only comprising 12% of global production (OECD, 2022b).

Plastic **waste** generation more than doubled from 2000 to 2019, increasing from 156 Mt to 353 Mt (OECD, 2022a). Only around 9% of plastic waste was recycled in 2019, 19% incinerated, almost 50% sent to well-regulated landfills, and the remaining 22% disposed of in uncontrolled ways, such as illegal dumping, open-air burning or leakage to the environment (OECD, 2022a). Again, if policies do not change, global plastic waste production may almost triple by 2060, with around two thirds being single-use or short-life products such as packaging, cheap plastic items and textiles (OECD, 2022b). Around 50% of this waste will still be landfilled and less than 20% recycled. OECD countries will continue to produce far more plastic waste than non-OECD countries (with averages of 238 kg and 77 kg per person per year respectively).

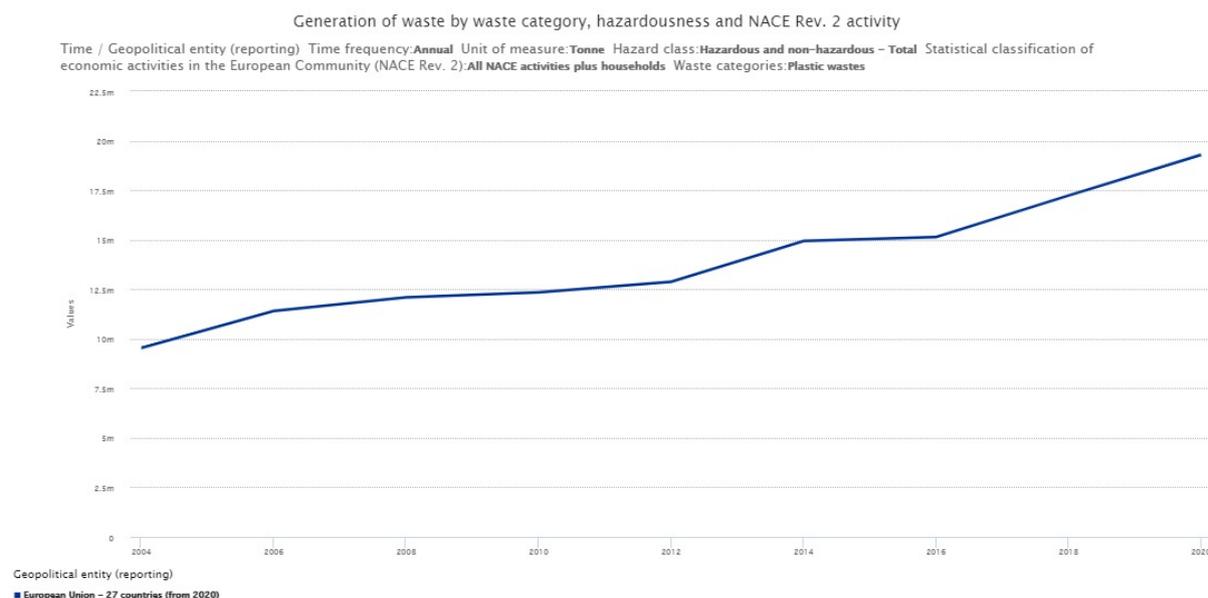
In 2019, it is estimated that 22 Mt of plastic **leaked into the environment** (just over 6 Mt of which leaked into the aquatic environment), largely due to poor collection and disposal methods. 88% of this is macroplastic items, with the remaining 12% made up of microplastics (pieces smaller than 5 mm) from sources including tyre abrasion and washing of man-made

textiles (OECD, 2022a). If adequate measures are not taken to address it, leakage to the environment may double to 44 Mt per year by 2060, and the accumulation of plastics in the aquatic environment may more than triple (OECD, 2022b).

The EU picture

In the EU27+3 (the EU plus Norway, Switzerland and the UK), 47.5 Mt (million tonnes) of plastics were **produced** in 2020, a reduction of 10.3% from 2018 (Plastics Europe, 2022b). The manufacturing of plastic products and parts ('plastics conversion') totalled just under 54 Mt, marking a 2.4% reduction over the same period (Plastics Europe, 2022b). Plastics **demand** was dominated by packaging (including commercial and industrial packaging), accounting for just over 40% of plastics demand, building and construction just over 20%, the automotive industry just under 9%, electrical and electronic items around 6%, household, leisure and sports items just over 4%, and agriculture just over 3% (Plastics Europe, 2022a).

According to Eurostat, the amount of **plastic waste** generated per year in the EU27 continues to increase, reaching around 19.3 Mt in 2020 (Eurostat, 2022a) (see figure below). With regards to treatment of plastic waste in the EU27, in 2020 around 11.1 Mt was treated in total: around 8.1 Mt recycled, 2.4 Mt sent for energy recovery, and 0.6 Mt disposed of through landfill or incineration (Eurostat, 2022b).



Figures from the plastics industry indicate that in the EU27+3, 29.5 Mt of plastic post-consumer **waste** was collected in 2020, with just under 35% sent for recycling (including facilities both inside and outside the EU27+3), just over 23% landfilled and 42% sent for energy recovery (Plastics Europe, 2022a). Since 2006, this represents a 117% increase in recycling, 77% increase in energy recovery, and 46% reduction in landfilling (Plastics Europe, 2022a).

Whilst these figures indicate that treatment of plastic waste is moving up the waste hierarchy, with disposal decreasing and recycling increasing, it also shows that there is a lot still to be done to achieve greater plastics circularity.

2. Environmental and social impacts of plastics material flows

The significant material flows associated with plastic production and consumption create major environmental and social consequences both inside the EU and in other parts of the world, both upstream and downstream in the value chain.

Environmental and social impacts upstream

The vast majority of plastics production is still reliant on the extraction and use of fossil fuels such as oil and gas, including shale gas. The impacts of this extraction include emissions of greenhouse gases. Throughout their whole lifecycle, plastics are estimated to contribute around 3.4% of global greenhouse gas emissions, with 90% of emissions arising during the production phase (OECD, 2022b). Other pollutants are also released, such as NO_x and SO_x which can lead to acidification, and toxic metals (e.g. lead, cadmium and mercury) and organic compounds that can cause eutrophication of ecosystems and accumulate in animals and plants, with associated health impacts (European Environment Agency, 2021). Oil extraction also comes with the risk of oil spills, which can cause both acute and long-term impacts on the marine environment and marine organisms (European Environment Agency, 2021). In addition, plastic production also generates large quantities of waste water that may contain small quantities of dispersed oil and other hazardous chemicals that can reach the environment if the waste water is not properly managed (European Environment Agency, 2021).

Bio-based plastic material, derived from biomass feedstocks such as sugarcane, maize or cellulose, can be used as an alternative to conventional fossil fuel-based plastics, but the land use needed for the production of the feedstocks can have environmental impacts (Spierling, et al., 2018).

Environmental and social impacts downstream

Plastic litter in terrestrial and aquatic environments is one of the most visible impacts of plastic consumption, and perhaps the one that receives the most public attention. The socioeconomic impacts of such litter include clean-up/retrieval costs, damage to tourism, shipping, fishing and aquaculture (European Commission, 2018a). Plastic pollution can also harm wildlife, including through entanglement or ingestion (for example plastic bags and lost fishing gear). In addition, microplastics released into the environment can enter the food chain (European Commission, 2018a), and their presence has been noted in several food and beverage streams (OECD, 2022a). The health impacts of microplastics on both marine species and humans are not yet fully known (European Environment Agency, 2021).

During the use of plastic products, consumers may be exposed to toxic substances that are sometimes added to plastics, such as flame retardants, endocrine disruptors and phthalates. These substances are associated with potential health impacts including reproductive and behavioural disorders, asthma and cancers (European Environment Agency, 2021). These chemicals can also leach from plastics that reach aquatic environments, where they can be ingested and absorbed by marine organisms (European Environment Agency, 2021).

Plastic waste that is collected for treatment can have a mix of positive and negative environmental impacts. Incineration of plastic waste leads to CO₂ emissions (an average of 2.7 t of CO₂ per tonne incinerated (Material Economics, 2019)). Sanitary landfilling temporarily prevents the release of carbon present in the plastics, but as they decompose (potentially over hundreds of years) they can release greenhouse gases (European Environment Agency, 2021). In addition, landfill fires (deliberate or otherwise) lead to the immediate release of greenhouse gases (European Environment Agency, 2021), and illegal landfills or landfills that are not well maintained can lead to the leakage of plastics into nearby bodies of water, eventually leading to them reaching the ocean.

Recycling plastics reduces the need for virgin plastics, and also the greenhouse gas emissions associated with virgin plastic production (Ellen MacArthur Foundation, 2016). However, this benefit is offset to some extent by the emissions associated with the fuel used for collecting, sorting and processing plastic waste.

3. Enhancing circularity in the plastics sector

Box 1: Selected EU policy and legislation on plastics

Existing policy and legislation

- The 2020 **Circular Economy Action Plan (CEAP)** included a focus on several resource-intensive sectors with high potential for circularity, including plastics and several products that contain plastics (packaging, electronics, vehicles, construction materials and textiles).
- The 2018 **EU Plastics Strategy** aims to promote more sustainable and safer plastics consumption and production, with reduced environmental impacts. Its actions aim to: reduce plastic waste; make recycling more profitable; encourage innovation and investment in materials and recycling; and drive global change on plastics.
- The 2019 **Single Use Plastics (SUP) Directive** (EU 2019/904) aims to prevent and reduce the environmental impacts of certain plastic products. Measures include:

- **Banning** some SUPs (cutlery, plates, beverage containers and cups, straws, stirrers, cotton bud sticks, balloon sticks, expanded polystyrene food containers and oxo-degradable plastic);
 - **Reducing consumption** of other SUPs (drinking cups, takeaway food containers);
 - Setting a **collection target** of 90% recycling for SUP plastic bottles by 2029 (77% by 2025) and requiring them to contain 25% recycled plastic by 2025 (for PET), and 30% by 2030 (for all bottles);
 - Requiring clear **marking** about plastic content and disposal information on some SUPs (sanitary items, wet wipes, tobacco products and beverage cups); and
 - Introducing **extended producer responsibility (EPR)** to cover the costs of waste collection and/or litter clean-up for numerous SUPs (food containers, packets and wrappers, beverage containers and cups, lightweight plastic carrier bags, wet wipes, balloons and tobacco products).
- In January 2021 a **ban on the export of hazardous and hard to recycle plastic waste** from the EU to non-OECD countries entered into force along with tighter rules on clean non-hazardous waste exports (European Commission Delegated Regulation (EU) 2020/2174).
 - The **Packaging and Packaging Waste Directive (PPWD)** (94/62/EC, as amended) aims to reduce the environmental impact of packaging and packaging waste. It requires Member States to set up EPR schemes for packaging, and requires 50% of plastic packaging waste to be recycled by 2025, and 55% by 2030.
 - The 2015 **Plastic Bags Directive** (EU 2015/720) amends the PPWD, requiring Member States to reduce the consumption and use of lightweight plastic carrier bags, e.g. through taxes/charges, reduction targets or bans, to no more than 40 per person per year by 2025.
 - The 2008 **Waste Framework Directive (WFD)** (2008/98/EC, as amended) sets out the legal framework for waste management. Related to plastic, it requires the separate collection of plastic waste, and sets targets for 55% recycling of municipal waste (including plastic) by 2025, 60% by 2030 and 65% by 2035.
 - The 2008 **Marine Strategy Framework Directive (MSFD)** (2008/56/EC, as amended) requires EU Member States to ensure that by 2020 the "properties and quantities of marine litter do not cause harm to the coastal and marine environment"; this includes plastic litter and micro-litter.

Forthcoming policy and legislation

- A 2021 proposal for a **new Regulation on waste shipments** (COM(2021) 709 final) would further restrict EU waste exports to non-OECD countries and only allow exports if third countries are willing to receive certain wastes and are able to manage them sustainably.
- The **Microplastics Regulation** (due to be proposed before the end of 2022) will aim to tackle microplastics unintentionally released into the environment, through such measures as labelling, standardisation, certification and regulation of the main sources of microplastics.
- The **Regulation on intentionally added microplastics** (due to be proposed before the end of 2022) will ban microplastics and nanoplastics that are deliberately added to a range of products including toothpastes, cosmetics and artificial turf used for sports fields. This will be under the REACH Regulation and will draw on recommendations sent by the European Chemicals Agency (ECHA) to the European Commission in February 2021.
- The **Communication on bio-based plastics and biodegradable or compostable plastics** (due to be published before the end of 2022) will aim to promote bio-based, biodegradable and compostable plastics where these provide genuine environmental benefits.

As outlined in Box 1, the EU has many plastics related policies and pieces of legislation. Earlier plastics related policies and laws, such as the WFD and the PPWD, tended to focus on **increasing the collection and recycling rates of various plastics**. Whilst this contributes to greater **circularity of plastic materials** through recycling, it does not create full circularity of products, and does not always allow for recycling of material back into the same product, sometimes resulting in downcycling due to a lack of high-quality recycled material.

However, some of the newer and forthcoming policies and legislation may make a greater contribution to plastics circularity by more actively **promoting the use of recycled plastic material**. For example, the SUP Directive introduces a **mandatory target for recycled plastic content** in bottles (25% for PET beverage bottles from 2025, and 30% in all plastic beverage bottles from 2030), and forthcoming revisions of the PPWD and End-of-Life Vehicles Directives (both due to be proposed before the end of 2022) may both also include mandatory recycled content targets. Industry is widely calling for a 30% recycled content target by 2030 for plastic packaging. Measures of this type should help to drive improved separate collection and recycling processes in order to obtain higher-quality recycled material.

The EU is also taking steps to reduce the **export of plastic waste** to non-EU and less-developed countries, placing a ban on the export of hazardous and hard to recycle plastic waste from January 2021, and proposing legislation to ensure that waste exports to non-OECD countries can only occur if those countries are willing to receive the waste and can maintain certain environmental standards during their processing or treatment.

Other plastics related policies, again more often the newer and forthcoming policies, are targeting the absolute **reduction of plastic consumption**. This is the case for the SUP Directive, which banned the sale of certain SUPs which have sustainable alternatives, for the Plastic Bags Directive, which set a target to limit the consumption of plastic bags per capita, and for the forthcoming Regulation to ban intentionally added microplastics from some products. These types of measures aim at the highest levels of the waste hierarchy (prevention and reduction), making an important contribution to more sustainable plastics use in the EU.

In addition, EU policies are reacting to **emerging issues related to plastics and plastic pollution. Microplastics**, and the impacts associated with their presence in the environment, have been recognised as an issue of concern for several years. The EU first indicated its intention to develop legislation to tackle microplastics in 2017 (European Environmental Bureau, 2022). Although progress has been rather slower than anticipated, the forthcoming legislation to ban intentionally added microplastics in various products and to tackle the unintentional release of microplastics to the environment will mark an important step in addressing the problem. In addition, **alternatives to traditional plastics** are being addressed at the EU level. The SUP Directive banned the sale of products made from products made from oxo-degradable plastic, and the forthcoming Communication on bio-based plastics and biodegradable or compostable plastics will aim to clarify the environmental benefits of the use of these alternatives.

There are also important **international** developments that are relevant to the pursuit of more sustainable plastic use, both globally and in the EU.

During the 1990s, China was a major destination for plastic waste, allowing many countries to outsource the disposal (landfilling or incineration) of plastic waste (Brooks, Wang, & Jambeck, 2018). In recent years, however, **China has drastically restricted its imports of plastic waste**, culminating in the “National Sword” policy in 2018 which permanently banned the import of non-industrial plastic waste (Brooks, Wang, & Jambeck, 2018) (resulting in a 99% drop in plastic waste imports the following year) (Yale School of the Environment, 2019), and a ban from 2021 on the import of all materials classified as “solid waste”. This is a driver for countries, including those in the EU, to improve the management of plastic waste in their own territories.

At the Fifth UN Environment Assembly (UNEA-5) in March 2022, 175 countries agreed to begin discussions on a **legally binding international agreement on plastics pollution**, to be in place by 2024. The agreement should address the whole plastic value chain from production through to leakage to the environment, and may include provisions on reporting of plastic pollution, compliance mechanisms, developing an enabling environment for a new plastics economy, and consideration of financing options for governments and businesses (UNEP,

2022b). An ad hoc open-ended working group (OEWG) was convened at the end of May 2022 to prepare for the work of the Intergovernmental Negotiating Committee (INC) which will develop the instrument, and the first meeting of the INC will be held in Uruguay at the end of November 2022 (UNEP, 2022a).

In addition, seventy-three WTO members have so far signed up to the **Informal Dialogue on Plastics Pollution and Environmentally Sustainable Plastics Trade (IDP)** (World Trade Organization, 2022a). The IDP will address better monitoring of plastic trade flows, explore how subsidies impact on plastics pollution, investigate measures to support markets for plastic reprocessing and use of alternative materials, and explore how standards and regulations can promote sustainable trade in plastics (World Trade Organization, 2022b).

In addition, the OECD (OECD, 2022b) has called for radical action to reduce demand, increase the lifespan of plastic products and their recyclability, and improve plastic waste management, to address the problem of plastic pollution. The OECD has also predicted that plastic consumption could be reduced by 16% by 2060 without reducing economic output, through technical progress and by increasing the use of recycled plastic in new products.

4. Prospective positive spillovers

Table 1: Prospective positive spillovers of greater plastics circularity

	Inside EU	Outside EU
Social	<ul style="list-style-type: none"> • Job creation in various parts of the plastics sector 	<ul style="list-style-type: none"> • Job creation in various parts of the plastics sector • Reduction in plastic waste exports (particularly hazardous)
Environmental	<ul style="list-style-type: none"> • Reduced plastic pollution and litter in the environment • Increased plastic recycling rates • Reduced virgin plastic production and associated reduction in greenhouse gas emissions 	<ul style="list-style-type: none"> • Reduced plastic pollution and litter in the environment • Reduction in plastic waste exports (particularly hazardous) • Reduced virgin plastic production and associated reduction in greenhouse gas emissions • Decreased primary resource (fossil fuel) extraction

Policies that promote greater plastics circularity provide signals to producers and markets, creating larger markets for alternative products or business models, with an associated positive impact on jobs in relevant parts of the plastics sector (European Commission, 2018a). Jobs may be created in areas such as innovative product design, plastic pollution prevention activities (e.g. in waste and waste-water treatment or port reception facilities for waste), clean-up activities, waste processing and recycling (European Commission, 2018a). The EU Plastics

Strategy suggested that between 2015 and 2030, a fourfold expansion in plastics sorting and recycling capacity could create 200,000 new jobs, with greater job security, across Europe (European Commission, 2018b).

Reduction in plastic waste exports (particularly hazardous) and associated health and environmental impacts

EU action to reduce the export of plastic waste to non-EU and less-developed countries (see Box 1) should reduce the various impacts associated with the export of plastic waste, in particular in the countries that receive EU plastic waste. Any reduction in the reception and processing of hazardous or hard to recycle plastic waste will result in less pollution (e.g. from uncontrolled dumping or burning of plastic waste) and lower health-related impacts (e.g. from emissions to air or risks associated with litter picking). The new Regulation on waste shipment, if properly implemented, will also help to ensure that plastic waste is exported to countries that can meet certain environmental standards during its processing or treatment.

Reduced plastic pollution and litter in the environment

A number of the policies and pieces of legislation mentioned in Box 1 (such as the SUP Directive, the Plastics Bag Directive and the forthcoming legislation on microplastics) aim to reduce the consumption of plastic, which will in turn reduce the risk of plastic pollution and littering and associated impacts.

Globally, it is estimated that around 109 Mt of plastics have already accumulated in rivers, and a further 30 Mt in the ocean, with 6.1 Mt of plastic waste leaking into rivers, lakes and the ocean in 2019 alone (OECD, 2022a). Around 40% of the plastic items reaching freshwater environments in Europe are single-use consumer products such as packaging, bottles and cigarette butts (European Environment Agency, 2021). Policies that contribute to the reduction of plastic consumption, pollution and littering will help to reduce the associated socioeconomic impacts (including clean-up/retrieval costs, damage to tourism, shipping, fishing and aquaculture (European Commission, 2018a)). They will also address the associated environmental impacts, including harm to wildlife through entanglement or ingestion (for example plastic bags and lost fishing gear). It has been estimated that 93% of fulmars in the North Sea have ingested plastics, and 85% of turtles analysed in one project covering the Mediterranean and Northeast Atlantic had ingested litter (European Commission, 2018a).

In addition to larger items of plastic litter, estimates suggest that in the EU tens of thousands of tonnes of microplastics are released into the environment each year (anywhere between 42,000 and 300,000 tonnes (ENDS Europe, 2021)). These can either be microplastics washed directly into the ocean (for example from artificial turf sport pitches, tyre wear, washing of synthetic clothing or cosmetic/sanitary products), or from the breakdown of larger plastic items that have reached the ocean. Microplastics can enter the food chain (European Commission, 2018a), and their presence has been noted in several food and beverage streams (OECD, 2022a). Whilst the health impacts of microplastics on both marine species and humans are not

yet fully known (European Environment Agency, 2021), policies that restrict their release to the environment will help to reduce those impacts.

Increased plastic recycling rates

EU legislation contains various targets to increase plastic collection and recycling rates (see Box 1). These include the SUP Directive's collection target for plastic bottles, the PPWD targets for the recycling of plastic packaging waste, and the Waste Framework Directive municipal waste recycling targets. In addition, several pieces of EU legislation have already introduced or may introduce mandatory targets for recycled plastic content (see Box 1). These include the SUP Directive's mandatory target for recycled plastic content in bottles, and the PPWD and ELV Directive revisions. Taken together, if achieved these targets should increase both the rates of plastic recycling and the use of recycled plastic material in the EU, helping to drive improved separate collection and recycling processes and supporting the development of markets for high-quality recycled material.

Reduced virgin plastic production and associated reduction in greenhouse gas emissions

Plastics production generates emissions of greenhouse gases and other pollutants to the air, with 90% of emissions arising during the production phase (OECD, 2022b). Global plastic production generated 1.8 billion tonnes of greenhouse gases in 2019 (OECD, 2022a), and if predictions on future plastic consumption are correct, this could more than double to 4.3 billion tonnes by 2060 (OECD, 2022b). In the EU, plastics production (refineries and manufacturing) emits around 13.4 million tonnes of CO₂, accounting for around 20% of the EU chemical industry's total emissions (European Environment Agency, 2021).

The use of secondary material obtained through plastic recycling reduces the need for virgin plastics, and greenhouse gas emissions associated with their production. Around 5.2 Mt of recycled plastics were used in new products in the EU each year between 2016 and 2019 (Circular Plastics Alliance, 2020), and policies and legislation that aim to increase the use of recycled plastic have the potential to increase this further. Indeed whilst global production of secondary recycled plastic has more than quadrupled over the past 20 years, this material still only accounts for 6% of total plastic feedstocks (OECD, 2022a).

It is estimated that recycling plastic rather than incinerating it can reduce emissions by 1.1–3 tonnes of CO₂ equivalent compared with production of the same amount of plastic from virgin fossil fuels (Ellen MacArthur Foundation, 2016). However, this is offset to some extent by the emissions associated with the fuel needed for the collection, sorting and processing of plastic waste.

Bio-based plastic material can be used as an alternative to conventional fossil fuel-based plastics, and policies that promote the use of these materials can therefore contribute to reducing the emissions associated with the production of conventional plastics.

Decreased primary resource (fossil fuel) extraction

Most plastics production is still based on fossil fuels. If plastic consumption continues as predicted, the plastics industry may account for 20% of global oil use by 2050 (European Environment Agency, 2021), and plastics and other petrochemicals are likely to be the most significant driver of growth in oil demand until 2030 (OECD and IEA, 2018). Around half of the oil used for plastic production is used as feedstock, i.e. the material from which the plastic is made, with the other half used for fuel during the production process (Ellen MacArthur Foundation, 2016). A reduction in oil extraction will also reduce the risk of oil spills and the generation of polluted waste water, reducing the associated environmental impacts (European Environment Agency, 2021).

5. Prospective negative spillovers

Table 2: Prospective negative spillovers of greater plastics circularity

	Inside EU	Outside EU
Social	<ul style="list-style-type: none"> Reduction of jobs linked to conventional plastic production 	<ul style="list-style-type: none"> Reduction of jobs linked to conventional plastic production
Environmental	<ul style="list-style-type: none"> Impacts of land use for bio-based plastic feedstocks Risk of impacts from biodegradable and compostable plastics 	<ul style="list-style-type: none"> Impacts of land use for bio-based plastic feedstocks

Reduction of jobs linked to conventional plastic production

Policies and legislation to reduce plastic production and consumption are likely to reduce the number of jobs linked to conventional plastic production, for example related to the extraction of fossil fuels for use as plastics feedstocks or the design and production of conventional or single-use plastic products. However, workers could potentially be redeployed or reskilled to work in other parts of the plastics industry that are better aligned with the pursuit of circularity (see positive spillovers section above).

Impacts of land use for bio-based plastic feedstocks

Policies that promote bio-based plastic material derived from biomass feedstocks will lead to land use that can have direct or indirect impacts on soil, biodiversity, greenhouse gas emissions and water (Spierling, et al., 2018).

Risk of impacts from biodegradable and compostable plastics

Some plastics are technically biodegradable or compostable, and marketed to consumers as such. By 2019, they accounted for around 1% of global plastic production (mainly in packaging)

(European Bioplastics, 2019). However, these plastics usually need specific conditions to biodegrade or decompose. For example, many compostable plastics will decompose well in industrial composting plants which have controlled conditions, but not in home composting bins or in the natural environment (European Environment Agency, 2021). This can be problematic since consumers may assume that these plastics have a lower environmental impact than is actually the case, and may dispose of them inappropriately as a result.

6. Policy recommendations for a socially and environmentally just circular transition

The pursuit of greater sustainability and circularity in the use of plastics will rely on the implementation of a range of policies with the potential to drive multiple social and environmental benefits, both inside and outside the EU. Nevertheless, the transition may also trigger negative impacts.

The following non-exhaustive list of policy recommendations aims to maximise the benefits of the transition to a more circular plastics economy, whilst minimising the negative outcomes.

- **Reduce absolute material demand by promoting policies supporting the reduction of plastic consumption.** Examples include the SUP Directive's ban on certain SUPs, the Plastic Bags Directive's limit on the consumption of plastic bags, and the forthcoming legislation on microplastics. These should be fully implemented and enforced to ensure the maximum possible benefit in terms of consumption reduction, and also complemented with additional consumption reduction targets where appropriate.
- **Continue to pursue ambitious targets for the collection and recycling of plastic waste.** This should include attainment of the collection and recycling targets in the SUP Directive, PPWD and WFD, and the consideration of progressively higher targets in these and other pieces of legislation related to plastics, to maintain a high level of ambition.
- **Promote the use of recycled plastics or alternative plastics**, where they are more sustainable than conventional plastics:
 - Promote the use of, and markets for, recycled plastic material, for example through attainment of the SUP Directive's mandatory target for recycled plastic content in bottles, and the inclusion of ambitious recycled content targets in the forthcoming revisions of the PPWD and ELV Directives.
 - Clarify the environmental benefits and appropriate use of alternative plastics in the forthcoming Communication on bio-based plastics, biodegradable and compostable plastics. The Communication should, for example, explore the impacts of land use required for bio-based plastic feedstocks, and how to ensure proper disposal of biodegradable and compostable plastics (European Environment Agency, 2021).

- **Pursue ambitious policies on microplastics.** Microplastics are recognised as one of the most damaging types of plastic pollution globally, and the forthcoming EU legislation must pursue measures to prevent the release into the environment.
- **Mitigate the potential loss of jobs** by preparing for the shifting needs of employment within the plastics sector through the means of reskilling and retraining. For example, jobs may be created in innovative product design, plastic pollution prevention activities, clean-up activities, waste processing and recycling (European Commission, 2018a).
- **Continue to tackle the impacts of plastic waste exports.** Ensure proper enforcement of EU and international rules on exports of plastic waste, in particular to less-developed countries, to ensure that exports are only made to countries that are willing to receive such waste and able to process it in a way that does not have detrimental environmental or social impacts. Consider the use of Aid for Trade and development cooperation policies to provide technical assistance to countries receiving plastic waste to allow them to meet the necessary environmental standards.
- **Actively pursue the development of ambitious global policies to reduce plastic pollution.** Since plastic pollution is a global problem, concerted and coordinated action is needed on a global scale. The CEAP states that the EU will lead international efforts to reach a global agreement on plastics and promote globally the use of a circular economy approach on plastics. This pledge should be kept, and the EU must play a leading role in the development of the new legally binding international agreement on plastics pollution.

References

- Brooks, A. L., Wang, S., & Jambeck, J. (2018, June 20). The Chinese import ban and its impact on global plastic waste trade. *Science Advances*, 4(6). Retrieved from <https://advances.science-mag.org/content/4/6/eaat0131>
- Circular Plastics Alliance. (2020). *Executive summary - State of play for collected and sorted plastic waste in Europe*. Retrieved from <https://ec.europa.eu/docsroom/documents/43694>
- Ellen MacArthur Foundation. (2016). *The new plastics economy - Rethinking the future of plastics*. Retrieved from <https://ellenmacarthurfoundation.org/the-new-plastics-economy-rethinking-the-future-of-plastics>
- ENDS Europe. (2021). *Delay to microplastics crack-down causing huge environmental damage, campaigners warn*. Retrieved from <https://www.endseurope.com/article/1734221/delay-microplastics-crack-down-causing-huge-environmental-damage-campaigners-warn>
- European Bioplastics. (2019). *Bioplastics market data*. Retrieved from <https://www.european-bioplastics.org/market>
- European Commission. (2018a). *COMMISSION STAFF WORKING DOCUMENT IMPACT ASSESSMENT Reducing Marine Litter: action on single use plastics and fishing gear (SWD/2018/254 final)*. Retrieved from <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=SWD%3A2018%3A0254%3AFIN>
- European Commission. (2018b). *COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS A European Strategy for Plastics in a Circular Economy (COM/2018/028 final)*.
- European Environment Agency. (2021). *Plastics, the circular economy and Europe's environment - A priority for action*. Retrieved from <https://www.eea.europa.eu/publications/plastics-the-circular-economy-and>
- European Environmental Bureau. (2022). *EU's detox pledge sabotaged by illegal delay to microplastics regulation*. Retrieved from <https://eeb.org/eus-detox-pledge-sabotaged-by-illegal-delay-to-microplastics-regulation/>
- Eurostat. (2022a). *Generation of waste by waste category, hazardousness and NACE Rev. 2 activity (ENV_WASGEN)*.
- Eurostat. (2022b). *Treatment of waste by waste category, hazardousness and waste management operations (ENV_WASTRT)*.

- Material Economics. (2019). *Industrial transformation 2050 - Pathways to net-zero emissions from EU heavy industry*. Retrieved from <https://materialeconomics.com/publications/industrial-transformation-2050>
- OECD. (2022a). *Global Plastics Outlook: Economic Drivers, Environmental Impacts and Policy Options*. Retrieved from <https://www.oecd-ilibrary.org/sites/de747aef-en/index.html?itemId=/content/publication/de747aef-en>
- OECD. (2022b). *Global Plastics Outlook: Policy Scenarios to 2060*. Retrieved from <https://www.oecd-ilibrary.org/sites/aa1edf33-en/index.html?itemId=/content/publication/aa1edf33-en>
- OECD and IEA. (2018). *The future of petrochemicals - Towards more sustainable plastics and fertilisers*. Retrieved from https://read.oecd-ilibrary.org/energy/the-future-of-petrochemicals_9789264307414-en#page1
- Plastics Europe. (2022a). *Plastics - the Facts 2021*. Retrieved from <https://plasticseurope.org/knowledge-hub/plastics-the-facts-2021/>
- Plastics Europe. (2022b). *The Circular Economy for Plastics: A European Overview*. Retrieved from <https://plasticseurope.org/knowledge-hub/the-circular-economy-for-plastics-a-european-overview-2/>
- Spierling, S., Knüpfner, E., Behnsen, H., Mudersbach, M., Krieg, H., Springer, S., . . . Endres, H.-J. (2018). Bio-based plastics - A review of environmental, social and economic impact assessments. *Journal of Cleaner Production* 185, pp. 476-491(185), 476-491. doi:10.1016/j.jclepro.2018.03.014
- UNEP. (2022a). *UNEP Event: Ad hoc open-ended working group (OEWG) to prepare for the intergovernmental negotiating committee on plastic pollution*. Retrieved from <https://www.unep.org/events/unep-event/Intergovernmental-Negotiating-Committee-end-plastic-pollution>
- UNEP. (2022b). *UNEP head responds to questions on global plastics agreement*. Retrieved from <https://www.unep.org/news-and-stories/story/unep-head-responds-questions-global-plastics-agreement>
- World Trade Organization. (2022a). *Plastics pollution and environmentally sustainable plastics trade*. Retrieved from https://www.wto.org/english/tratop_e/ppesp_e/ppesp_e.htm
- World Trade Organization. (2022b). *Trade must be part of the global effort to address plastics pollution: DDG Paugam*. Retrieved from https://www.wto.org/english/news_e/news22_e/ddgjp_01apr22_e.htm

Yale School of the Environment. (2019). *Piling Up: How China's Ban on Importing Waste Has Stalled Global Recycling*. Retrieved from <https://e360.yale.edu/features/piling-up-how-chinas-ban-on-importing-waste-has-stalled-global-recycling>

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