WAYS OUT OF THE PLASTIC CRISIS

DEMANDS FROM GERMAN CIVIL SOCIETY

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Ways out of the plastic crisis: Demands from German civil society

German Marine Litter Association (Bundesverband Meeresmüll e.V.), Friends of the Earth Germany (Bund für Umwelt und Naturschutz Deutschland e.V., BUND), German Ocean Foundation (Deutsche Meeresstiftung), Environmental Action Germany (Deutsche Umwelthilfe e.V., DUH), Food & Water Europe, Greenpeace, Heinrich Böll Foundation (Heinrich-Böll-Stiftung), Health and Environment Justice Support (HEJSupport), Green Bauhaus Foundation (Stiftung Grünes Bauhaus), Surfrider Foundation Germany, Women Engage for a Common Future (WECF)

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Stop flooding the world with plastic!

Plastic engulfing our environment – this is one of the most visible and most serious ecological problems in today's world. Plastic is a deadly hazard for many creatures that consume it in their food. The deluge of plastic also threatens human health: microplastic has even been detected in the human bloodstream. And the production and consumption of plastic also fuel climate change.

For the first time in Germany, major civil society actors have come together in an alliance to resolve the plastics crisis and have formulated 15 demands for the German government to act on.

Sadly, Germany is the European leader in the use of plastics. That puts a special responsibility on us to find a solution to this worldwide problem. It is now time to act, and to act decisively.

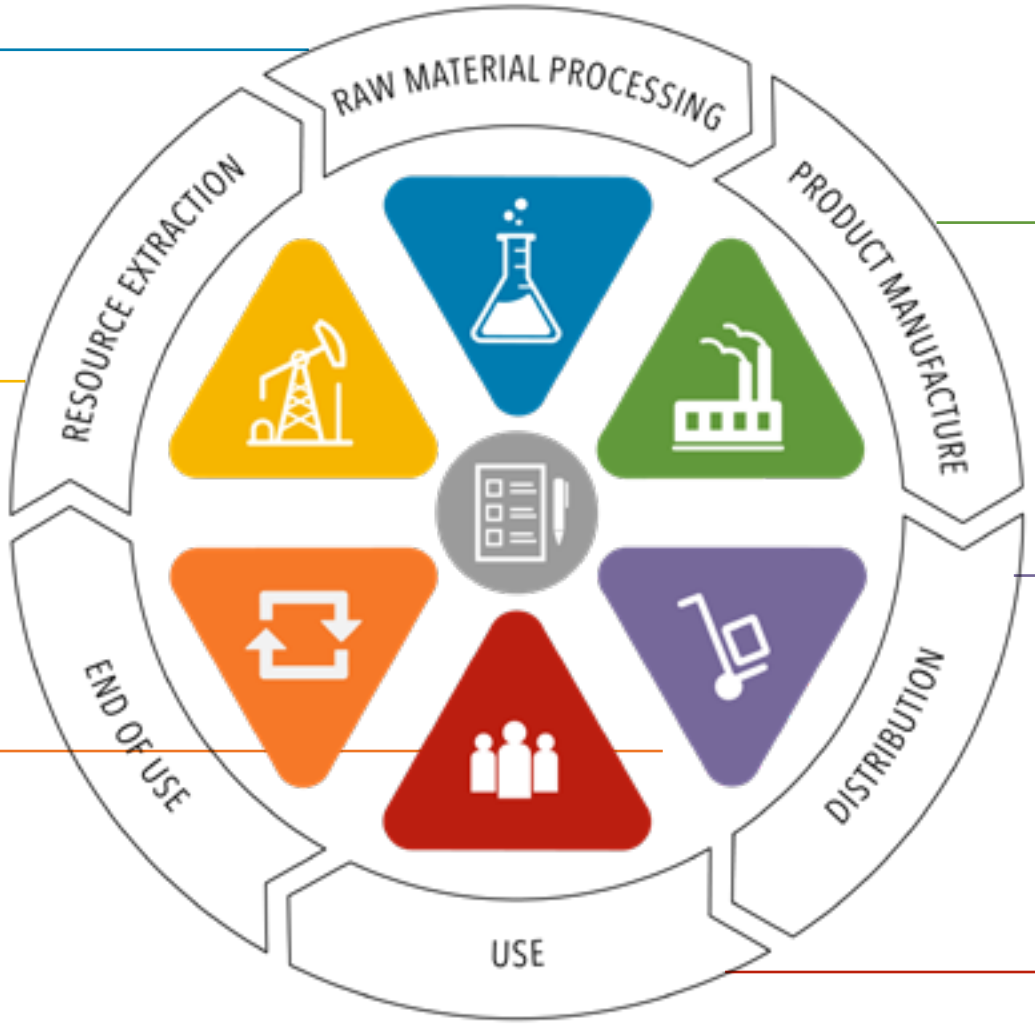
Overview

1 Reduce the consumption of Plastic

2 Hold manufacturers and distributors liable for damage

3 Raise awareness and require information availability and transparency

4 Promote a global agreement to combat the flood of plastic



Ban the use of hazardous substances as additives to raw materials **15**

Reduce the use of raw materials **14**

Prevent waste **13**

5 Stop single-use plastics

6 Promote sustainable product design

7 Manufacture products without hazardous substances

8 Ban primary microplas

9 Restrict the use of plastics in logistics chains

10 Prevent the release of microplastics through wear and tear

11 Promote reusables

12 Stop the disposal and loss of plastic at sea

What is plastic?

Plastics belong to the anthropogenic polymers. Polymers are a group of chemical compounds that consist of long-chained macromolecules that in turn consist of a multitude of small units known as monomers that repeat themselves according to certain laws.[1] "Anthropogenic" means they are artificial, made by humans. In this document, we use the definition of the Fraunhofer Institute for Environmental, Safety and Energy Technology, UMSICHT: **anthropogenic polymers** encompass the entirety of polymers in the environment. Alongside micro- and macroplastic, they also include dissolved, dispersed, gel-like and liquid polymers, as well as natural polymers that, through human activity, have been transformed or transferred to other environmental compartments.[2]

When using the term plastic, we also use the definition of the Fraunhofer Institute UMSICHT: Plastic is a material consisting of synthetic, semi-synthetic and microbial polymers produced in technical processes. Plastics are divided into three subgroups: thermoplastics, elastomers and thermosets.[3]

- **Thermoplastics** are easily deformable within certain temperature ranges.
- **Elastomers** are stable in shape but can be deformed elastically; they return to their original shape after stress.[4]
- **Thermosets** are closely cross-linked plastics which, after curing, are no longer malleable by heating and are rather hard and brittle.[5]

Microplastics also consist of artificially produced polymers. The term "microplastics" has not yet been consistently defined and is used in different senses. In this document, we use the definition from the GESAMP report, cited by the United Nations Environment Programme (UNEP),[6] as particles of plastic in the size range 1 nm to <5 mm.[7] However, this definition is not suitable for problem-oriented differentiation, which is needed from the point of view of environmental sciences. For example, it makes no clear distinction between micro- and nanoparticles, and fails to specifically consider physicochemical parameters.[8]

Furthermore, we are guided by the differentiation and typology of microplastics carried out by the Fraunhofer Institute UMSICHT. This differentiates between primary and secondary microplastics.

Primary microplastics include **type-A** microplastics, which are produced intentionally (e.g., to create friction in cosmetics, as blasting media and in plastic pellets), and **type-B** microplastics, which are produced when a product is used (e.g., through the abrasion of tyres and the release of synthetic fibres during washing).

Secondary microplastics include microplastics resulting from the weathering and slow fragmentation of macroplastics in the environment, such as the decay of improperly disposed plastic waste.[9]

Synthetic (or anthropogenic) polymers include macroplastics (particles larger than 5 mm in diameter) and particulate microplastics, along with dissolved, liquid, gel- or wax-like synthetic polymers (regardless of their state of aggregation), such as those used in the cosmetics industry and in detergents and cleaning agents.

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1 Miklos et al. 2016
2 Bertling et al. 2018, p. 45 (own translation)
3 Ibid.
4 Ibid., p. 44
5 Ibid.
6 UNEP 2016
7 GESAMP 2015, p. 14
8 A proposal for a differentiated definition based on the approaches used internationally to date is: Nanoplastic: 1 to <1000 nm, Microplastic: 1 to <1000 µm, mesoplastic: 1 to <10 mm, macroplastic: 1 cm and larger. Source: Hartmann et al. (2019)
9 Bertling et al. 2018

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WAYS OUT OF THE PLASTIC CRISIS

DEMANDS FROM GERMAN CIVIL SOCIETY

The plastics crisis

Since the 1950s, plastics have become a mass product. Global production amounts to more than 400 million tonnes per year,[10] and this figure is expected to rise to over 600 million tonnes by 2030.[11] According to Plastics Europe, a manufacturers' association, in Europe (the 28 states of the European Union [up to 2019], plus Norway and Switzerland) the demand for plastics in 2017 was over 51 million tonnes – mostly for packaging (40%). With around 25%, Germany accounts for the biggest slice of demand.[12]

Improper disposal results in the release of around 35 million tonnes of plastics into the environment every year, 5–13 million tonnes of which end up in the oceans,[13] where they cause devastating damage. While the problem of macro- and microplastics in rivers and the sea has been recognized, little is known about the contamination of the soil and air with microplastics, which is released into the environment in various ways, including from tyre abrasion and wear and tear of artificial turf pitches and textiles, or into fields via sewage sludge, biowaste compost and fermentation residues.[14] According to a 2016 estimate, alone in Germany some 9,700 tonnes of microplastics a year are spread onto fields as part of sewage sludge.[15]

In Germany, an estimated 5.4 kg of plastics per person are released into the environment each year. Of this, 26% is macroplastics and 74% microplastics.[16] Due to the longevity of plastics,[17] increasing production volumes, improper disposal and low recycling rates, the amount of plastics in the environment worldwide can be expected to rise significantly in the coming years.[18] Releasing plastic into the environment not only causes devastating damage in the oceans and on land. This material is also lost for recycling or energy recovery, so represents a waste of valuable resources and energy.

Plastics in the environment already pose a deadly risk for many organisms. Animals mistake them as food; they thus enter the food web, along with the chemicals they contain or are attached to. That generates a health risk for both animals and humans that has so far been little researched.[19] What is clear is that numerous additives that are hazardous to health and the environment are used in the production and processing of plastics. They form a burden for both humans and the environment throughout their entire product life cycle, and make it difficult to recycle the materials.[20]

In 2016, Europe's (EU-28, plus Norway and Switzerland) official recycling schemes collected 27 million tonnes of plastic, 42% of which was for energy recovery (incineration and use of the energy generated), 31% for recycling and 27% for landfill.[21] In 2017 in Germany, the supposed world champion of recycling, 3.15 million tonnes (61%) of 5.2 million tonnes of post-consumer plastic waste collected went directly to incineration.[22] Another 2.02 million tonnes (39%) were sent for recycling, with only 0.81 million tonnes of this recycled material being used to make more plastic.[23] This is just 15.6% of the total plastic waste collected. Around 710,000 tonnes of the plastic waste collected in Germany and destined for recycling were exported to other countries.[24] Due to inadequate disposal techniques in importing countries, the annual export of thousands of tonnes of German plastic waste causes serious ecological and social consequences.[25]

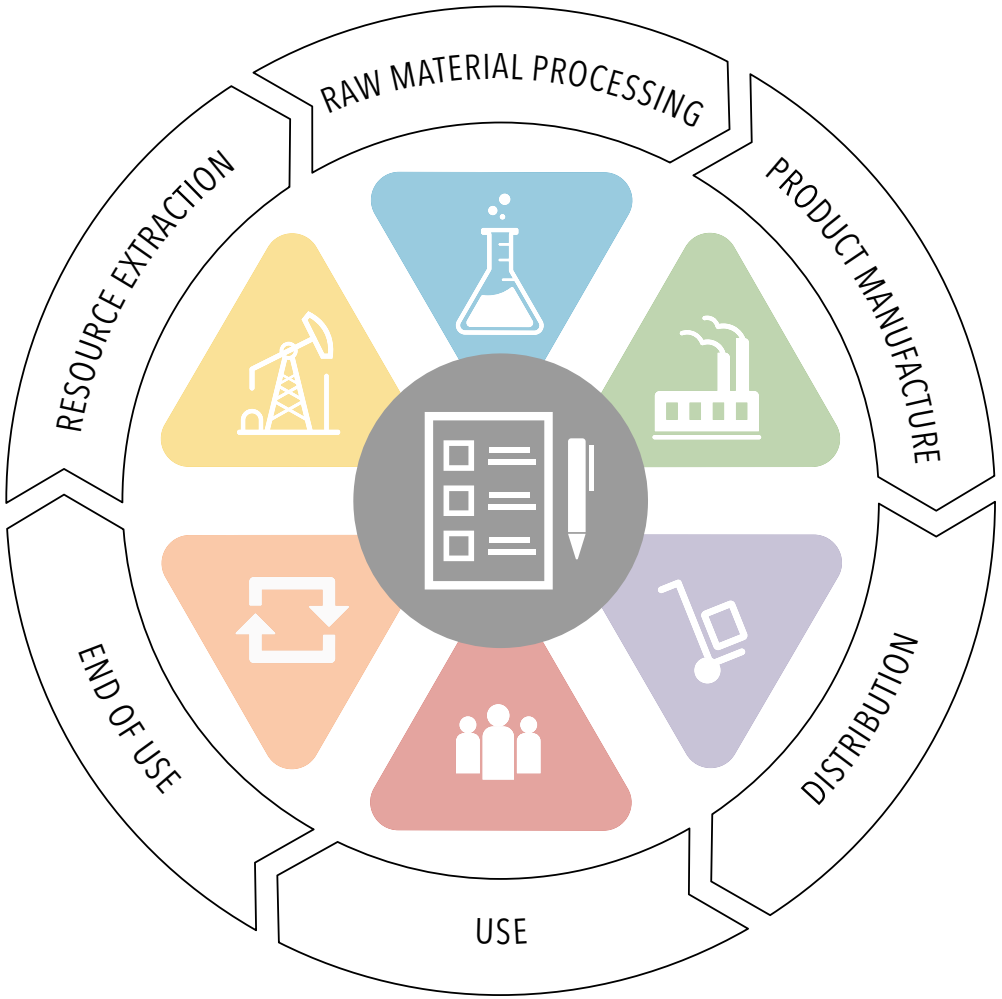
Fossil raw materials are used to make 99% of the worldwide output of plastic,[26] and making plastic accounts for around 6% of global oil consumption.[27] If current trends continue, this figure will rise to 20% by 2050.[28] Greenhouse gases are produced throughout the entire life cycle of plastic. Production of plastic and incineration of the resulting waste alone was predicted to be responsible for the release of more than 850 million tonnes of climate-damaging greenhouse gases into the atmosphere in 2019, equivalent to that from 189 coal-fired power plants.[29] If plastics production and incineration grow as predicted, by 2050 the cumulative greenhouse-gas emissions may triple to 56 gigatonnes. [30] This would correspond to 10–13% of the remaining global carbon budget that must be adhered to in order to stay within the 1.5°C target for global warming.[31] It would counteract the decarbonization of the global economy needed to comply the Paris climate-protection goals.

To a certain extent, fossil raw materials used to make plastic can be replaced by renewables, but these generally offer no advantage when all the environmental impacts are considered. Instead of a real solution, the problem is merely shifted somewhere else. This is because the production

and processing of crops such as maize as raw materials also requires large amounts of resources[32] and fossil energy.[33] The crops are mainly grown using conventional methods. Side-effects include the encroachment of natural areas, eutrophication of water, soil and water acidification, and the loss of biodiversity.[34] As conventional plastics are replaced by substances made from renewable raw materials, it can be expected that competition for land will increase, for example between renewables and food and feed.[35]

Plastics labelled as "biodegradable" also offer few advantages over non-degradable plastics. When they are composted, they do not form significant quantities of valuable soil components, and when fermented, they make only a small contribution to the production of biogas.[36] They decompose poorly in composting and fermentation plants, so are often sorted out and incinerated in advance.[37] Because they are not distinguishable from conventional plastic, they are easily disposed of as such, impairing the quality of the secondary raw materials produced in recycling [38] If plastics labelled and advertised as "biodegradable" or "compostable" end up in the sea or on the land, they have a similar lifespan there to conventional plastics and can cause considerable damage before they degrade completely.[39]

10 Geyer et al. 2017
11 Geyer 2020
12 Plastics Europe 2018
13 Jambeck et al. 2015
14 Nizetto et al. 2016; Weithmann et al. 2018
15 Nizetto et al. 2016
16 Bertling et al. 2018
17 E.g. Barnes et al. 2009
18 Jambeck et al. 2015; Geyer et al. 2017
19 Wright & Kelly 2017
20 CIEL et al. 2019
21 Plastics Europe 2018
22 Conversio 2018
23 Ibid.
24 Ibid.
25 Arkin 2019
26 CIEL et al. 2019
27 WEF 2016
28 CIEL et al. 2019
29 Ibid.
30 Ibid.
31 IfBB 2018
32 CIEL et al. 2019
33 UBA 2012
34 UBA & BMU 2007; Colwill et al. 2012
35 BUND 2011; UBA 2012; DUH 2018; UBA 2018; Lauwigi 2019
36 BUND 2011; DUH 2018; UBA 2019
37 BUND 2011
38 Napper & Thompson 2019



Demands throughout the life cycle

01 Reduce the consumption of plastic

02 Hold manufacturers and distributors liable for damage

03 Raise awareness and require information availability and transparency

04 Promote a global agreement to combat the flood of plastic

1 Reduce the consumption of plastic

Absolute reduction of the production, consumption and emissions of all synthetic plastics, with no exceptions for bio-based plastics or plastics labelled as biodegradable, and no substitution by single-use products made of other materials.

Plastic production is booming. Between 1950 and 2015, more than 8.3 billion tonnes of plastic were produced worldwide,[40] by 2017 the figure had reached 9.2 billion tonnes.[41] That is more than one tonne of plastic per person currently living on the planet. The dangers to health, the environment and the climate that plastic poses throughout its entire life cycle are becoming increasingly obvious. They range from health and environmental risks due to the use of problematic chemicals in production and processing, massive release into the environment and fatal risks for many living creatures, to the exacerbation of the climate crisis due to huge emissions of climate-damaging greenhouse gases during production and disposal.

Current patterns of production, use and disposal of plastics must change fundamentally in order to contain the risks to health, the environment and climate. In order to tackle the plastics problem, we demand that the German government take all necessary political and legal steps to achieve an absolute reduction in the production, consumption and emissions of all synthetic plastics. Only if plastics are consistently avoided will it be possible to minimize the health risks resulting from their production, use and disposal in accordance with the precautionary principle, stop the massive pollution and destruction of habitats on land and in water, prevent the waste of valuable resources, and protect the climate.

No exceptions should be made for bio-based plastics and plastics labelled as biodegradable, as they have no significant advantages over conventional plastics in terms of resource use, climate and environmental protection. The supposed environmental friendliness of "bioplastics" suggested by the term "bio" is misleading and can encourage the wasteful use and greater uncontrolled disposal (or "littering") of plastics (see also Demand 3). Waste avoidance and a renunciation of short-lived plastic products and single-use plastics, whether "bio" or conventional, must have top priority (see also Demands 11 and 13).

Short-lived plastic packaging and products must not be substituted by disposable products made from other materials. Environmental and climate protection begins with avoiding unnecessary single-use products and disposable packaging in production and trade. Materials such as paper and aluminium also have problematic ecological balances throughout their life cycle. More sustainable and resource-saving solutions must be pursued to comply with planetary boundaries. This requires a social change, away from a throwaway to a zero-waste culture (see also Demand 3). The five-level European waste hierarchy, with prevention at the highest level,[42] must be consistently implemented (see also Demand 13). This requires the legal definition and consistent adherence to reduction and reuse targets for packaging as well as the expansion and promotion of reuse systems (see also Demands 2, 11 and 13). A resource tax or earmarked levy on particularly environmentally harmful single-use articles should also be established. Conversely, low-waste reusable packaging should be granted tax incentives (see also Demands 5 and 13).

2 Hold manufacturers and distributors liable for damage

Enforcement of the polluter pays principle along the entire value chain by introducing and implementing a more ambitious extended producer responsibility for all plastic products and packaging.

In the EU Directive on Single-Use Plastics ("SUPD"), the Extended Producer Responsibility (EPR) regulations cover the costs of clean-up and raising consumer awareness for single-use articles.[43]

By the end of 2024, producers of certain single-use plastic products will be required to contribute to the costs of collecting, transporting and treating the waste, as well as for cleaning and awareness raising measures.[44] This includes makers of certain food-packaging items (e.g., for fast food and takeaway meals), beverage containers under 3 litres, balloons, wet wipes, tobacco products (the deadline for which is early 2023), light plastic carrier bags, etc.[45]

The Directive is a first step towards creating a comprehensive framework for producer responsibility in waste management. However, it is neither clear nor ambitious enough to address the scale of the plastics problem and to provide sufficient certainty for investment in alternative and reuse systems.

For the Directive to be effective, it must be implemented at the national level.

1. It must have a clear, binding target for reduction at source, and
2. the reduction must be supported by a binding EPR – both in terms of financial contributions to achieve reduction and reuse targets, and through transparency on the part of companies.

For producers and distributors, a major responsibility according to the "polluter pays" principle consists of **routinely internalizing the health, climate and environmental costs of plastic products throughout the full product life cycle**. EPR implies that producers and distributors have a responsibility not only for the disposal of their products but also for prevention measures and for targets to avoid waste. EPR also includes the responsibility for cleaning costs, on land, in the sea and in surface water (see also Demands 8 and 10). EPR includes the design and creation of distribution systems that are adapted to local conditions and do not use disposable plastic (see also Demand 11). It must ensure the promotion of reuse and deposit systems. It also means the development of durable and repairable products designed for high-quality and clean recycling, and the production of new high-quality and safe products, without the introduction of chemical contaminants (see also Demand 6).

To achieve the end of the linear throwaway business model and replace it with a true circular economy, the **precautionary principle must be strictly applied to both recycling and the use of bio-based substitutes.** Prior to marketing, the producer must prove by means of appropriate data that the product poses no risk to the environment or health, either during production or during and after use. The principle of **reversal of the burden of proof** applies here.

The EPR includes **transparency over the entire product life cycle** (see also Demand 3). The items must be traceable back to the raw-material producer, and this information must be publicly available. Transparency in the supply chain includes the collection, processing and publication of data on production, distribution and waste generation for all plastic products. In accordance with the right-to-know principle, manufacturers and distributors must disclose all measures taken to prevent or reduce pollution at source, as well as all efforts to introduce reuse systems and recycling, including information on hazardous substances in the materials.

Hazardous substances are those substances that have hazardous properties and may endanger human health or the environment.[46] The Greenpeace Detox Commitment[47] provides guidance on how to identify these chemicals. The establishment and regular review of an appropriate list of substances with hazardous properties are required. Examples of such lists can be found in the Detox Commitments[48] or in comprehensive lists such as Chemsec's Substitute It Now (SIN) list.[49]

3 Require openness and transparency, and raise awareness

Awareness raising, education and transparent information transfer throughout the entire product life cycle about the risks of plastics and their constituents to humans, the environment and climate and on strategies to avert these risks.

Germany is Europe's leader in plastics – in a negative sense: it is the continent's biggest plastic consumer.[50] But public attention and awareness of the problem is increasing. Some 96% of people in Germany see plastic waste as the greatest danger to the oceans.[51] In a representative survey, 56% of respondents said they were concerned about microplastics in food.[52] More and more consumers want to reduce their consumption of plastics: most say they would like to have fewer plastics in their lives.[53] Representative surveys show, for example, that a large part of the German population would welcome less plastic packaging for their food.[54] But plastic products are ubiquitous, and habits and usage patterns in our consumer culture make it hard to cut consumption in everyday life. At the same time, there is a lack of differentiated and holistic information on the effects on the environment and climate of the mass use of disposables compared to reusables, one that takes into account the entire product life cycle, as well as the problem of substituting disposables made from one material with disposables made from some other material.

A mishmash of labels and designations leads to confusion among the public and makes it difficult to weigh up the ecological consequences of individual products and their alternatives. Paper bags, for example, continue to enjoy a better ecological image than plastic bags, although from an overall ecological perspective they are not necessarily any better.[55] In sharp contrast to the one-sided flood of information and the mass of current alternatives to plastic products, silence reigns about the harmful substances that plastics may contain and that pose risks to human health and the environment (see also Demands 15 and 7). There is no complete declaration of the substances that plastic products and packaging contain, or of those used in processing.

Clear, independent labelling and terminology are necessary to facilitate consumer decisions based on health and environmental considerations and to avoid misleading consumers. It is still difficult to distinguish between single-use and returnable, multi-use drinks bottles.[56] Labels such as "compostable" on bioplastic bags used for organic waste contribute to confusion, as they are usually not decomposed in composting plants and are not suitable for disposal in organic waste or in home composting.[57] The same applies to other products such as "compostable" organic (bio) coffee capsules. The ambiguous use of the term "bio" also makes it difficult to distinguish plastic products and packaging that are bio-based from those that are biodegradable. However, the term "bioplastics" is particularly problematic in itself, as it suggests environmental friendliness that does not in fact exist (see also Demand 1).

Action is also needed on the disposal of plastic products. The complexity of municipal waste-management systems requires additional education of the population so that households can contribute optimally to the waste-management system.

We therefore call on the government to make a **declaration obligatory on all plastic products intended for consumers through simple, easily identifiable labels**. These should be integrated into existing labels where possible (e.g., the Blauer Engel, Blue Angel ecolabel). They should clarify the following points:

- The **ecological footprint** of the products (along the entire life cycle of the product, including potential disposal risks).
- **Potential health hazards**, taking into account all additives, with particularly clear labelling for especially vulnerable groups such as pregnant people and children.
- The **intended use** and possible risks due to incorrect use (e.g., wet-wipes made of synthetic fibres should not be disposed of in a toilet).
- Clear labelling for **proper disposal** (which waste bin should it go in?) and how packaging is to be separated.

To protect consumers, reduce uncertainties and provide a basis for informed consumer

decisions, information on hazardous substances in plastics that affect health and the environment must be given greater focus. This information should be made available to consumers, for example in a digital application that can be accessed by scanning the barcode, displayed in online shops and made available in analogue information tables on the shelves in shops. In addition, more information must be provided on the environmental and climate impact of the current use of plastics and especially the mass use of single-use products. We also call on the government to require:

- **A complete declaration of the substances contained in plastic products and packaging and used in production**, whereby the obligation to declare must apply **along the entire supply chain**, so that safe handling and processing of plastic products can be ensured in all processes of the value chain (occupational health and safety, product safety, use, further use/reprocessing) (see also Demands 6, 7 and 15).
- **Transparency in the manufacturing chain** so that it is possible to determine at any time which substances are contained in the product and what risks exist for humans and the environment (see also Demands 6, 7 and 15).
- The **awareness-raising of consumers about the substances that are (or may be) contained in or on plastic products and packaging** and their consequences for human health and the environment.
- The **provision of information on the negative effects of endocrine disruptive chemicals** (EDC) and the listing of suspected EDC candidates.
- **Awareness-raising about the occurrence and formation of microplastics** (e.g., by washing synthetic textiles, tyre abrasion, artificial turf pitches and fragmentation of plastic waste released into the environment), the resulting health and environmental risks, and ways to avoid them.
- **Education about the precautionary principle and extended producer responsibility.**

To exploit the enormous potential to reduce plastics through consumer behaviour and to promote sustainable behaviour patterns, and in particular to counteract the substitution of single-use plastic products with single-use items made from other materials, it is essential to provide clear and simple information about possible behavioural alternatives and reuse systems. We call on the government to ensure:

- **Clear labelling of single-use and reusable products and packaging, both on the product and on the packaging.**
- **Wide-ranging information and education campaigns** on practicable reuse solutions and existing reuse systems, the switch away from unecological habits, and on the subject of "zero waste".
- At the federal state level, work towards **incorporating the issues of "resource management" and "conscious consumption" in school curricula** and vocational education and training.

To prevent littering and improper disposal of waste, we demand that the government:

- **Provide easily understandable information regarding correct waste disposal and the return of consumer goods that are no longer needed.**
- **Provide sufficient free disposal and return facilities and structures for consumers.**
- Enforce regulatory measures to **punish littering and fly-tipping.**

4 Promote a global agreement to combat the flood of plastic

The German government must proactively advocate a binding global legal framework under international law to solve the plastic problem along the entire life cycle of plastic and support the achievement of internationally formulated goals.

Plastic is a global problem. Single-use plastic products have become a symbol of modern life and, as lifestyle products, enjoy increasing importance worldwide. Everywhere, people are employed in the production and processing of plastics for the world market, sometimes in dangerous workplaces. Plastic waste is traded globally. Plastic released into the environment is transported to every corner of the earth by ocean currents and wind, with negative consequences for biological diversity. Moreover, greenhouse gases from the production and disposal of plastic are accumulating in the atmosphere and contribute to global warming.

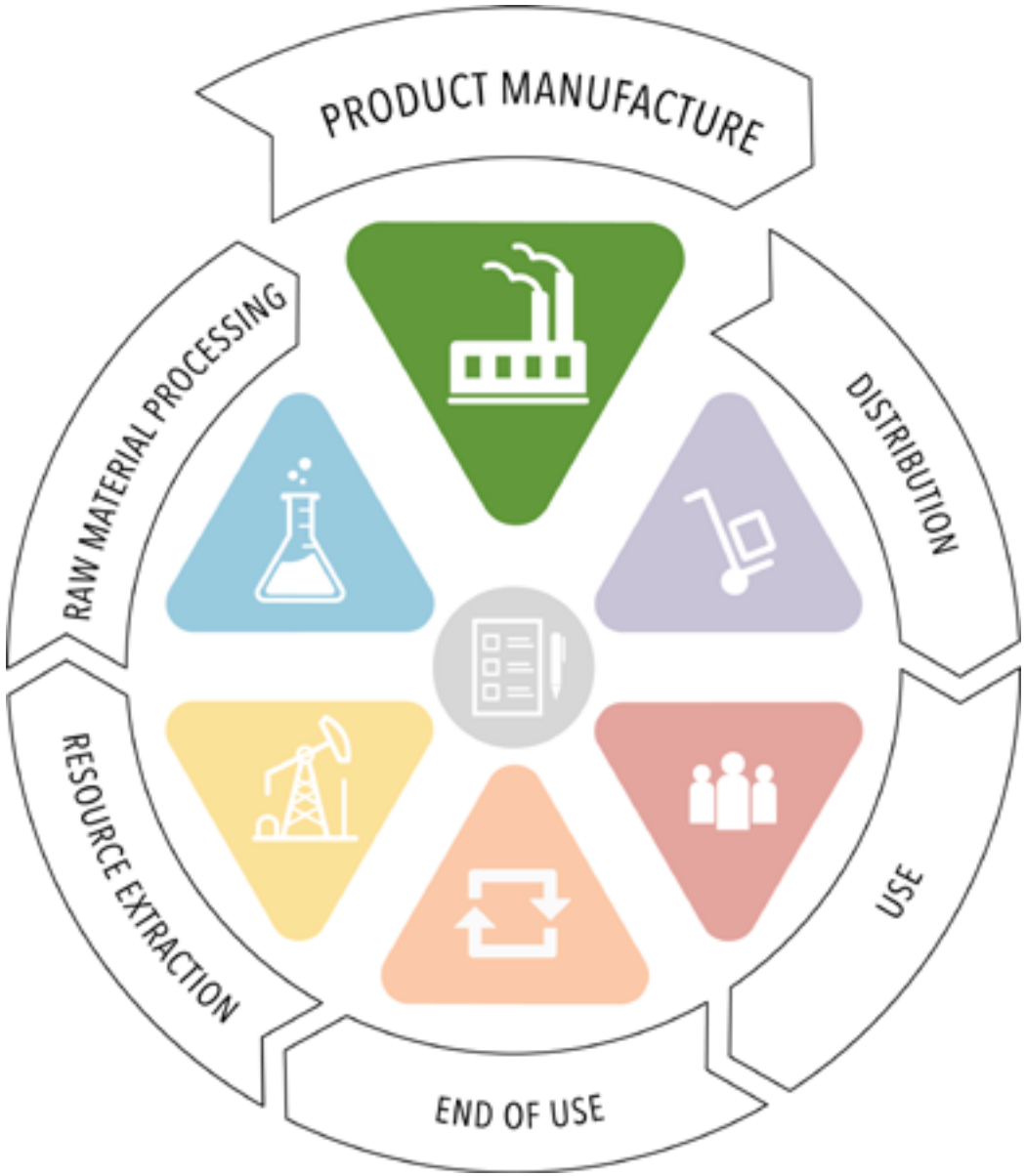
Existing international agreements on plastics are highly fragmented and ineffective. Binding international regulations have not yet been put in place to counteract land-based inputs into international waters, for example via rivers. It is becoming increasingly clear that the problem cannot be solved at the national or regional level alone. Although voluntary initiatives, commitments and measures by individual states or industry are welcome, they have not yet led to a reduction in the globally boom in plastic consumption, nor have they been able to prevent ever larger quantities of plastic waste from being released into the environment. What is therefore urgently needed at the global level is a legally binding international agreement that commits states worldwide to the common goal to contain the health risks posed by plastics, minimize the negative effects on the climate and biodiversity, and stop the entry of plastics into the environment.[58]

We therefore call on the German government to **proactively work towards a global, internationally binding and holistic framework agreement to solve the plastics problem** and to work towards this in existing committees and working groups.[59] Such an agreement should address the negative impacts of plastics along the entire value chain, from the extraction of raw materials to the handling of plastic waste. It should not only address the visible problems (mountains of waste, pollution of seas and coasts with waste). It should also include restrictions and a ban on pollutants in plastics that are hazardous to health, climate and the environment. Parties to the agreement should be required to provide systemic solutions for a circular economy and waste management.

A binding agreement under international law is required that includes the following aspects:

- A **plastic pollution reduction plan**: clear reduction targets in accordance with an action plan for the production of plastics and for the input of plastics into the environment.
- **Target values for national reuse and recycling rates** and for the use of recycled plastics.
- **National plastic pollution reduction plans** to achieve the objectives of the agreement.
- **National reporting obligations** and compliance mechanisms.
- **Obligation of the economically stronger contracting countries** to support weaker countries with sustainable and plannable financial and technical support in the development of solutions and the achievement of objectives, in the sense of a "just transition".
- **Extension of producer responsibility (EPR)** in the production and marketing of plastics, so that reuse and deposit systems, waste-management systems and the circular economy are strengthened internationally.
- **Prevention of waste exports to countries** without high-quality recycling by coordinating all international tasks in existing plastic-relevant multilateral environmental agreements (MEAs).
- **Supply chains geared towards sustainability and transparency** in accordance with the Agenda 2030 for Sustainable Development.

40 Geyer et al. 2017
41 Geyer 2020
42 EU Waste Framework Directive 2008
43 Awareness-raising activities here include especially information about reusable alternatives, reuse systems and waste-management systems, along with the effects of littering and improper disposal into the environment or the sewage system. (for a detailed listing see Article 10 of the EU Single-Use Plastics Directive, "SUPD", 2019)
44 Ibid., Article 8
45 Ibid., Part E of the appendix to the EU Directive (listing of the relevant single-use plastic articles)
46 The definition of substances with hazardous properties covers all pollutants that have intrinsically hazardous properties: "PBT" = persistent, bioaccumulative and toxic; "vPvB" = very persistent and very bioaccumulative; "CMR" = carcinogenic, mutagenic and toxic for reproduction; "ED" = endocrine disruptors; other properties of similar concern (not just those that have been regulated or restricted in other regions). For definition of terms see glossary.
47 Greenpeace 2018
48 E.g., Tchibo Greenpeace Detox Commitment 2014
49 SIN: Substitute It Now, see: ChemSec 2019
50 Plastics Europe 2018
51 BMU 2017
52 BfR 2018
53 BMBF 2017
54 vzbv 2019
55 Bisinella et al. 2018
56 AK Mehrweg GbR 2018
57 UBA 2019
58 Heinrich-Böll-Stiftung 2019
59 Deutscher Bundestag 2018



Demands on Product Manufacture

- 05 Stop single-use plastics
- 06 Promote sustainable product design
- 07 Manufacture products without hazardous substances
- 08 Ban primary microplastic

5 Stop single-use plastics

Drastic reduction of the production and marketing of single-use products (plastics and other materials) through an effective mix of instruments according to a scheduled action plan.

It is especially disposable packaging and other single-use products that waste valuable resources in their production and pollute land and sea through their improper disposal. In Germany alone, the consumption of single-use cups for drinks rose by 102% from 1994 to 2017, and the consumption of single-use plates, bowls and boxes went up by 173%.[60] Some 63% of fruit and vegetables are now packed in plastic and cardboard.[61] Plastic bags, PET bottles, balloons, straws, plastic crockery and cutlery, cotton buds and cigarette butts are particularly common on European beaches.[62]

The Single-Use Plastics Directive adopted by the EU Council in May 2019 is an important first step towards reducing the enormous amounts of waste caused by single-use plastic products and packaging. Among other things, the directive requires certain single-use plastic products to be banned by 2021. But the list of banned products is too short; reusable alternatives already exist for a much broader range of products. Above all, the focus should be placed much more strongly on eliminating single-use packaging. According to the directive, EU member states can decide for themselves how to implement an ambitious and sustainable reduction of single-use plastic cups and other food packaging for immediate consumption (either takeaway or eat-in). A **national-level ban** is explicitly permitted; Germany should put it into effect accordingly. That this is possible is shown by the ban on plastic bags that came into force on 1 January 2020. The **marketing of other single-use products and packaging should also be restricted** in order to consistently implement the European waste hierarchy, the top priority of which is prevention.[63]

In order to reduce the consumption of environmentally harmful single-use products quickly and effectively, further financial guidance instruments are necessary in addition to the implementation of a binding EPR (see also Demand 2). The German government should therefore introduce a **resource tax** (see also Demand 14) or set **earmarked levies on particularly environmentally harmful single-use items**. The rapid and decisive effect of financial incentives is demonstrated by the example of Ireland, where a levy of 22 cents on plastic bags led to a 96% reduction in consumption.[64] An appropriate sum for a levy, for example on plastic bags, disposable plastic bottles and takeaway coffee cups, is at least 20 cents. In contrast to voluntary arrangements, such a levy means that the funds can be used for the specific purpose of financing waste-avoidance measures and are not available to retailers to pay for marketing. Conversely, **low-waste, reusable packaging should be given tax breaks and promoted**, for example through a lower VAT rate. Binding **reuse quotas should be legally defined and consistently implemented** (see also Demand 11). **Concrete reduction targets for single-use products and packaging** must be set by law (see also Demand 13).

In order to adhere to the European waste hierarchy and to protect resources and the climate, it is essential that the **above measures not be limited to single-use products made of plastic**. The massive environmental problems that plastic waste causes in the marine ecosystem are shocking and require immediate action. But it must not be forgotten that the root cause is not plastic in itself, but lies in our throwaway consumer society. Switching to disposable products made of other materials would merely shift environmental problems and would not reduce the mountains of waste. Enormous amounts of water and energy are used to make paper,[65] for example, and the quantity of materials required to make tear-resistant paper packaging is much greater than for plastic.[66] Bioplastics, often named as alternatives, do not generally have any overall ecological advantage over conventional plastics.[67]

6 Promote sustainable product design

Implement sustainable product design in relevant legal regulations to ensure durability, reuse, reparability and recyclability of plastic products and packaging.

Sustainable product design is an essential prerequisite for achieving a long-term plastics transition. A core element here is that products meet all the requirements for recyclability. Many products made from plastic cannot currently be returned to the production process, or this can be done only with considerable losses in quality. Optimal recycling using pure recyclate of the highest quality is still the exception. One reason for this is that fossil raw materials are still too cheap on the world market, so the demand for recycled plastic material is stagnating. The development of products optimized for a recycling economy does not receive a strong enough impetus.

The necessary avoidance of plastics in production and trade will not be achieved solely through voluntary measures by market players. It is also unlikely that the use of plastics will be renounced in the foreseeable future for economic reasons or due to declining supplies of fossil raw materials. Rather, the German government must adopt **legal requirements for product design with regard to durability, reusability, reparability and the use of recyclable, ecologically compatible materials**. It must also push through a binding and more ambitious EPR in order to strengthen sustainable product design over unecological alternatives (see also Demand 2). It is essential that **recyclability be anchored in pertinent legal frameworks**.

Clear guidelines for product design must be incorporated both at the **national level**, for example in the Packaging Act, the Electrical and Electronic Equipment Act and the Waste Management Act, and at **European level** in the Ecodesign Directive. The German government must take **binding standards on the recyclability** (cf. CEN-CLC/TC 10) of plastic packaging and products into account in its legislation, and non-compliance must be sanctioned.

Ecodesign must be a top priority for products such as electrical appliances so that they can be reused and repaired. A **"right to repair"** should guarantee inexpensive repair and thus the reuse of electrical appliances. There is also a need for binding minimum standards on recyclability and separate recycling quotas for the plastics and "technology metals" (rare earths and other metals used in electronic components and for other specialist purposes).

In addition, **minimum quotas for the use of recycled materials** as well as **binding labelling requirements for the materials used** must be introduced (see also Demands 3, 7, 13 and 15) in order to enable optimum recycling or secure recovery. This applies in particular to ensuring that comprehensive information on problematic substances is made available centrally, e.g., in waste databases, to prevent toxic substances from remaining in circulation. A sustainable circular economy can only exist if substances that harm health or the environment no longer enter the recycling system. Because composite and multi-component plastics make recycling more difficult, it is necessary to reduce the use of these materials by setting minimum standards for recyclability (see also Demand 13).

It is especially important to ensure that **comprehensive information on problematic substances along the supply chain is documented and declared** (see also Demand 3). This is impressively demonstrated by the study "Toxic soup: Dioxins in plastic toys"[68] presented by the European NGOs ARNIKA, IPEN, BUND and HEAL in November 2018. This found alarmingly high levels of brominated dioxins in products made from recycled plastic waste. Depending on the content of hazardous substances, plastic products have to be separately recorded in the European Waste Catalogue and specifically directed to the correct recovery or disposal method, so that "toxic recycling" is prevented. In principle, the use of substances hazardous to health, climate and the environment should be prohibited in the production of plastic raw materials and of plastic products and packaging (see Demands 7 and 15). The use of such substances should be made superfluous by appropriate product design (see also Demand 7).

To ensure that toxic substances do not stay in circulation, we demand a **ban on recycling**

of plastics containing persistent organic pollutants (POPs) and/or substances of very high concern (SVHC). Such products have to be collected separately and processed safely; a specific labelling of these products may be necessary.

Plastics labelled as "biodegradable" pose a problem in recycling processes. Current collection, sorting and recovery processes lack a realistic possibility of using such plastics as materials. As a result, they do not contribute to a circular economy and do not promote sustainable product design. The current systems do not guarantee proper recovery and frequently lead to the massive disruption of established recycling operations, for example through their long persistence in composting processes or in biogas production, the difficulty of distinguishing them from non-degradable plastics, and contamination of the material flows of classic polymers (see also Demand 3).

Other factors that must be taken into account by optimizing product design with regard to the entire life cycle include:

- **The absolute minimization of the use of resources** (material, energy, water, land) – comparative life cycle assessment (LCAs), environmental product declarations (EPDs), etc.
- **Preventing the entry of plastics into the environment**, e.g., the emission of microplastics through wear and tear (e.g., tyre wear).
- **Saving resources through reuse concepts and avoidance of littering.**

7 Manufacture products without hazardous substances

Prohibition of the use of substances hazardous to health, environment and the climate in the manufacture of plastic packaging and products.

As in the manufacture of plastic as a basic material (see Demand 15), additional chemicals are often added during the manufacture and processing of plastic items in order to achieve certain product properties. These include flame retardants in electrical appliances and upholstered furniture, fragrances in dolls, and water-repellent per- and polyfluoroalkyl substances (PFAS) in outdoor clothing. Many of these substances are persistent, i.e., difficult to break down in the environment, and are harmful to health; they are considered to be carcinogenic, harmful to reproduction, mutagenic or have hormonal effects as endocrine disrupting chemicals (EDCs) (see also Demand 15). A large number of chemicals are used in production, including some pesticide- and biocide-active substances, heavy metals and industrial chemicals such as polychlorinated biphenyls (PCBs), bisphenol A and other bisphenols.[69] Production processes and combustion can also generate undesirable and unintended by-products such as highly toxic dioxins and furans or polyaromatic hydrocarbons (PAH).[70] The use of hazardous substances in plastic packaging and products also hinders the recycling process and a clean circular economy (see also Demand 6).[71]

To protect people and the environment and to ensure occupational health and safety as well as safe recycling, the **use of harmful substances that are hazardous to health, the climate and the environment must be banned in the manufacture and processing of plastic packaging and products**, as it must be in the production of the basic material (see Demand 15). The **precautionary principle must be applied here**. Equally high standards of protection against EDCs and other hazardous substances are required, which apply in all phases of production or use. Particular attention must be paid to the protection of particularly vulnerable groups such as pregnant people and children who are excessively exposed to hazardous substances in plastic products.[72] Chemicals with endocrine disrupting and other harmful properties must be banned, especially in plastic products for children and pregnant people.

Products must be designed to obviate the need to add substances that are hazardous to health, climate and the environment during product manufacture (see Demand 6).

In principle, the **substances contained in the products/packaging and used during processing must be declared and disclosed completely** (see also Demands 3, 6 and 15). In addition, we need **product responsibility on the part of producers and retailers** (see Demand 2). Every supplier must provide consumer information on the substances contained in their products, including the packaging. The **principle of reversal of the burden of proof** must also apply here (see also Demands 2, 8 and 15).

This allows for safer handling along the production chain, occupational health and safety, consumer protection and better and cleaner recycling and waste handling.

8 Ban primary microplastics

Prohibition of the use of primary microplastics and other dissolved, liquid, gel- or waxy synthetic polymers in products with open environmental application.

According to an estimate by the Fraunhofer UMSICHT Institute, approximately 330,000 tonnes of primary microplastics from various sources enter the environment in Germany every year: equivalent to about 4 kg per person per year.[73] It is estimated that about 11% of this is microplastic that has been produced and used intentionally.[74]

Large quantities of specifically produced primary microplastics (type A) are used in the surfaces of sports pitches and playgrounds. For example, around 120 tonnes of synthetic granulate are used as bedding in an artificial turf pitch, with an annual replenishment of three to five tonnes per pitch.[75] Assuming that about half of the refill quantity is due to the compaction of the granulate and the other half to the discharge of the granulate into the environment, this results in microplastic emissions of 1.5 to 2.5 tonnes per pitch and year.

Another example of the intentional use and release of primary microplastics into the environment are nutrient granules used in agriculture. The microplastics they contain are designed to release nutrients and other active substances into the soil in a controlled manner over a certain period of time. But the plastic itself is also introduced into the soil.

Manufacturers also use a variety of synthetic polymers (liquid, dissolved, waxy or gel-like) especially in cosmetics and personal-care products: The list of the International Nomenclature for Cosmetic Ingredients (INCI) comprises between 16,000 and 21,000 substances; "CosIng", the EU database for cosmetic ingredients, lists a total of more than 28,000 substances. The exact number of polymers used as well as their (accumulative) effects are not known; moreover, there is a lack of information on quantities used worldwide.[76] Because treatment plants are unable to filter these substances completely out of wastewater, they enter watercourses almost unhindered and reach fields as part of sewage sludge spread as fertilizer.

Women use far more cosmetics and personal care products than men – up to 15 different products a day.[77] They are much more likely to be exposed to products that contain microplastics. During pregnancy, microplastic particles can reach the foetus through the placenta.[78]

We demand that the German government prevent these easily avoidable and often deliberate discharges into the environment by **banning the use of primary microplastics and synthetic polymers in products that are predestined to be released into the environment**. Possible alternatives should be **examined by independent institutes for human and ecotoxicological safety**. All **data from existing and future assessments should be published with full transparency**.

This means in particular:

- The **prohibition of the use and application of non-recoverable plastic granulates in surfaces of sports grounds and playgrounds** (e.g., artificial turf).
- **Prohibition of the use of microplastics in agricultural nutrient granules.**
- A **total ban on the use of microplastic particles and synthetic polymers in cosmetics and personal care products, as well as in detergents and cleaning products,** applying the precautionary principle (with no lower limit for sizes or physical state) and without exception in all product segments.

The German government must actively participate in the current EU process to ban microplastics deliberately added to products and ensure that the precautionary principle is consistently applied in the planned restriction under the European Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation (REACH).

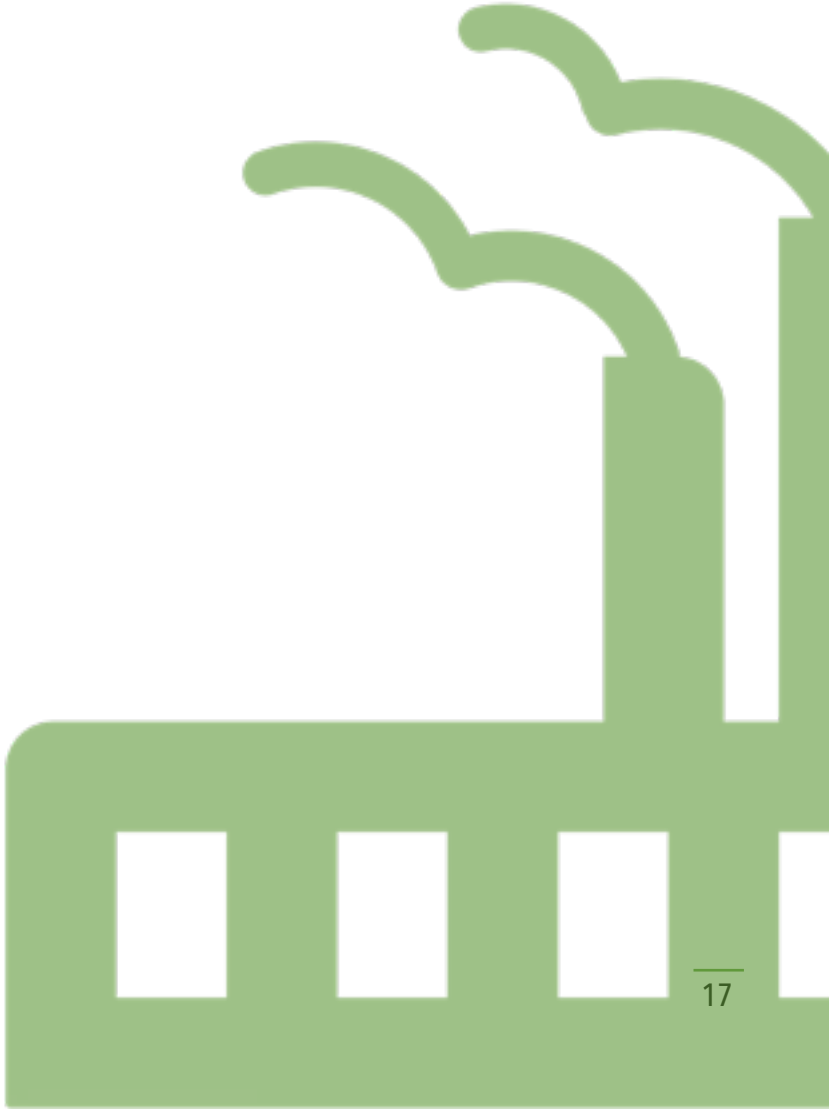
Theoretically at least, microplastic particles in wastewater are filtered out mechanically in sewage treatment plants. But they accumulate in the sewage sludge and so are released onto fields

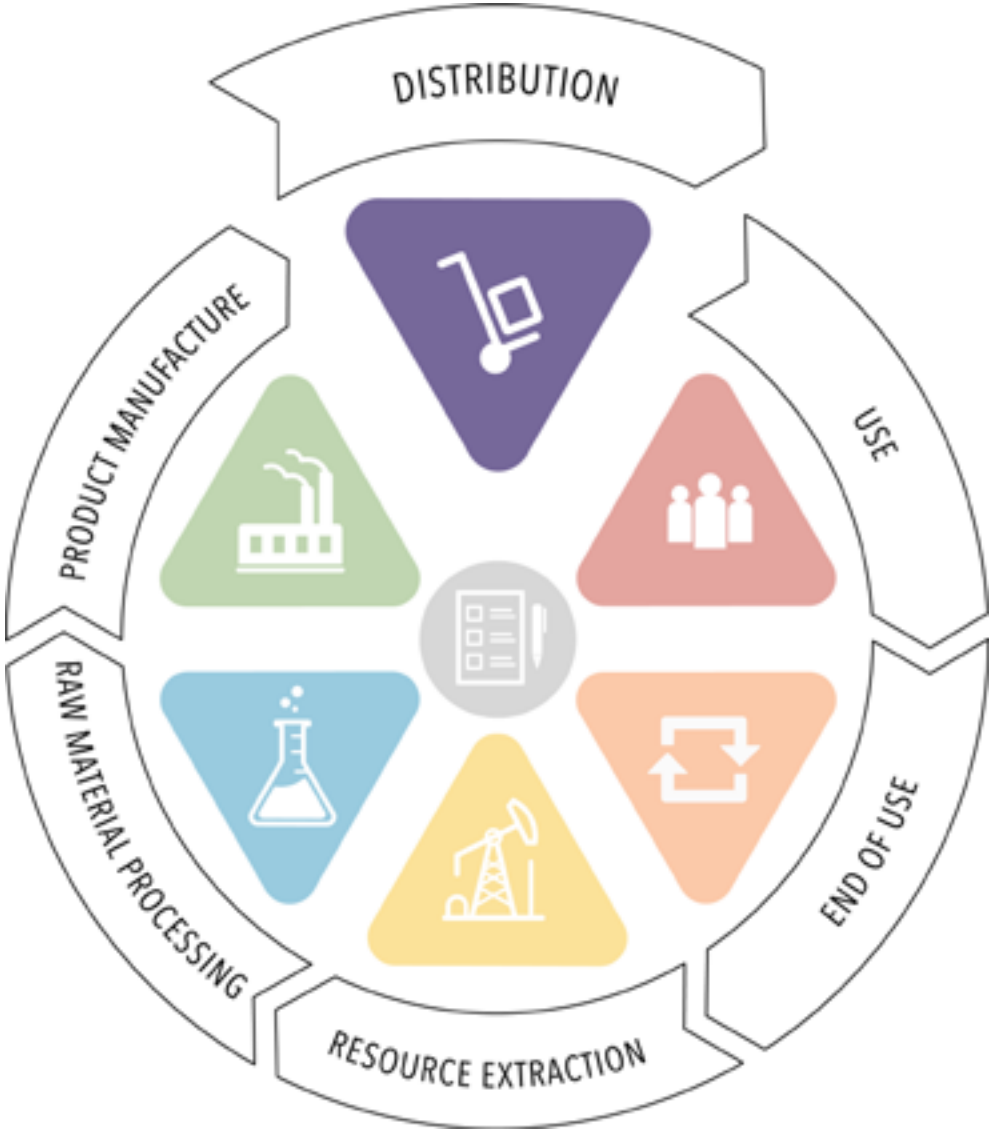
and into the environment when the sludge is applied as fertilizer. Moreover, sewage treatment plants cannot in practice completely remove the microplastic particles from the wastewater by conventional means.[79] The retention capacity of different wastewater treatment plants varies greatly.[80] Only a system with a fourth clarification stage in the form of a disk cloth filter has so far proved able to reduce the amount of plastic particles in wastewater by 97%.[81] We therefore demand that **manufacturers and distributors of all other products that cause micropollutants in wastewater be required to finance the expansion of treatment capacities and stages of municipal sewage treatment plants**, in accordance with a consistently enforced EPR (see also Demand 2).[82] An upgrade is particularly worth considering if drinking water is produced in the drainage basin below the wastewater plant, the receiving watercourse carries a high proportion of wastewater, or has particularly high concentrations of microplastics.

During the use of purpose-produced primary microplastics that are not open to the environment, it must be ensured, e.g., by amending the wastewater ordinances for discharges from industrial and commercial enterprises, that the **particles cannot enter the environment at any time during production, transport, use and disposal**. A reuse, recycling or disposal option that makes sense from a sustainability perspective must also be available in order to approach the goal of a circular economy.

Furthermore, **the reversal of the burden of proofs** for the applicant and transparent proofs are applicable here. This concerns, among others, the use of polymer blasting agents, powdered polymers (e.g., laser sintering powders for 3D printers) and plastic pellets (see also Demand 9).

60 NABU 2018
61 Ibid.
62 Ibid.
63 EU Waste Framework Directive 2008
64 DUH 2018
65 UBA 2014
66 DUH n.d.
67 DUH 2018
68 Petrlik et al. 2018
69 Hahladakisa et al. 2018
70 UBA 2016
71 Straková et al. 2018
72 EEB n.d.
73 Bertling et al. 2018, p.10 (Primary microplastics here include particles that are already generated during production and are contained in the product (e.g., friction particles in cosmetics or plastic pellets as semi-finished products as well as particles that are generated by the use of a product, e.g., abrasion of fibres from textiles or abrasion of tyres. Not included in this figure are microplastic particles resulting from the comminution or weathering of macroplastics (littering), e.g., plastic waste in the environment).
74 Ibid.
75 Lassen et al. 2015; Magnusson et al. 2016; Hann & Hogg 2017; Hann et al. 2018
76 Greenpeace n.d.
77 Environment Working Group n.d.
78 De Souza Machado et al. 2018
79 Mintering et al. 2014
80 Leslie et al. 2013; Mintering et al. 2014; Talvitie & Heinonen 2014
81 Mintering et al. 2014
82 UBA 2015





Demands on distribution

09 Restrict the use of plastics in logistics chains

9 Restrict the use of plastics in logistics chains

Prevent the consumption of plastics as a result of logistics and distribution as well as their release into the environment in all phases of the life cycle.

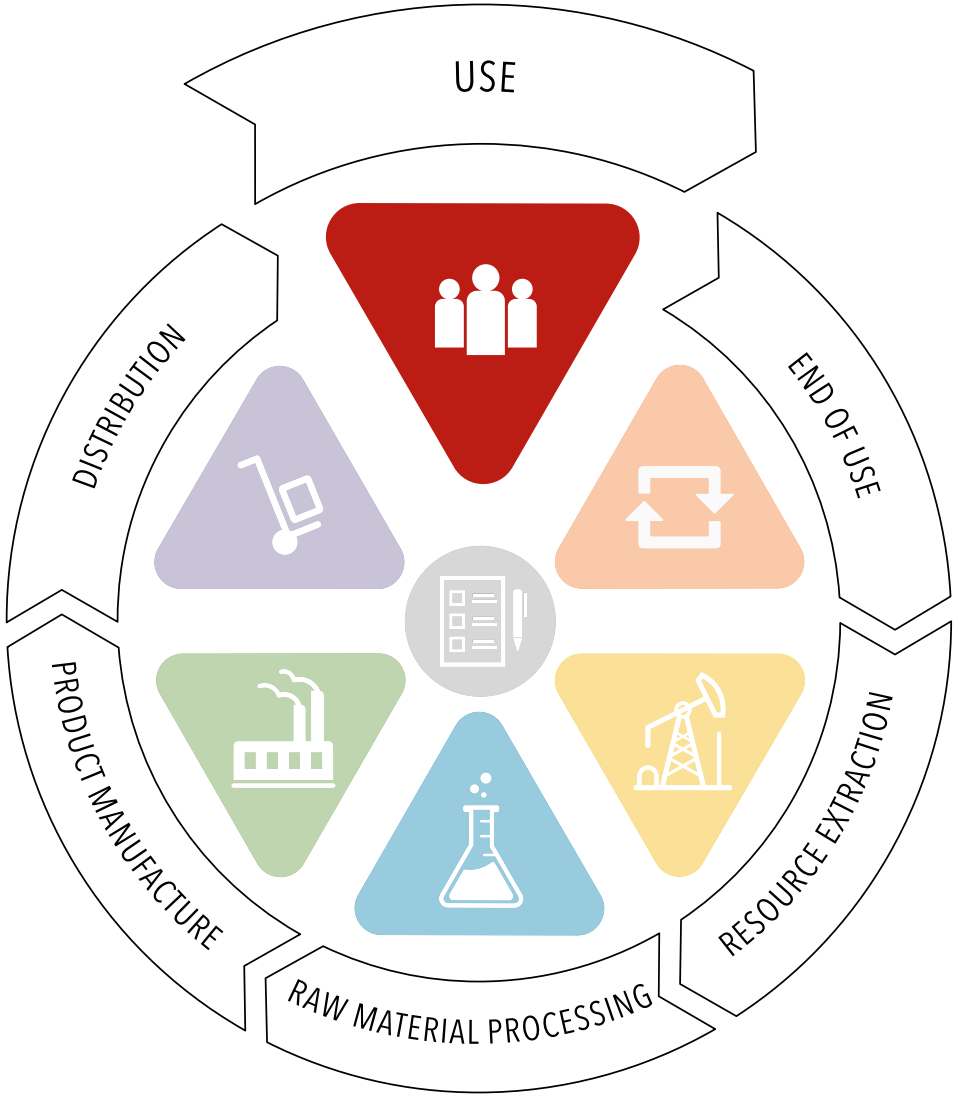
Increasing flows of goods and the exchange of products as a result of globalization consume large quantities of plastics. This takes the form of shipping and transport packaging and filling material along the entire logistics chain. The global market for industrial packaging is growing: from around USD 57 billion in 2017 to a forecast USD 72 billion by the end of 2023.[83] There is no comprehensive intelligent deposit and circular system for industrial packaging, equivalent to the "intermediate bulk containers" used for the storage and transport of liquids and free-flowing materials. The consistent establishment of reuse solutions such as reusable transport boxes, reusable shipping boxes and reusable trays is still pending. In addition, the booming online trade, whose growth rate in recent years has been around 10%,[84] producing ever larger quantities of plastic waste, for example in the form of plastic shipping bags. With around 3.5 billion courier, express and parcel shipments transported through Germany in 2018, the industry association BIEK predicts 4.3 billion for 2023[85] (these figures do not take into account the boom in online trade and consumption of single-use plastics as a result of the Covid-19 pandemic). Long transport routes for fruit and vegetables for the retail trade also encourage the use of additional protective packaging.

It is not just the mass consumption of plastics for logistics and distribution that is critical. The direct release of plastics into the environment during logistics processes is also a problem. Thus, losses of plastic pellets, an important intermediate product and typical delivery form in the plastics industry, are one of the main sources of primary microplastics in the (marine) environment.[86] Across Europe, between 17,000 and 167,000 tonnes of microplastics in the form of plastic pellets are released into the environment every year – mainly during handling and loading in production and (further) processing facilities.[87] In Germany, an annual release of around 180 g per person is estimated.[88] For every German citizen, plastic pellets the weight of two bars of chocolate contaminate the environment as microplastic even before they can be processed into products.

To minimize plastic waste as a result of logistics and distribution, the use of single-use plastics and single-use shipping packaging in general must be avoided during the transport and distribution of goods and in the shipping of online orders, and unnecessary outer packaging and filling materials must be avoided. Intelligent reusable packaging adapted to the product, which among other things reduces the use of filling materials, must be promoted (see also Demands 11 and 13). An optimal circulation of packaging and materials as well as high-quality and pure-sorted recycling must be guaranteed (see also Demand 6). Substitution by other single-use materials must not be allowed. The government is responsible for ensuring that industries and companies reduce the consumption of plastic in their supply chains to a minimum. **Reuse systems in the distribution of goods must be strengthened and a binding reuse quota for transport and shipping packaging (B2B and B2C) must be defined and implemented** (see also Demand 11). **A mandatory reuse system for shipping packaging must be introduced as a joint industry solution for parcel-service providers**. By strengthening regional product cycles, unnecessary protective packaging for fruit and vegetables can be avoided.

To avoid their release into the environment due to logistics and distribution, the safe handling and transport of micro- and macroplastics must be ensured. To stop the release of pellets into the environment at source, the government must, in accordance with the polluter-pays principle, **issue binding targets and measures for pellet producers, logistics companies and processors.** These should ensure safe handling in production and processing facilities and during loading and transport, as well as the clean-up of affected areas.

83 Mordor Intelligence n.d.
84 Handelsverband Deutschland – HDE e.V. 2019
85 BIEK 2019
86 Sherrington 2016; Bertling et al. 2018
87 et al. 2018 (the large range in quantities give here is due to the lack of data); Karlsson et al. 2018
88 Bertling et al. 2018, p.45



Demands on use

- Prevent the release of microplastics through wear and tear
- Promote reusables
- Stop the disposal and loss of plastic at sea

10 Prevent the release of microplastics through wear and tear

Prevent the emission of microplastics into the environment caused by the use and weathering of plastics.

Microplastics are released into the environment as a result of the use, wear and tear of plastics. For example, some of the main sources of primary microplastics[89] released into the environment in Germany include tyre abrasion, release during waste disposal, the abrasion of polymers and bitumen in asphalt, emissions from construction sites and fibre abrasion from washing synthetic textiles.[90] In addition, so-called secondary microplastics are produced by the weathering and fragmentation of macroplastics that have been released into the environment. The annual amount of macroplastics released into the environment in Germany is estimated at 116,000 tonnes, or 1.4 kg per person.[91]

The German government must take measures to curb these emissions in the various phases of the life cycle. In particular, it must ensure **that manufacturers and distributors, in accordance with a consistent EPR, are held financially liable** (see also Demand 2) for funding measures against the use- and weathering-related emissions of macro- and microplastics.

Since the greatest successes in reduction can be expected from measures that **prevent inputs directly at the source,**[92] these should be clearly prioritized. In view of the large number of different input sources, the **most effective and efficient measures** in each case to reduce macro- and microplastic emissions into the environment **must be identified and consistently implemented. Research on the sources of inputs and possible technical solutions should be promoted** to close gaps in knowledge and reduce uncertainties.

In addition, **incentive and return systems (such as deposit systems) must be created to prevent littering and illegal waste disposal**, and structures must be developed which encourage the **feeding of plastic waste into professional recycling and contribute to a general reduction in the volume of waste** (see also Demands 11 und 13).

Runoff rainwater contaminated with microplastics must not be discharged untreated into aquatic systems. Furthermore, microplastics must not be allowed to enter the soil, air or environment by contaminated compost and fermentation residues; **measures to prevent this must be implemented at the company, plant and consumer levels**. The implementation of a **tightened biowaste and fertilizer ordinance, which reduces the content of foreign substances in fertilizers to a minimum, in conjunction with comprehensive quality assurance,** is necessary for this purpose.

Some concrete measures to be taken include:

- The development of a standard measure to determine the abrasion rate of vehicle tyres and the introduction of a corresponding labelling obligations as well as the restriction of the marketing of the most abrasion-susceptible tyres.
- The use of abrasion-minimizing road surfaces and cleaning of road wastewater or drainage water using suitable cleaning and filtering techniques.
- The implementation of targeted measures to initiate a transition in transport, such as a massive reduction in private transport, the introduction of speed limits and weight reduction for motor vehicles (e.g., a ban on SUVs) to reduce tyre wear.
- A commitment by particularly high-emission industries to the development and mandatory use of microplastic filters at the production stage.
- The enforcement of extended producer responsibility also to producers and distributors of synthetic textiles. This should cover the durability of textiles, their recyclability and the provision of end-of-life options such as collection systems. It should ensure the consistent implementation of the European waste hierarchy and prevent exports of synthetic used textiles.
- The obligation of manufacturers and distributors of synthetic textiles:
  - to develop solutions a) to prevent

synthetic fibres from entering the environment during the production and transport process, and b) in textile design to prevent emissions of synthetic fibres via washing water.

  - for industrial pre-treatment (e.g., by washing or drying) and appropriate treatment of wastewater/exhaust gases.
  - on financial participation in the development and retrofitting of washing machine filter systems to remove synthetic fibres from the washing wastewater.

- Extension of the Ecodesign Directive to textiles (see also Demand 6).
- Expansion of wastewater technologies, especially retrofitting of wastewater treatment plants (municipal investments in new filter stages for the mechanical removal of particles) (see also Demand 8).
- Purification/treatment of road wastewater, also in the case of separate sewerage systems.
- Adaptation of the design of high-emission products where they are used in the open environment.
- Prevention of the use of plastics in agriculture and forestry, with close examination and subsequent proof of the environmental compatibility of alternatives.

11 Promote reusables

Consistent promotion and prioritization of reuse systems in all areas of consumption as well as compulsory orientation of public procurement towards reusable and single-use plastic-free goods along the entire supply chain.

Reuse systems are waste avoidance in practice. If a product or packaging is reused, no resources have to be spent on making new items. Especially in the packaging sector, the unrealized potential for environmental relief is enormous in this respect.

In sales, shipping and transport packaging, many reusable alternatives exist and must be promoted and used on a wide scale (see also Demand 9). A well-established example is the German return and refill system for beverage packaging, which serves as a model for the whole of Europe. However, the reuse quota has been declining steadily for years in favour of single-use plastic bottles and cans. To protect and further expand the environmentally friendly reuse system, **the reuse quota of 70% anchored in the packaging law must be strictly implemented.** Clear guidelines, such as a step-by-step plan and a sanction system that takes effect at an early stage, are necessary to ensure that the reuse target is achieved by 2021. If it is clear that this will not be achieved, an additional, non-refundable, one-way levy in addition to the deposit must be introduced.
Auch für andere Lebensmittelverpackungen gibt es bereits funktionierende Mehrwegsysteme: Milch und Joghurt werden seit Jahrzehnten in Mehrwegglas angeboten und auch für Honig gibt es regionale Mehrwegkreisläufe. Vor allem bei To-Go-Verpackungen, Verpackungen von Obst und Gemüse oder lange haltbaren Lebensmitteln besteht großes Potential für Mehrwegalternativen. Mehrweg-Pfandsysteme für Coffee-to-go-Becher und Mehrwegboxen im Supermarkt sind erste erfolgversprechende Ansätze, die sich in diesem Bereich etablieren.

Functioning reuse systems for other food packaging already exist: milk and yoghurt have been offered in reusable glass for decades and there are also regional reuse cycles for honey. There is great potential for reusable alternatives, especially for takeaway packaging, packaging for fruit and vegetables, and for food with a long shelf life. Reuse deposit systems for takeaway coffee cups and reusable boxes in supermarkets are the promising approaches that are establishing themselves in this area.

However, large quantities of waste are also generated primarily in the business-to-business sector and through increasing online trade. Reusable transport boxes, shipping boxes, trays and pallets have so far been used only sporadically. If reuse systems are to be established on a wide scale, they must be promoted by suitable framework conditions. This includes the use of financial steering instruments, such as a levy on disposable articles, in accordance with a consistent EPR (see Demand 2). **The legally binding definition of reuse quotas must also be consistently pursued and extended to the areas of sales, transport and shipping packaging** (see also Demand 9).

Comprehensive system solutions are required in all areas. In addition to beverage packaging, a **reuse quota of 15% should therefore be set for food packaging and other sales packaging by 2025 and 30% by 2030. For shipping packaging (B2C), a reuse rate of 30% should apply from 2025 and 50% from 2030; for transport packaging (B2B), a rate of 70% should apply from 2025.** The public sector has a special role to play in waste prevention. As a demand-side actor and standard-setter, it can exert a decisive influence on the use of disposable plastic products and their design, strengthen reuse solutions and reduce the volume of waste by consistently using reusable products (see also Demand 13). For this reason, **single-use products should be banned as a matter of principle in public procurement if reuse solutions are available as an alternative. Otherwise, preference should be made compulsory for recyclable products containing recycled material.** Reuse solutions, for example at street festivals and other major events, should generally be given priority.

In practice, various factors currently hinder this. The economic assessment is often based on the purchase price. Costs are not considered over the entire utilization phase (repairs, consumables, energy consumption, etc.) and possible disposal.

Thus, the ecological and often also economic advantages of regional products, suppliers or alternative services are not taken into account in procurement practice.

The government must ensure that, for example, the **recommendations and training materials** developed within the framework of the German Environment Agency research project "Elaboration of scientific principles to promote the consideration of environmental criteria in the award of public contracts"[93] **are used in all areas of public procurement.**

It must also ensure that **established procurement criteria are regularly reviewed for their effectiveness in controlling public procurement to avoid disposable plastic**, since the continuous, market-driven development of products or services may make new, more ecological alternatives available for the intended use.

The existing portal for sustainable procurement of public contractors, http://www.nachhaltige-beschaffung.info at the Procurement Office of the Federal Ministry of the Interior does not currently appear to be very suitable to promote procurement that avoids the use of disposable plastic. There is a lack of concrete information on reusable alternatives to disposable plastic products or on the consideration of recycled material in plastic products.

It is imperative to develop **general standards for environmentally friendly procurement**, which will subsequently also serve as a basis for the private sector. Thus, the (planned) establishment of a working committee on "Public Procurement" at the German Institute for Standardization is to be welcomed, which will provide technical support for the European technical committee "Public Procurement" (CEN/TC 461) in Germany.

12 Stop the disposal and loss of plastic at sea

Mandatory implementation and strict control of the "zero-discharge" principle regulated under MARPOL, introduction of deposit systems and technical measures for marking and locating fishing gear, and a ban on the use of synthetic "dolly ropes" in bottom trawling, to prevent the entry into the seas of synthetic materials and fishing gear from sea-based sources (especially shipping and fishing).

Plastics entering the sea from sea-based sources come mainly from shipping and fishing; aquaculture and offshore industry are also possible sources.

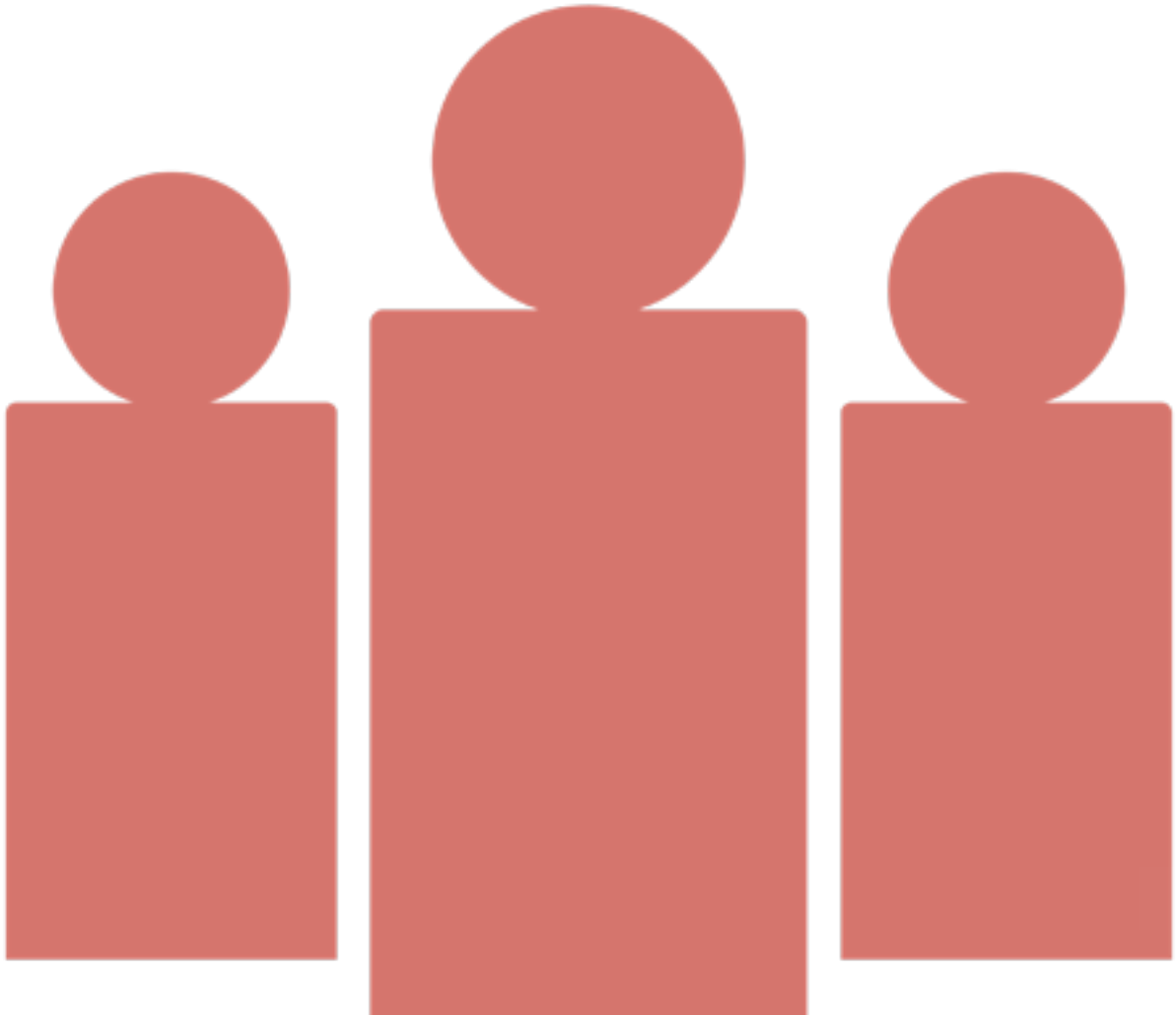
In the shipping industry, the "zero discharge" principle is regulated under MARPOL, the International Convention for the Prevention of Pollution from Ships. Annex V of MARPOL regulates the prevention of pollution by ship-generated waste. The conditions for discharge are determined by the type of waste in question. The dumping of plastics is prohibited. A garbage record book must be kept to document all processes relating to the garbage produced on board. The introduction of plastics from offshore platforms is also prohibited according to MARPOL. We demand a **ban on waste incineration at sea**. Only if waste incineration is banned can the garbage record book provide an effective check on waste disposal and enable criminal prosecution in the event of illegal waste disposal.

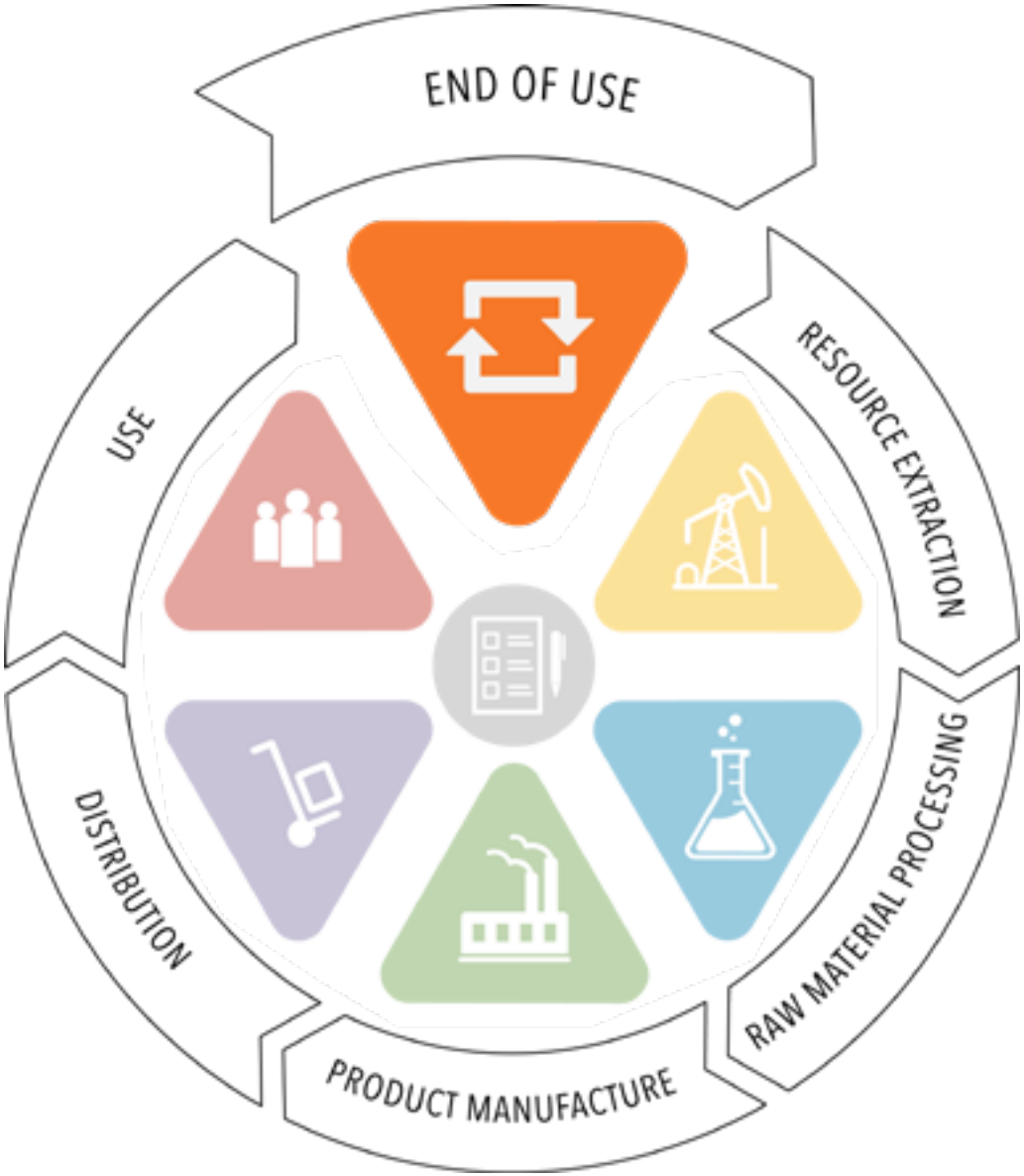
In fishing, lost fishing gear ("ghost nets") and so-called "dolly ropes" are typical sources. Ghost nets are fishing nets that drift around aimlessly. They drift in the sea if their connection to the fishing boat is broken. Their tiny plastic fibres slowly break up and thus contribute to the marine litter and microplastic pollution of the seas. Since the 1960s, fishing nets have no longer been made of easily perishable natural materials such as hemp, sisal or linen, but from synthetic materials such as polypropylene, polyethylene and nylon (polyamide). Pollution from fishing nets – whether deliberate or caused by accidents and unintentional losses during fishing – must be reduced as far as possible. We therefore call for the **speedy implementation of the EU's Marine Strategy Framework Directive measures under Environmental Target 5-05** ("Measures relating to lost and abandoned fishing nets and gear").[94] These include **awareness-raising and educational work in relevant circles** (e.g., fishers' and fishing associations), **technical measures for marking and locating nets,** and the creation of incentives such as **deposit systems for the collection of discarded nets and fishing gear.**

Research and development of alternative materials and methods must be intensified, for example to prevent the harmful effects of the wear and tear of nets used in bottom trawling. The use of **degradable materials for nets must be examined and, if necessary, made compulsory.**

"Dolly ropes" are used to protect fishing nets from wear when in contact with the seabed. Bundles of polyethylene strands are knotted into the net or secured with cable ties. The dolly ropes are expendable items that are released into the marine environment in large quantities. Many birds and other creatures strangle themselves in this material, drown or starve to death because they cannot free themselves, or consume smaller strands. Gannets often use the mostly orange or blue threads to build their nests, often also with a fatal outcome. We demand a **ban on synthetic dolly ropes.**

89 In the underlying definition of the FraunhoferInstitut UMSICHT, "primary microplastics" includes microplastics of type A, which are specifically produced (e.g., friction bodies in cosmetics, polymeric abrasives and plastic pellets) and microplastics of type B, which are produced in the use phase (e.g., the abrasion of tyres and synthetic fibres released during washing). Source: Bertling et al. 2018, p.9.
90 Ibid. p. 10f.
91 Ibid. p. 14
92 Hann et al. 2018 93
93 UBA 2019
94 See: BMUB n.d.





Demands on end of use

13 Prevent waste

13 Prevent waste

Absolute reduction of the volume of waste in accordance with the zero waste principle, promotion of high-quality recycling and compulsory minimum-use quotas for recycled materials for consistent implementation of the European waste hierarchy, and a ban on plastic waste exports to processing plants with lower standards than in Germany.

According to European waste legislation, first and foremost waste should be avoided. Germany must make significant improvements in this respect: the amount of packaging waste is increasing each year, with each person currently (2017) producing around 227 kg each year[95] – 20 % more than the European average.[96] The amount of plastic packaging waste in Germany has been growing inexorably since 1995: between 1995 and 2017 it rose by 105 %.[97] A total of 18.7 million tonnes of packaging waste were generated in Germany in 2017[98] – and the trend is rising.[99] In view of the planetary boundaries and the accumulation of more and more plastic in the environment, waste avoidance must have top priority.

The introduction of a waste-avoidance target, as discussed during the preparation of the European circular economy package, must be a core element of this change of direction and must ensure a commitment to less waste. For packaging waste, **a waste-avoidance target of a maximum of 90 kg per person per year from 2030** should be set.

To achieve a genuine circular economy, recycling must also be made possible and material cycles closed. Whether in the form of milk or juice cartons, coated sandwich paper or pharmaceutical paper, composite materials make it difficult to sort packaging and subsequently to recycle it. Nevertheless, the use of such packaging is tending to go up rather than down. The various materials can be separated from one another only with great effort, which is why such composite packaging is usually incinerated rather than recycled.[100] The same applies to the use of non-recyclable multi-component plastics in other product groups. Recyclable alternatives include, for example, sports shoes that consist of only one type of plastic. We need **minimum standards for the recyclability of packaging and products**, which must be made binding by law (see also Demand 6). To stimulate the demand for recycled material in the long term, **minimum-use quotas for recycled materials in certain packaging and product groups** must also be specified (minimum content approach).

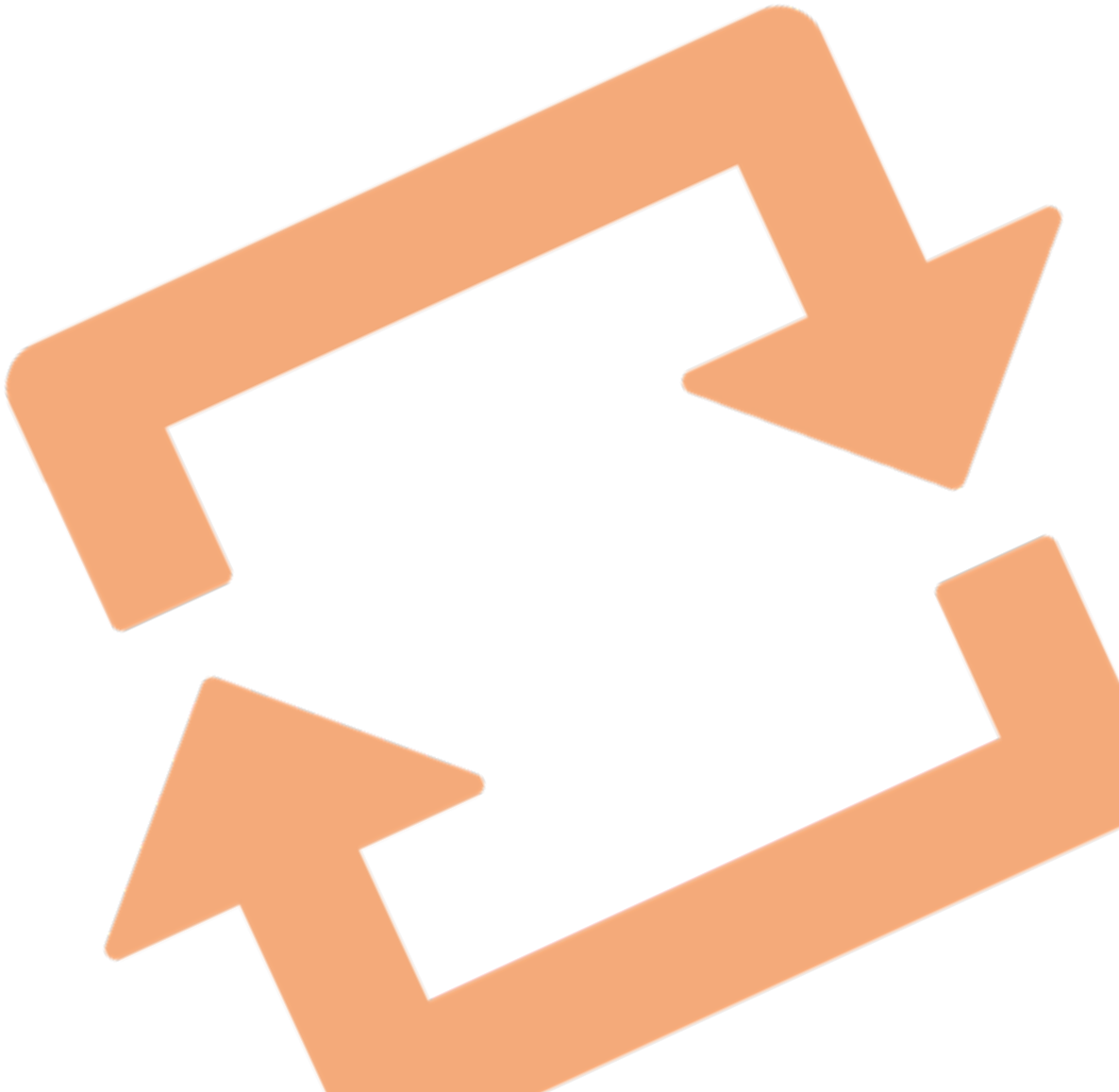
In particular, manufacturers and distributors of unecological types of packaging and those who put them on the market must be made more responsible in accordance with a consistently implemented EPR (see also Demand 2). This requires **economic incentives, either through a significant increase in licence fees or a resource levy.** The current "dual system" used in Germany, where consumers sort waste into recyclables and residual waste, does not provide sufficient incentive through its "ecological design of license fees". Conversely, **low-waste reusable packaging should be made financially more attractive and promoted**, for example through a reduced VAT rate.

The proximity principle needs to be strengthened in waste recycling. Germany is an industrialized country that produces a particularly large amount of plastic waste and which has hitherto exported a particularly large amount of such waste. In 2018 alone, 132,000 tonnes of plastic waste were shipped to Malaysia, 68,000 tonnes to India and 64,000 tonnes to Indonesia.[101] Trade continued in 2019, and from January to October more than 139,000 tonnes of plastic waste were exported to Malaysia.[102] In principle, **the export of plastic waste should be permitted only if the destination country demonstrably meets at least Germany's own disposal and recycling standards.** In many emerging and developing countries, a lack of suitable structures and controls means that plastic waste is not handled with sufficient care – with serious consequences for human health and the environment. For example, the export of used plastics to countries with underdeveloped or no disposal structures at all further exacerbates the global problem of plastic waste in the oceans.

The revision of the **Basel Convention** adopted in May 2019 with regard to a notification requirement for hazardous and unsorted plastic waste is therefore to be welcomed. The amendments mean that contaminated, mixed

or non-recyclable plastic waste is now among the exports requiring prior authorization. The German government **must make a major contribution to implementing the agreements reached** in this context. This requires increased controls of waste management and a special focus to be placed on waste exports.

95 Schüler 2019
96 Eurostat 2019
97 Istel 2016
98 UBA 2019
99 Schüler 2019
100 DUH 2019
101 Greenpeace 2019
102 Destatis 2020



Demands on resource extraction

14 Reduce the use of raw materials

14 Reduce the use of raw materials

An absolute reduction in the industrial use of primary raw materials (fossil fuels as well as renewable raw materials) for the production of plastics, in accordance with the climate goals of the Paris Climate Protection Agreement.

To achieve Germany's long-term climate target and to become greenhouse gas neutral by 2050 according to the Paris Agreement,[103] **the industrial use of fossil primary raw materials such as crude oil, natural gas and coal as raw materials for the production of plastics** must be consistently reduced. This would reduce the emissions of greenhouse gases that are produced in large quantities during the extraction, production and transport of these primary raw materials for the manufacture of plastics. At present, more than 850 million tonnes of greenhouse gases are emitted worldwide every year through the production and combustion of plastics. This is equivalent to the emissions of 189 coal-fired power plants. The trend is rising.[104] Although 99% of global plastics production is accounted for by fossil fuels, it is also important to firmly reduce the industrial use of renewable primary raw materials. This is because the production and processing of raw material crops, such as maize, is also resource-intensive,[105] consumes fossil fuels[106] and releases greenhouse gases.

Economic, regulatory and fiscal measures must be taken to ensure a successful change from resource- and CO2-intensive production of plastics to a CO2-neutral circular economy based on secondary raw materials. Only in this way can the production of plastics from primary raw materials and the associated CO2 emissions be drastically reduced and the wasteful use of plastics and their raw materials be stopped. To curb the use of fossil and renewable raw materials, **primary raw materials should be subject to a resource tax, based on criteria that take into account the harm they cause to the climate and the environment** (see also Demand 5). The government must set **binding standards for the recyclability of plastic products and packaging as well as minimum quotas for the use of recycled materials** (see also Demand 6).

Direct and indirect environmentally harmful subsidies to the petrochemical industry must be stopped so as to achieve a steering effect. The petrochemicals sector is already one of the largest industrial consumers of hydrocarbons. By 2030, according to the International Energy Agency, it will be the largest driver of global oil consumption (including so-called "wet gas" and ethane).[107] The industry is already responsible for 14% of global oil consumption (including "wet gas" and ethane) and 8% of global gas consumption every year – mainly to make plastic packaging and artificial fertilizers.[108] According to a response from the European Parliamentary Research Service to a question by MEP MichèleRivasi in May 2018, the petrochemicals industry accounts for 99.99% of the non-energy use of natural gas in Europe.[109] Instead of encouraging the use of fossil fuels for plastic production through taxation exemptions,[110] **taxes on oil and natural gas for the production of plastics** should be introduced. At the same time, the **transfer of free certificates from the European emissions trading scheme to the petrochemicals industry must be stopped.**

The fracking boom has produced an oversupply of cheap ethane (the "wet gas" component in shale), which is used as a raw material for the production of ethylene, the most-produced basic chemical and one that is used in particular as a raw material for plastic.[111] Developments in recent years show that the plastics industry in the USA has benefited massively from the climate-hostile and environmentally destructive fracking technology.[112] In return, the petrochemicals industry has opened up a new profitable market perspective for the fracking industry. Germany has banned fracking in water- and nature-conservation areas in principle (and shale gas fracking until 2021). However, a restrictive legal framework for the use of fractured hydrocarbons by the petrochemical industry is still lacking. The **import, trade and processing of fracked hydrocarbons must be stopped immediately.** This concerns both their use as an energy source for the operation of energy-intensive facilities and as a direct raw material for the production of plastics, artificial fertilizers and other petrochemical products. At the same time – in view of the international obligations under

the Paris Convention and the climate protection targets to be implemented on a binding basis – a re-evaluation of the operation and operating life of existing and planned petrochemical plants must take place against the background of climate, environmental and health protection.

103 UBA 2019
104 CIEL et al. 2019
105 IfBB 2018
106 CIEL et al. 2019
107 IEA 2018
108 Ibid.
109 EPRS 2018
110 Runkel & Mahler 2017
111 AFPM 2017; ECI 2017; Carey 2019; Wikipedia 2019; ACC n.d.
112 Food & Water Watch 2017

Demands on raw material processing

15 Ban the use of hazardous substances as additives to raw materials

15 Ban the use of hazardous substances as additives to raw materials

Prohibition of the use of pollutants that are hazardous to health, climate and the environment in the production of plastics as raw materials.

When a plastic is produced, additives are included to give it certain properties, such as flexibility or fire-resistance. Substances that are dangerous for humans and the environment may be used for this purpose. These include "CMR" substances that are carcinogenic (cause cancer), mutagenic (cause mutations in genes) or are toxic to reproduction (can damage the unborn child or impair reproductive ability). The additives may also include endocrine disrupting chemicals (EDCs), such as flame retardants or per- and polyfluoroalkyl substances (PFAS), phthalates, bisphenols and nonylphenols.[113]

EDCs are associated with a variety of diseases. Even at low concentrations, some of these substances can be harmful to health and damage the ecosystem. EDCs can enter the human body via food, they may be breathed in, or pass through the skin during the production of plastics, during their processing or during the use of the finished products. The World Health Organization sees a link between EDCs and the increased incidence of hormone-related cancers such as breast, testicular and prostate cancer, fertility disorders and reduced sperm quality, obesity, adult-onset diabetes, neurological diseases, genital malformation, and premature puberty and menopause.[114]

Plastics of particular concern are polyvinyl chloride (PVC) and polycarbonate (PC). PVC contains up to 70% plasticizers or ultraviolet stabilizers containing heavy metals, while PC is based on bisphenol A (BPA) or other bisphenols. Plasticizers, bisphenols and other substances can escape and harm the environment and health. If PVC is improperly incinerated, extremely toxic dioxin may be released and enter the environment.[115]

Toxins from plastics have different physiological effects depending on gender, both in the workplace and in everyday life.[116] This is due both to biological differences such as body size or fatty tissue on the one hand and to traditional gender roles on the other. Female bodies have a higher proportion of body fat and therefore accumulate more fat-soluble chemicals such as phthalates (used as plastic softeners). In periods such as puberty, breastfeeding and menopause as well as during pregnancy, the female body reacts in a particularly sensitive way to toxins. This can also have consequences for the unborn child, because the placenta is not a secure barrier.[117] Endocrine-active chemicals, in particular, can disrupt hormonally controlled developmental phases even in the womb. This may promote the development of birth defects and contribute to the above-mentioned diseases, which only become apparent much later in life. By using feminine hygiene products, some of which consist 90% of plastic, women also come into contact with plastics and the harmful substances they contain in a particularly intensive way.

It is estimated that 30% of those employed in the plastics industry worldwide are women,[118] often in low-wage jobs without proper health and safety measures. They are thus often exposed to hazardous chemicals and processes in plastics production without protection. A Canadian study shows that women in the plastics industry have a five-fold increased risk of breast cancer and reproductive problems.[119] When plastic waste ends up in landfills in developing countries and emerging markets, it is often women who, as "waste pickers", are directly exposed to the harmful substances.[120]

The **issue of chemical safety and toxic substances in plastics must be placed on the political agenda** across all ministries. Chemical safety impinges on the work of ministries of the environment, consumer protection, health, food and agriculture, education, family, women, economy, economic cooperation, etc.

The current legal situation is not sufficient to protect the population and the environment sufficiently from hazardous substances in plastic. The use of **particularly hazardous substances such as EDCs, CMR substances, flame retardants, per- and polyfluoroalkyl substances (PFAS), phthalates, bisphenols and nonylphenols must be urgently banned in the manufacture of plastics.** A complete ban must be imposed on PVC. These substances

must be replaced by safe alternatives. The **precautionary principle** must be applied to mixtures of substances which have generally been insufficiently researched with regard to their environmental, health and climate impact. The **principle of the reversal of the burden of proof** must also apply here: before marketing, manufacturers must prove that plastics and the additives they contain are harmless by means of appropriate data.

In addition, the government must make an international effort to ensure that the **environmental, climate and health impacts of plastics, plastic waste and the additives contained in plastics are included as so-called "issues of concern" in the negotiations of the follow-up process of SAICM (Strategic Approach to International Chemicals Management)**. The same applies to the stricter regulation and prohibition of EDCs, which, like "chemicals in products", are included in the SAICM process as an "emerging policy issue" (EPI). The implementation of the set goals for EPIs must be given emphasis in a SAICM follow-up process.[121]

As a matter of principle, the **emission of substances hazardous to the environment, climate and health must be prevented** during the production and processing of raw and auxiliary materials for plastics production, and during the processing of plastics. In particular, the release of particles through abrasion or of chemicals that are only used in production or processing must be taken into account.

The **transparent traceability of the base material, the substances they contain and the additives used** must be guaranteed in the future. The sources of **information must be accessible to all** and for **each product the type of plastic as well as the substances and additives used must be labelled** (see also Demands 3, 6 and 7). This provides for safer handling along the production chain, occupational health and safety, consumer protection and better and cleaner recycling and waste handling.

113 Hahladakisa et al. 2018
114 WHO 2002
115 Zhang et al. 2017; CHEJ n.d.
116 Messing et al. 2003
117 Barret et al 2009
118 Lynn et al. 2017
119 Brophy et al. 2012
120 Muhhamad & Manu 2013
121 SAICAM n.d.

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Glossary

Bioaccumulation

The build-up of substances in an organism. These substances are absorbed either through food or the surrounding medium (e.g., air or water).

Bitumen

A (usually sticky) hydrocarbon mixture resulting from the processing of crude oil. Bitumens are used mainly in road construction and for sealing work and, due to their lower content of carcinogenic substances, replace tar products made from lignite or hard coal. Bitumen is also found in nature, for example in rocks, natural asphalt lakes or in so-called oil sands mixed with sand and water.

Carcinogen

A substance that causes cancer.

CMR (carcinogenic, mutagenic and toxic to reproduction) substances

Substances that may cause cancer or genetic mutations or that are toxic to reproduction. They are divided into two main categories according to their hazardousness: Category 1a/b: effect proven in humans, or effect proven in animals and suspected in humans; Category 2: possible effect suspected in humans.

Contaminants

Undesirable substances that lead to impurities in (or contamination of) another substance or mixture of substances.

Decarbonization

The change in economic practices (such as in the energy sector) towards a reduction in the use of carbon-based raw materials and thus the lower release of greenhouse gases.

Disposable packaging (or single-use packaging)

In accordance with Germany's Packaging Act, disposable (or single-use) packaging is packaging that is not reusable packaging (see Reusable packaging and articles).[122] A deposit may be levied on disposable packaging, for example to prevent littering. In Germany, a deposit is levied on most disposable packaging for beverages. However, these are not reused after they are returned, but are recycled. Only reusable packaging with a deposit is cleaned and refilled.

Ecotoxicology

Toxicology is the study of toxins, poisoning and their treatment. Ecotoxicology, or environmental toxicology, looks specifically at the effects of substances on the living environment.

EDCs (endocrine disrupting chemicals)

Environmental hormones or endocrine disruptors which, even in tiny quantities, can damage health by altering the endocrine system.

Environmentally closed applications

Processes where there is no direct contact with environmental compartments (such as water, soil or air), and so no possibility of substances entering the environment.

Environmentally open applications

Processes where there is direct contact with environmental compartments (such as water, soil or air), and thus the possibility of substances entering the environment.

EPD (**e**nvironmental **p**roduct **d**eclarations)

Declarations that contain measurable, environmentally related information on the life cycle of a product or service and thus enable comparisons between products or services with the same function.

European waste hierarchy

The European waste hierarchy is part of the EU Waste Framework Directive.[123] This obliges member states to treat waste according to a five-level waste hierarchy. Measures for prevention, preparation for re-use and recycling are to be given priority over other recovery (energy recovery or backfilling) and final disposal by incineration or landfilling. The aim is that the environment and human health are not adversely affected by the waste.

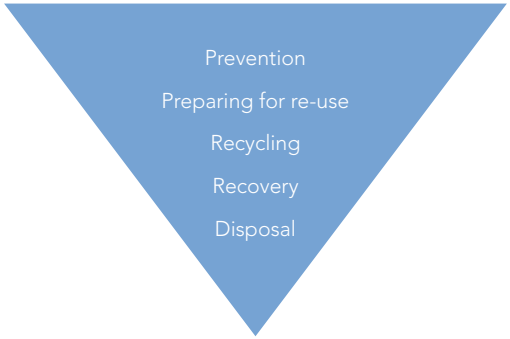

Fig.: Schematic representation of the European waste hierarchy

Eutrophication

The accumulation of nutrients in an ecosystem or part of it, for example the human-induced (anthropogenic) increase in the nutrient content of water bodies due to nitrogen- and phosphorus-containing fertilizers. The result is often associated harmful plant or algal growth, increased oxygen consumption and the displacement of other living organisms.

Human toxicology

Toxicology is the study of toxins, poisoning and their treatment. Human toxicology focuses on the effects of toxins on humans.

INCI (**I**nternational Nomenclature of **C**osmetic **I**ngredients)

A binding standard for the uniform labelling and correct declaration of all ingredients in cosmetic products. A database with the INCI designations of ingredients and further information can be found at https://www.haut.de/inhaltsstoffe-inci/.

Intended or unintended emission

The intended or unintended release or emission of substances, such as plastics or radiation, into the environment.

LCA (**L**ife **C**ycle **A**ssessment)

An analysis of the environmental impacts of products along their entire life cycle. All stages of the life cycle are considered: from the extraction and processing of raw materials to the manufacture, transport, use and disposal of the product. The contents and procedures for carrying out life cycle assessments are defined in the standard German DIN standard EN ISO 14040/14044.

Mutagen

Chemical or physical influences that can trigger changes (mutations) in the genetic material of organisms. Known chemical mutagens include formaldehyde and nitrosamines. Physical mutagens include ultraviolet radiation and radioactivity.

Planetary boundaries

The ecological stress limits of the Earth. Exceeding these limits endangers the stability of the Earth's ecosystem and thus also the basis of human life. They include climate change, land-use change and (fresh) water consumption. Nine planetary boundaries are currently being discussed, which describe the safe operating space for humanity; several of them have already been exceeded.[124]

POPs (**p**ersistent **o**rganic **p**ollutants)

Organic compounds that degrade or transform very slowly in the environment.

Precautionary principle

A fundamental principle of environmental and health policy. Applying it avoids or minimizes potential burdens or damage to the environment or human health in advance - even if the knowledge base is incomplete. It thereby prevents risks and hazards. As early as 1992, at the UN Conference on Environment and Development (UNCED) in Rio de Janeiro, the precautionary principle was laid down in the framework of the Agenda 21 declaration: "In the face of threats of irreversible environmental damage, lack of full scientific understanding should not be an excuse for postponing actions which are justified in their own right. The precautionary approach could provide a basis for policies relating to complex systems that are not yet fully understood and whose consequences of disturbances cannot yet be predicted."[125]

Primary raw materials

Natural resources (e.g., oil, natural gas, coal, minerals, plant biomass) that have not yet been processed. They may be used directly as energy sources (for example), or serve as feedstocks for further processing in the manufacture of products.

Recyclate

A product of a recycling process, such as a secondary raw material from plastic waste, which can be used for new production processes.

Recycling

The EU Waste Framework Directive defines "recycling" as "any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations."[126]

Renewable raw materials

Biomass produced in agriculture and forestry that is not used as food or animal feed, but is used specifically for applications in energy or as materials. In contrast to renewable raw materials, non-renewable raw materials are usually of fossil or mineral origin.

Reusable packaging and articles

Germany's Packaging Act defines reusable packaging and articles as those which are intended to be reused several times for the same purpose after use and whose actual return and reuse is made possible by adequate logistics and promoted by suitable incentive systems, usually by means of a deposit.[127]

SAICM (**S**trategic **A**pproach to **I**nternational **C**hemicals **M**anagement)

A non-binding framework adopted in 2006 to promote sustainable chemicals management. The objective is to minimize the negative impacts of the use of chemicals on humans and the environment. SAICM is a multi-sectoral, multi-stakeholder process in which, in addition to the relevant participating states, non-governmental organizations, companies and scientific actors from the environment, health, agriculture, labour and other sectors are also involved.

Secondary raw materials

Raw materials obtained through recycling, which in turn can be used as feedstock for new production processes.

Single-use plastic products

The EU's Single-Use Plastics Directive ("SUPD") defines single-use plastic products as those that are not "conceived, designed or placed on the market to accomplish, within its life span, multiple trips or rotations by being returned to a producer for refill or re-used for the same purpose for which it was conceived".[128]

SVHCs (**S**ubstances of **V**ery **H**igh **C**oncern)

Chemical compounds or groups of chemical compounds for which it has been determined in accordance with the European Chemicals Regulation REACH that they may have serious effects on human health or on the environment. These substances are registered by the European Chemicals Agency (ECHA) and are subject to special information obligations within

the supply chain.

Toxic to reproduction

Reproductive toxicants can impair the sexual function and fertility in males or females, cause damage to the unborn child in the womb, and impair the development of the offspring.

Recovery

According to the EU Waste Framework Directive, "any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function".[129] Examples of waste-recovery operations are thermal recovery (incineration and the use of the energy released) and material recovery ("recycling").

Reuse

According to the EU Waste Framework Directive, "reuse" means "any operation by which products or components that are not waste are used again for the same purpose for which they were conceived".[130] Return-refill systems are an example of reuse-oriented systems.

Zero Waste

An approach with the goal of producing as little waste as possible and not wasting raw materials. The Zero Waste International Alliance defines zero waste as: „The conservation of all resources through responsible production, consumption, reuse and recovery of products, packaging and materials without incineration and without discharges to land, water or air that threaten the environment or human health".[131]

122 Based on the German Packaging Act (VerpackG) 2017
123 EU Waste Framework Directive 2008
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125 Agenda 21, Chapt. 35.3
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