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COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

EU policy framework on biobased, biodegradable and compostable plastics

1. Introduction

The EU's transition to a circular, resource-efficient and climate neutral economy, together with the ambition to reach zero pollution and the need to protect and enhance biodiversity have triggered an overall rethinking of how plastics are produced, used and disposed of. Despite efforts made to increase the sustainability and circularity of plastics, in Europe only 14% of plastic waste was recycled in 2020 domestically, the remaining being either incinerated with energy recovery, landfilled, littered, or exported[1]. Given this predominantly linear model and indications that production is going to double in the next 20 years[2], there is an urgent need to improve the overall environmental sustainability of plastics. However, significantly reducing greenhouse gas (GHG) emissions, waste generation, littering and plastic pollution presents a complex set of challenges[3].

In the search for solutions to these challenges, biobased, biodegradable and compostable plastics are emerging in our daily lives as alternatives to currently dominant, conventional plastics. They are used in applications such as packaging, which accounts for almost half the demand for such plastics, followed by consumer goods and textiles, as well as in sectors like agriculture, transport and construction. Globally, these plastics represent 1% of total plastic production capacity, for a volume of over 2 million tonnes per year. Europe hosts a quarter of the production capacity, and Asia accounts for nearly half. Their production is expected to grow faster than in previous years and to double their share of total plastic production capacity by 2025[4].

Biobased, biodegradable and compostable plastics are widely perceived, in Europe and internationally, as more environmentally friendly than conventional plastics, which are fossil-based and non-biodegradable. At the same time, there is increasing scientific evidence and awareness that a number of conditions have to be met to ensure that the production and use of these plastics result in overall positive environmental outcomes and do not exacerbate problems of plastic pollution, climate change and biodiversity loss. While making plastics from biomass or ensuring that plastic products can biodegrade in some receiving environments can bring a number of benefits compared to conventional plastics, these solutions have their own sustainability challenges and trade-offs that should be well understood and duly taken into account. They should also not detract from the need to align the lifecycle of plastics with the circular economy and to ensure, as a priority, that resource use is reduced in the first place, that materials of all feedstocks, including biobased feedstocks, are kept in the loop for as long as possible, and that secondary raw materials are preferred to primary raw materials.

Though EU policies and legislation address some aspects and applications of biobased, biodegradable and compostable plastics, it would be better to take a more systemic approach to underpin decisions by both the public and private sector. This approach should be based on

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1 'Reshaping Plastics', Systemiq (2022), based on best available academic and industry data.

2 World Economic Forum, Ellen MacArthur Foundation, and McKinsey & Co., 'The New Plastics Economy: Rethinking the Future of Plastics' (2016).

3 Plastics, the circular economy and Europe′s environment — European Environment Agency (europa.eu)

4 European Bioplastics/nova-Institute Market Update 2021. The EU market share of these plastics is also 1%.

the European Green Deal[5], the circular economy action plan[6] and the EU plastics strategy[7]. Furthermore, the zero pollution action plan[8] aims to reduce plastic litter at sea by 50%, and microplastics released into the environment by 30% by 2030. The focus of the EU soil strategy[9] is to prevent soil contamination at source.

These policies foster the following goals, in order of priority: reducing, reusing and recycling plastics to minimise the use of energy and resources and keep materials in the economy for as long as possible, while pursuing a toxic-free environment.

A more systemic approach will seek to strike a careful balance between the need to reduce dependency on fossil resources, the impacts of which are strongly felt in the current energy crisis caused by Russia's brutal war on Ukraine, and to ensure food security, which is impacted by the use of land for biomass production that has to meet competing demands.

The aim of this policy framework for biobased, biodegradable and compostable plastics is to provide better understanding of the challenges and benefits that stem from their use. It also sets out the conditions to ensure that overall, the environmental impact of their production and consumption is positive. It aims to fill policy gaps, guide future EU policy or legislation on such matters and provide orientation for the market with a view to avoiding any unsustainable developments. A common understanding across the EU on the use of these plastic materials will also facilitate the single market and prevent differences at national level fragmenting the market.

2. The concepts: biobased, biodegradable or compostable plastics?

Referring to plastics as **'biobased'** points to the **raw materials, or feedstock,** used for their production. While conventional plastics are made from fossil resources (oil and natural gas), **biobased plastics are made from biomass.** The biomass currently originates mainly from plants grown specifically to be used as feedstock to substitute fossil resources, such as sugarcane, cereal crops, oil crops or non-food sources like wood[10]. Other sources are organic waste and by-products, such as used cooking oil, bagasse and tall oil. **Plastics can be fully or partially made from biobased feedstock**. As shown in the figure below, **biobased plastics can be both biodegradable and non-biodegradable.**

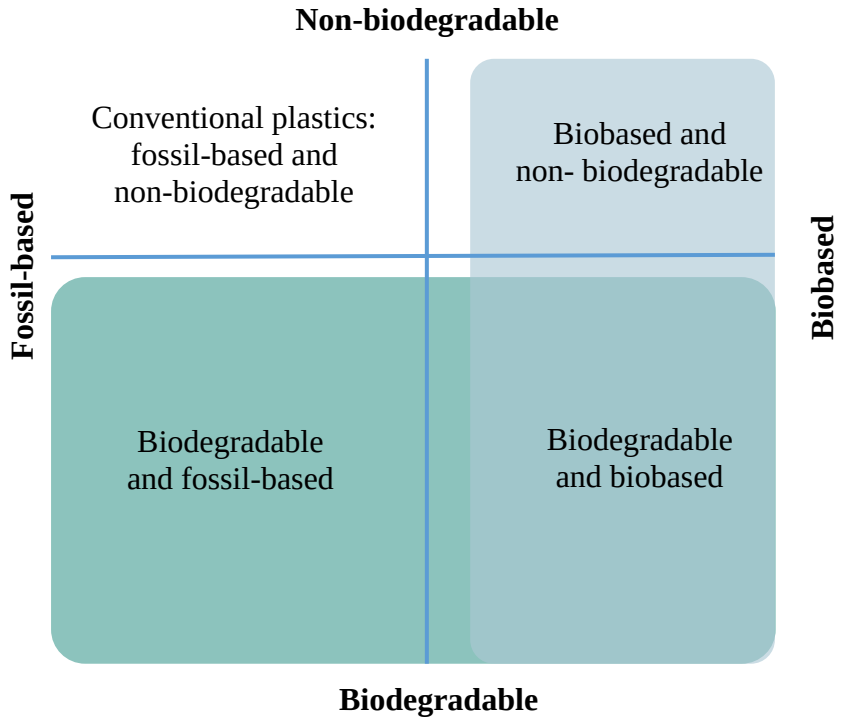
While conventional plastics do not decompose at the **end of their life**, plastics referred to as **'biodegradable' are designed to decompose** at the end of their life by the conversion of all their organic constituents (polymers and organic additives) mainly into carbon dioxide and water,, new microbial biomass, mineral salts and, in the absence of oxygen, methane[11]. For

5 COM(2019) 640.
6 COM(2020) 98 final.
7 COM(2018) 28.
8 COM(2021) 400.
9 COM(2021) 699 final.
10 Renewable Carbon – Biobased Building Blocks and Polymers
11 Commission's Group of Chief Scientific Advisors, Biodegradability of plastics in the open environment | European Commission (europa.eu).

that to happen, in addition to the characteristics of the plastic material, suitable conditions in the receiving environment and sufficient time are necessary. This is why plastic biodegradation must be considered not only in terms of the properties of the material, but above all in terms of a 'system-property' where material-related and environment-related factors are equally important. As shown below, **plastics designed to biodegrade can be both biobased and fossil-based**.

'Compostable plastics' are a subset of biodegradable plastics designed to biodegrade under controlled conditions, typically through industrial composting in special facilities for composting or anaerobic digestion. The biodegradable plastics waste sent for industrial composting first needs to be collected. There is a European standard for industrially compostable packaging[12] but not for home composting as the conditions for the latter can differ significantly.

Figure 1: Alternatives to conventional plastics (Source: European Environmental Agency)[13]



3. Biobased plastics

The circular economy action plan identifies the need to address emerging sustainability challenges related to sourcing, labelling and the use of biobased plastics, based on assessing

[12] European standard EN 13432:2000.

[13] Biodegradable and compostable plastics — challenges and opportunities — European Environment Agency (europa.eu)

where the use of bio-based feedstock results in genuine environmental benefits, going beyond reduction in using fossil resources. This means also ensuring that the use of biobased feedstock does not have negative impacts on biodiversity, ecosystems or land and water use.

The chemicals sector will continue to need carbon as a feedstock for materials such as plastics. To reduce GHG emissions, the EU circular economy agenda sets out as a priority to reduce the consumption of short-lived products and waste, and to increase plastic recycling and the use of recycled content to make new products.

As carbon feedstock will continue to be needed, renewable carbon from sustainably sourced biomass is an alternative to fossil carbon. In particular, using organic waste and by-products to produce biobased plastics can offer a partial decoupling from fossil resources and help meet climate neutrality targets while also reducing the use of primary biological resources and avoiding harm to biodiversity. The role of sustainably sourced biomass has also been recognised[14] and there are policy and market developments encouraging the increase of biobased content[15]. The Communication on 'Sustainable Carbon Cycles'[16] sets out the aspirational objective that at least 20%[17] of the carbon used in chemical and plastic products should be from sustainable non-fossil resources to help reaching climate neutrality. The updated bioeconomy strategy[18] emphasises the importance of finding nature-friendly biobased solutions. Biobased plastics can also stimulate the creation of jobs, especially by increasing the role of primary producers in local bioeconomies. To ensure such positive impact, the biobased plastic industry will need skilled labour force. To that end, the European Skills Agenda[19] helps to operate a shift in skill sets to reap full potential.

3.1 Biobased plastic content

There is currently no mandatory minimum biobased content nor agreed certification scheme or label for a plastic product to be labelled as biobased. The **crosscutting standards developed by the European Technical Committee for Standardisation for biobased products (CEN/TC411)** offer guidance on aspects such as measuring methods of biobased content, business-to-business and business-to-consumer communication. These voluntary standards are widely used by the market and **their application is recommended as it ensures a consistent approach**.

To fight greenwashing and avoid misleading consumers, **generic claims on plastic products such as 'bioplastics' and 'biobased' should not be made**. The Commission's proposal on empowering consumers for the green transition[20] puts forward a ban on such practices unless

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14 European Commission study on 'Biobased plastics: sustainable sourcing and content' (2022). Link to come.

15 The Dutch government plans to increase the percentage of recycled and biobased plastics to 41% and 15% respectively by 2030 and is currently looking at mandatory targets. As a pre-requisite for support, biobased plastics must meet sustainability criteria including sustainable agricultural production and a 30% CO_2 emission reduction. Mandatory percentage of recycled or bio-based plastic. In the European Union - CE Delft - EN

16 COM(2021) 800.

17 Current level is 10%. The part used to make plastics is 1 to 2%.

18 COM(2018) 673.

19 https://ec.europa.eu/social/BlobServlet?docId=22832&langId=en

20 Proposal for a Directive on Empowering Consumers for the green transition.

they are underpinned by recognised excellent environmental performance or whenever the specification of the claim is not provided in clear and prominent terms on the same medium**.** In order to avoid misleading consumers, claims should only refer to **the exact and measurable share of biobased plastic content in the product**, stating for instance, that the 'product contains 50% biobased plastic content'.

It is also important to ensure that biobased content is measured precisely. **Radiocarbon-based methods[21] should be preferred** as their results are robust and their use is widely accepted. Documenting the use of biomass through a chain of custody and attributing a share to end-products through mass balance accounting is a method which is not considered suitable for confirming the actual share of biobased content. Such method should be used only when it ensures a high level of transparency and accountability, and is underpinned by agreed standards to avoid greenwashing.

3.2 Feedstock sustainability

In most cases, the production of biomass requires the use of natural resources such as land and water and the use of chemicals such as fertilisers and pesticides. Therefore, producing plastics from primary biomass can lead to direct or indirect land-use change, which in turn can result in biodiversity loss, ecosystem degradation, deforestation and water scarcity, as well as competition with crops intended for human consumption.

In line with the circular economy principles, **producers should prioritise the use of organic waste and by-products as feedstock,** by thus minimising the use of primary biomass and avoiding significant environmental impacts.

When primary biomass is used, it is important to ensure that it is environmentally sustainable and does not harm biodiversity or ecosystem health. As consumers expect biobased plastics to be genuinely sustainable, whenever a product is made of biobased content and carries a claim on biobased content, the content must originate from sustainably sourced biomass.

In line with the EU forest strategy for 2030, as part of the review of the Renewable Energy Directive (REDIII) of July 2021[22], the Commission proposes to integrate in national supporting schemes the cascading use of biomass principle, according to which biomass should be used where it has higher economic added value. In line with this principle, **biomass should be preferably used to produce materials, including plastics, and only in subsidiary order, as a source of bioenergy.**

Furthermore, **priority should be given to long-lived products over short-lived products, including single-use products.** This priority order applies to waste, to by-products and to primary biomass coming, for instance, from agriculture, forestry or aquaculture. Organic

[21] These methods use ^{14}C as a marker for biobased carbon content.

[22] Proposal for a Directive amending Directive (EU) 2018/2001 on promotion of energy from renewable sources

waste and by-products should be preferred over primary biomass, especially for short-lived products.

Biomass used to produce biobased plastics must meet the EU sustainability criteria for bioenergy[23]. As proposed by the Commission under the review of the Renewable Energy Directive (REDIII) of July 2021, these criteria include measures related to forest biomass and to biofuels with high risk of direct and indirect land-use change, such as those derived from palm oil[24]. Pending finalisation of REDIII negotiations**,** the REDII sustainability criteria for bioenergy should be applied. This is also the approach taken in the EU Taxonomy for sustainable investments for "agricultural biomass used for the manufacture of plastics in its primary form"[25].

With regard to **greenhouse gas emissions, the bioenergy framework cannot be directly applied to biobased plastics** as these are not used to generate energy. Methodologies to assess the impacts of biobased plastics compared to fossil-based plastics from a life-cycle perspective are still under development. The most harmonised methodology currently available is the framework developed by the Commission's Joint Research Centre, referred to as the 'Plastics LCA method'[26], which builds upon the EU Product Environmental Footprint (PEF) method[27]. Moreover, innovations should be assessed at an early stage to ensure the development of safe and sustainable alternatives[28].

Further scientific advancement is needed to incorporate in the assessment the accounting of biogenic carbon uptake and release from products during their lifespan. Discussions to this end are ongoing in the context of the UN Life Cycle Initiative[29]. **Only biobased plastic products with long lifetime that are not incinerated when they become waste can have beneficial carbon storage effects.** For short-lived products, i.e. most of today's biobased plastic products such as single-use packaging, the carbon initially taken up from the atmosphere is quickly released back.

4. Biodegradable and compostable plastics

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23 Except for GHG emissions.

24 Renewable Energy Directive

25 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32021R2139

26 The Commission's JRC's Life Cycle Assessment of alternative feedstock for plastics production. Whether the impacts of biobased plastics compared to those of conventional ones turned out to be higher or lower depended on the application, the polymer, the feedstock, the reference material, the manufacturing process and the specific environmental impact category considered. Generally, methodological challenges to calculate impacts from biomass sourcing include indirect land-use changes, biotic resource-depletion effects, biodiversity impacts, end-of-life aspects, comparison of new biobased technologies with well-established, conventional ones and, finally, data sources.

27 Commission Recommendation on the use of the Environmental Footprint methods.

28 On such purpose, the JRC has recently published a framework for the assessment of Safe and Sustainable by Design chemical and materials, and is developing guidelines to support the environmental assessment of early stage technologies for biobased products. https://op.europa.eu/en/publication-detail/-/publication/eb0a62f3-031b-11ed-acce-01aa75ed71a1/language-en/format-PDF/source-273331464. Joint Research Centre, Prospective LCA for Novel and Emerging Technologies for BIO-based products

29 Home - Life Cycle Initiative

The circular economy action plan highlights the need to give policy direction on the use of biodegradable or compostable plastics, based on an assessment of the applications where such use can be beneficial to the environment, and of the criteria for such applications. It also underlines the need to ensure that labelling a product as 'biodegradable' or 'compostable' does not mislead consumers and does not encourage them to dispose of it in a way that causes plastic littering or pollution due to unsuitable environmental conditions or insufficient time for degradation.

Biodegradation is indeed an important characteristic of plastics as it determines whether they will persist and accumulate in the environment, breaking down to smaller and smaller fragments, microplastics and nanoplastics, and become an increasing source of pollution, harmful to human health and the environment. Biodegradable plastics are not likely to persist and accumulate provided that they decompose fully in the receiving environment they are intended for and do not spill into an environment where they cannot biodegrade. This can happen, for instance, if a plastic which is biodegradable in soil is transferred by wind or runoff from soil into riverine or marine waters. The timescale for biodegradation must also be short enough not to harm ecosystems and marine life, for instance through ingestion by marine animals.

Plastics biodegradation is an area that has received considerable attention in terms of research and innovation. It is increasingly subject to policy measures designed to ensure that biodegradable plastics do not cause harm, that they do bring environmental benefits and that consumers are not given the impression that biodegradable plastics can be littered. The Directive on the reduction of the impact of certain plastic products on the environment[30] includes in its scope plastic products made of biodegradable plastics because if these products are littered, there is no guarantee that they can biodegrade in the open environment. In addition, it bans oxo-degradable plastics as they fail to deliver a proven environmental benefit, do not biodegrade completely, and have a negative impact on the recycling of conventional plastic.

The Fertilising Products Regulation[31] states that by 16 July 2026, coating agents and formulation additives must meet set biodegradability criteria. It also requires assessing the ability of agricultural mulch films to biodegrade in natural soil conditions and aquatic environments across the EU. Furthermore, the proposed restriction on intentionally added microplastics under REACH[32] exempts biodegradable polymers if they meet specific biodegradability criteria, proven either according to one of three test method groups with stringent screening tests measuring ready biodegradation or inherent biodegradation, or according to simulation studies where biodegradability criteria should be met in three environmental compartments of water, soil and sediment (or two, for agricultural and horticultural uses). Concerning polymers, including biodegradable ones, as announced in the

30 EUR-Lex - 32019L0904 - EN - EUR-Lex (europa.eu)

31 EUR-Lex - 02019R1009-20220716 - EN - EUR-Lex (europa.eu). In the absence of such criteria, an EU fertilising product placed on the market after that date shall not contain such polymers.

32 Commission's restriction proposal on intentionally added microplastics.

EU chemicals strategy for sustainability[33], the Commission is considering extending the duty of registration to certain polymers of concern in the context of the targeted revision of REACH.

4.1 Biodegradable plastics

To provide further guidance to policy development, the Commission tasked its Group of Chief Scientific Advisors to assess the biodegradability of plastics in the open environment. Their opinion[34] highlights the need to limit the use of biodegradable plastics in the open environment only to specific applications for which reduction, reuse or recycling are not feasible. Furthermore, it emphasises that such plastics should not be considered as a solution for inappropriate waste management or littering. To realise the potential environmental benefits of biodegradable plastics over non-biodegradable plastics, the Group recommends supporting the development of coherent testing and certification standards. It also identifies the need to promote accurate information on the properties, appropriate use and disposal, and the limitations of biodegradable plastics and their applications to specific user groups. The opinion issued by the Group identifies the material properties, the environment the material ends up in, the likelihood of spilling into other environments, and the behaviour of consumers as important factors.

In light of these considerations, as a first principle for the purposes of designing new plastics or for developing policy measures, **biodegradation must be regarded as a 'system property'** that takes into account material properties, specific environmental conditions and risks.

Secondly, **the use of plastics that biodegrade in the open environment must be limited** to materials for which full bio-degradability has proven to be below a specific and evidence-based timeframe to avoid environmental harm, and to specific applications where consumption reduction or reuse are not viable options and where the full removal, collection and recycling of plastic products is not feasible. As biodegradable plastics are predominantly used in relatively short-lived applications such as food and beverage packaging, the resources used to produce these products are rapidly lost. Substituting conventional plastics by biodegradable plastics risks slowing down the development of circular economy solutions based on reducing waste and reuse of such products. It also risks disincentivising designs to recycle plastics to keep materials in the loop for as long as possible, as well as the use of more sustainable alternatives that do not contain plastics. Therefore, **substitutions should not be considered as a solution for inappropriate waste management or littering**.

Mulch films used in agriculture are good examples of suitable applications of plastics that biodegrade in the open environment, provided that they are certified compliant against appropriate standards. For this purpose, the Commission will request the revision of the existing European standard[35] with the view to taking into account, in particular, the risk of

33 The EU's Chemical Strategy
34 Biodegradability of plastics in the open environment | European Commission (europa.eu)
35 European standard EN 17033:2018

plastic residues that biodegrade in soil entering water systems[36]. For other applications of biodegradable plastics to be considered suitable, such as dolly ropes used in fishery, products used for tree protection, plant fixing clips or lawn trimmer threads, new standards on test methods should be developed.

[36] Issues for improvement are the practice of tilling, not always followed by growers, the variety of EU agricultural environments and occurrence and risks of runoff, and the presence of hazardous biodegradable and non-biodegradable additives.

Example box: Mulch films

Conventional – fossil-based and non-biodegradable – plastics are widely used to promote higher yields, earlier harvests, less reliance on herbicides and pesticides, to protect against frost and to conserve water. But proper management of these plastics in agriculture at their end of life is problematic. In 2019, only around 63% of agri-plastic (non-packaging) waste generated in the EU was collected, while the destination of the remaining 37% is unknown – either stored, burnt, buried or collected with other waste. Despite their high potential for recycling, only 24% of agri-plastic plastics placed on the market every year in the EU is currently recycled. If mulch films are not removed or not completely, which cannot be always ensured, they release plastics that accumulate in soils, fragment into microplastics or are spread by wind or runoff. Mindful that soil plastic pollution is difficult to reverse, **certified biodegradable mulch films can offer a beneficial alternative**. Farmers have a direct interest in maintaining soil health and can be expected to check the labelling and instructions on how to use and dispose of these products correctly. Non-biodegradable plastics should be removed, collected and recycled. Member States can help by setting up relevant Extended Product Responsibility systems.

Consistent and science-based testing and certification standards for biodegradation of plastic in the open environment are essential for these limited applications where biodegradable plastics could be useful. Biodegradation tests are generally conducted in artificial environments to ensure the testing conditions are replicable, but there is a need to observe the processes occurring in natural environments under real conditions[37]. Standards are particularly challenging to develop for biodegradation in the marine environment, as biodegradation at the bottom of the ocean is unlikely due to the specificities of the marine environment[38]. The Commission has been tasked with carrying out an assessment of the scientific and technical progress concerning possible criteria or a standard for biodegradability in the marine environment under the Single-Use Plastics Directive [39].

Further challenges are presented by additives that are used for the manufacturing of biodegradable plastics, which should equally biodegrade. With regard to the complex chemical mixture contained in plastics, including additives, and their toxicity, a comparison with conventional plastics indicates that biodegradable plastics can be similarly toxic[40]. Moreover, biodegradable plastics can release these additives directly to the environment and do so quicker than conventional plastics[41]. **Additives used to manufacture biodegradable or compostable plastics should biodegrade safely and not be harmful for the environment. They should also be disclosed** to retailers, users and the public.

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37 Haider et al. 2018.

38 Biodegradation depends on a combination of abiotic (UV, temperature, moisture, pH) and biotic processes and parameters (microbial activity), often not present in the deep sea.

39 EUR-Lex - 32019L0904 - EN - EUR-Lex (europa.eu)

40 Zimmermann L., Dombrowski A., Völker C. & Wagner M. (2020) Are bioplastics and plant-based materials safer than conventional plastics? In vitro toxicity and chemical composition. *Environment International.*

41 Meng Qin et al. (2021) A review of biodegradable plastics to biodegradable microplastics: another ecological threat to soil environments? *Journal of Cleaner Production*.

Thirdly, consumer or user behaviour concerning biodegradable plastics is another key area that requires a careful approach. In order to avoid misleading consumers, **plastics labelled as 'biodegradable' must always specify the receiving open environment for which they are intended and the required timeframe for their biodegradation, in terms of weeks, months or years**. The indicated timeframe should ensure that environmental impacts are minimal. Such claims should be based on existing standards or certification schemes.

Claims, including in the form of labels, should not be made on the biodegradation of litter-prone products, including products covered by the Single-Use Plastics Directive.

4.2 Industrially compostable plastics

Although the framework rules to ensure the overall environmental benefits of biodegradable plastics also apply to compostable plastics, these materials require additional attention given the specificities of composting. Consumers often play a key role in channelling these plastics to controlled waste treatment systems.

Industrially compostable plastics should only be used for specific applications when the environmental benefits are higher than their alternatives and when they do not have a negative impact on the quality of the compost, taking into account consumer behaviour. In addition, there needs to be a compatible biowaste collection and treatment system in place. The potential benefits of using industrially compostable plastics are higher biowaste capture and lower contamination of compost by non-biodegradable plastics. Compost of a higher quality is more beneficial for use as organic fertiliser in agriculture and does not become a source of plastics pollution in soils and groundwater.

Industrially compostable plastic bags for the separate collection of biowaste are a beneficial application. These bags can reduce the plastics pollution of compost as conventional plastic bags, including fragments that remain even after action to remove them, are a contamination problem in current biowaste treatment systems in use throughout the EU[42]. As of 31 December 2023, biowaste must be separately collected or recycled at source[43], and the introduction of industrially compostable plastic bags for the separate collection of biowaste in countries such as Italy and Spain has led to less pollution in biowaste and increased capture of biowaste. However, not all Member States or regions support the use of such bags as specific composting methods are required and cross-contamination of waste streams may occur.

Examples of suitable applications in packaging are fruit and vegetable stickers, tea bags and filter coffee pods, as well as very light plastic carrier bags although alternatives with no packaging or reusable alternatives are to be preferred. Where both conventional and compostable plastics are available on the market for similar applications, consumers increasingly lack clarity on how to properly dispose of compostable plastic packaging[44]. The

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42 European Commission study on 'Relevance of compostable plastic products and packaging in a circular economy' (2020). Bio-based, biodegradable and compostable plastics (europa.eu)

43 EUR-Lex - 02008L0098-20180705 - EN - EUR-Lex (europa.eu)

44 European Commission study on 'Relevance of compostable plastic products and packaging in a circular economy' (2020). Bio-based, biodegradable and compostable plastics (europa.eu)

resulting cross-contamination of conventional and compostable plastic packaging waste reduces the quality of resulting secondary raw materials and should be prevented at source. Therefore, the Commission proposal for a Packaging and Packaging Waste Regulation[45] mandates the use of compostable plastic packaging for these products and foresees that other packaging, including packaging made of biodegradable plastic polymers, has to allow for material recycling without affecting the recyclability of other waste streams. Under the new rules, the Commission is empowered to amend this list in light of technological and regulatory developments that affect the disposal of compostable plastics and provided that the use of such materials is beneficial to environmental and human health.

To address consumer confusion, the use of labels does not help sufficiently, as they may not always work as intended[46]. In order to avoid misleading consumers, **only certified industrially compostable plastics should be qualified as 'compostable'** and it should always be specified that they are intended for industrial composting.

Industrially compostable packaging should display the way in which they should be disposed of using pictograms, as proposed by the Commission in its proposal for a Packaging and Packaging Waste Regulation[47]. Rather than simply raising awareness, **information campaigns should seek to promote effective and correct disposal action**.

Industrially compostable packaging should be certified compliant against appropriate standards. For this purpose, the Commission will request the revision of the existing European standard[48] with a view to clarifying the concepts of biodegradability and compostability; reflecting the current industrial composting conditions in EU biowaste treatment facilities, addressing the presence of toxic or adverse effects on the environment; and addressing the product as a whole, including additives.

Home composting is more challenging in terms of ensuring full biodegradation of compostable plastics and requires a greater degree of precaution. Compliance with standards for industrial composting does not imply decomposition also under home composting. In industrial composting, the required conditions are often high temperatures (55°C-60°C) and high humidity levels. In home composting, the required conditions very much depend on local climate circumstances and consumer practices, biodegradation risks to be slower than in industrial composting or uncompleted, and results are often closer to biodegradation in the open environment than to industrial composting. Home composting for plastics not covered by EU rules should only be considered in the context of specific local conditions under the supervision of the relevant authorities and provided that the use of such plastics has clear added value.

5. Continued support for research, innovation and investment

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45 Source to come.

46 SAPEA Evidence Review Report on 'Biodegradability of plastics in the open environment', Chapter 6 'Social, behavioural and policy aspects'. Influencing factors include lack of understanding, complexity and proliferation of labels as well as waste infrastructure-related factors (e.g. availability and proximity of enabling waste infrastructure).

47 Source to come.

48 European standard EN 13432:2000

EU-funded programmes already support research and innovation related to biobased, biodegradable and compostable plastics. The objectives focus on ensuring the environmental sustainability of the sourcing and production processes and of the use and disposal of the final products.

The Commission will promote research and innovation with the aim of designing circular biobased plastics that are safe and sustainable by design and that allow for reusability, recyclability and biodegradability. This includes assessing the benefits of applications where biobased materials and products are both biodegradable and recyclable. More work is also needed to assess and reduce the net greenhouse gas emissions of biobased plastics compared to their fossil-based equivalents, taking into account the lifetime of application and the possibility of multiple recycling[49].

Biodegradation processes need to be further explored. This includes work to ensure that biobased plastics for agricultural and other uses can biodegrade safely, taking in account the possible transfer to other environments, biodegradation timeframes and long-term effects. It also includes work to minimise any negative effects, including long-term effects, of additives used in biodegradable and plastic products. Among the range of potential non-packaging applications for compostable plastics, absorbent hygienic products merit particular attention. Research is also needed into consumer behaviour and the claims of biodegradability as a factor that may have an influence on littering behaviour.

6. International aspects

Plastics are part of integrated, global value chains. Decisions and strategic guidance on biobased, biodegradable and compostable plastics in international and multilateral fora and non-EU countries will have a significant impact on the EU's ability to fully implement its policy objectives and on the impact of identified measures on the ground.

The Commission will pursue the objectives of this communication, while taking into account the views of the EU Member States, the Council and the European Parliament, in discussions under relevant existing multilateral environmental agreements such as the Basel Convention on hazardous waste and their disposal; negotiations of legally binding instruments on plastic pollution, in particular those initiated by the UNEA Resolution 5/14; discussions in the context of the WTO, including the WTO Dialogue on Plastics Pollution and Environmentally Sustainable Plastics Trade, and future free trade agreements to be concluded or enhanced by the EU; as well as dialogues and cooperation with non-EU countries. The Commission will also strengthen the EU's approach to international standardisation on these plastics, which will help to achieve consistent standards at global level.

[49] ETC/WMGE Report 3/2021: Greenhouse gas emissions and natural capital implications of plastics (including biobased plastics) — Eionet Portal (europa.eu)

Conclusion

Many new plastic materials are emerging on the market. Biobased, biodegradable and compostable plastics can bring advantages over conventional ones if designed for circularity, produced safely and from sustainably sourced feedstock, prioritising the efficient use of secondary biomass, and compliant with relevant standards. However, these plastics also present challenges. It is important to ensure that they contribute to the circular economy, which aims to keep the value of resources, materials and products in the economy for as long as possible and to avoid waste.

The aim of this policy framework is to bring clarity and understanding of these plastics and to guide future policy developments at EU level such as under ecodesign requirements for sustainable products[50], the EU Taxonomy for sustainable investments, funding programmes and related discussions in international fora.

The Commission encourages citizens, public authorities and businesses to use this framework in their policy, investment or purchasing decisions.

[50] Ecodesign for sustainable products | European Commission (europa.eu)