Land-Based Solutions for Plastics in the Sea

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D8.4 Preliminary version of policy briefs on SMNP

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PROJECT INFORMATION

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List of participants:

Nº	Participant name	Acronym	Country	Type
1	UNIVERSIDADE DE VIGO	UVI	SPAIN	HES
2	UNIVERSIDADE DA CORUÑA	UDC	SPAIN	HES
3	Bundesanstalt fuer Gewaesserkunde	BfG	GERMANY	RTO
4	LABORATORIO IBERICO INTERNACIONAL DE NANOTECNOLOGIA	INL	PORTUGAL	RTO
5	KATHOLIEKE UNIVERSITEIT LEUVEN	KUL	BELGIUM	HES
6	HELMHOLTZ ZENTRUM FUR OZEANFORSCHUNG KIEL	GEOMAR	GERMANY	RTO
7	NATIONAL OCEANOGRAPHY CENTRE	NOC	UNITED KINGDOM	RTO
8	SORBONNE UNIVERSITE	SU	FRANCE	HES
9	OPEN UNIVERSITEIT NEDERLAND	OUNL	NETHERLANDS	HES
10	LEIBNIZ INSTITUTE FOR BALTIC SEA RESEARCH	IOW	GERMANY	RTO
11	ASSOCIACAO PARA O DESENVOLVIMENTO DO ATLANTIC INTERNATIONAL RESEARCH CENTRE	AC	PORTUGAL	RTO
12	UNIVERSIDADE FEDERAL DO SAO PAULO	UNIFESP	BRAZIL	HES
13	BASF SE	BASF	GERMANY	LE
14	TG ENVIRONMENTAL RESEARCH	ER	UNITED KINGDOM	SME
15	CONTACTICA S.L.	CTA	SPAIN	SME
16	STICHTING EGI	EGI	NETHERLANDS	Non-P
17	STICHTING RADBOUD UNIVERSITEIT	RU	NETHERLANDS	HES
18	UNIVERSIDADE FEDERAL DO PARÁ	UFPA	BRAZIL	HES

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Executive summary:	This report corresponds to Deliverable 8.4 Preliminary version of policy briefs on SMNP for EU officials and international policy makers, resulting from Task 8.2 of the LAPBLAS project. It presents two preliminary policy briefs, one adressing tyre particle emissions, and the other focusing on biodegradable plastics.

Version	Date	Comments
1	30/05/2023	Initial version

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ABBREVIATIONS AND ACRONYMS

Abbreviation / Acronym	Description
SMNP	Small micro and nano plastics

1 INTRODUCTION

Plastic is pouring from land into our oceans at a rate of nearly 10 million tonnes a year. Once in the sea, plastics fragment into particles moving with the currents and ocean gyres before washing up on the coastline. The smaller the size the higher the risk posed by these particles to organisms and human health. Because small, micro- and nano-plastics (SMNP) cannot be removed from oceans, proactive action regarding research on plastic alternatives and strategies to prevent plastic from entering the environment should be taken promptly. The LABPLAS project is a 48-month project whose vision is to develop new techniques and models for the detection and quantification of SMNP. Specifically, LABPLAS will determine reliable identification methods for a more accurate assessment of the abundance, distribution, and toxicity determination of SMNP and associated chemicals in the environment. It will also develop practical computational tools that should facilitate the mapping of plastic-impacted hotspots and promote scientifically sound plastic governance.

This document corresponds to Deliverable 8.4 "Preliminary version of policy briefs on SMNP for EU officials and international policy makers". This deliverable results from Task 8.2 (Action-oriented knowledge transfer to policy makers and other relevant stakeholders) of WP8 (GOVERNING PLASTIC). Two preliminary policy briefs, one addressing the problem of tyre particle emissions, and the other focusing on the issue of biodegradable plastics, are presented in this document. Annex 1 shows the two policy briefs.

2 PRELIMINARY POLICY BRIEFS

The aim of Task 8.2 is to transfer the knowledge, insights and tools developed in the LABPLAS project, including the lessons learnt in the case studies, in an action-oriented manner to policy makers and other relevant stakeholders so that they can apply these lessons, knowledge, insights and tools to reduce (micro)plastics emissions.

In order to carry this, different subtasks are defined. Under subtask 8.2.2, findings and results of the project that are relevant for the Literacy of the Oceans will be gathered and prepared to be shared with targeted stakeholders, in the form of a preliminary version (D8.4) and a definitive version of policy briefs (D8.6).

In subsections below it is described the preliminary version of policy briefs (D8.4), focusing on two issues: tyre particle emissions, and biodegradable plastics. These two policy briefs have been attached at the end of this document (see Annex 1). These are preliminary versions in the sense that their content will be updated (in D8.6) with new knowledge, results and findings of LABPLAS project regarding these two specific issues. Other policy briefs, addressing other key issues and findings of LABPLAS, will be presented in the D8.6.

3 POLICY BRIEF "DRIVING TOWARDS CLEANER OCEANS: ADDRESSING THE THREAT OF CAR TYRE EMISSIONS"

The use of vehicles on wheels as a means of transport has become an integral part of modern life, but this comes at an increasing environmental cost. Nowadays, it is becoming increasingly recognized that a major source of river and ocean plastic pollution comes from vehicle tyre wear. Urgent actions are required to address this, as to date, particulate emissions from tyres are not yet fully regulated in the EU. The LABPLAS policy brief "Driving towards cleaner oceans: addressing the threat of car tyre emissions" (Figure 1) focus on the problem of particle emissions from car tyres and provides recommendations for policymakers to address this problem.

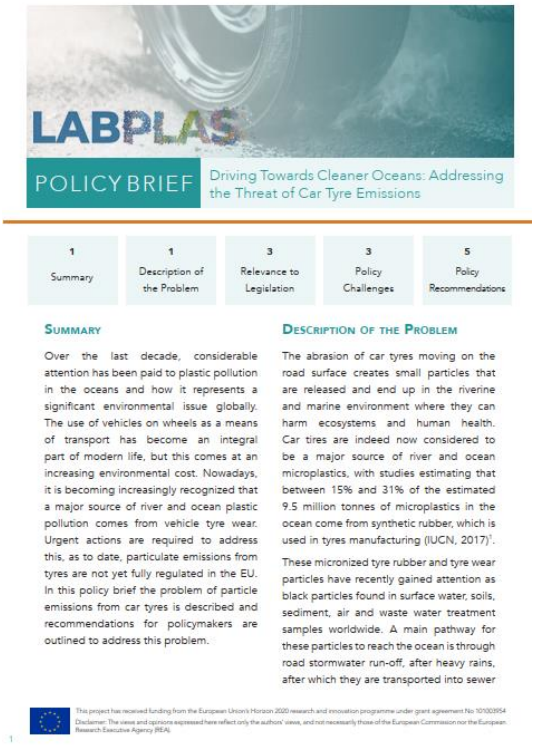
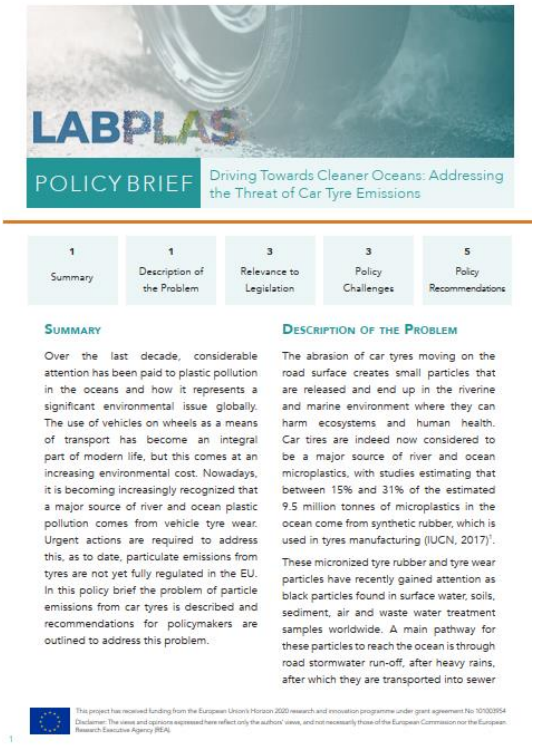


Figure 1. Front page of the LABPLAS policy brief "Driving towards cleaner oceans: addressing the threat of car tyre emissions".

4 POLICY BRIEF "SUPPORTING ENVIRONMENTALLY SAFE BIODEGRADABLE PLASTICS"

Biodegradable plastics can help reduce the accumulation of plastic in the environment. However, use of ambiguous terms such as biopolymers and bioplastics, and the lack of reliable labeling information, can mislead consumers. Furthermore, there is a need for a better understanding of environmental biodegradability and development of improved testing methods and certification schemes. Challenges regarding biodegradable plastics are addressed in LABPLAS policy brief "Supporting environmentally safe biodegradable plastics" (Figure 2). The policy brief also provides insights and recommendations for policymakers in order to better develop the legislative framework.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POLICY BRIEF Driving Towards Cleaner Oceans: Addressing the Threat of Car Tyre Emissions

1 Summary | 1 Description of the Problem | 3 Relevance to Legislation | 3 Policy Challenges | 5 Policy Recommendations

SUMMARY

Over the last decade, considerable attention has been paid to plastic pollution in the oceans and how it represents a significant environmental issue globally. The use of vehicles on wheels as a means of transport has become an integral part of modern life, but this comes at an increasing environmental cost. Nowadays, it is becoming increasingly recognized that a major source of river and ocean plastic pollution comes from vehicle tyre wear. Urgent actions are required to address this, as to date, particulate emissions from tyres are not yet fully regulated in the EU. In this policy brief the problem of particle emissions from car tyres is described and recommendations for policymakers are outlined to address this problem.

DESCRIPTION OF THE PROBLEM

The abrasion of car tyres moving on the road surface creates small particles that are released and end up in the riverine and marine environment where they can harm ecosystems and human health. Car tires are indeed now considered to be a major source of river and ocean microplastics, with studies estimating that between 15% and 31% of the estimated 9.5 million tonnes of microplastics in the ocean come from synthetic rubber, which is used in tyres manufacturing (IUCN, 2017)[1].

These micronized tyre rubber and tyre wear particles have recently gained attention as black particles found in surface water, soils, sediment, air and waste water treatment samples worldwide. A main pathway for these particles to reach the ocean is through road stormwater run-off, after heavy rains, after which they are transported into sewer

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Figure 2. Front page of the LABPLAS policy brief "Supporting environmentally safe biodegradable plastics".

ANNEX 1: POLICY BRIEFS

POLICY BRIEF

Driving Towards Cleaner Oceans: Addressing the Threat of Car Tyre Emissions

Summary

Over the last decade, considerable attention has been paid to plastic pollution in the oceans and how it represents a significant environmental issue globally. The use of vehicles on wheels as a means of transport has become an integral part of modern life, but this comes at an increasing environmental cost. Nowadays, it is becoming increasingly recognized that a major source of river and ocean plastic pollution comes from vehicle tyre wear. Urgent actions are required to address this, as to date, particulate emissions from tyres are not yet fully regulated in the EU. In this policy brief the problem of particle emissions from car tyres is described and recommendations for policymakers are outlined to address this problem.

Description of the Problem

The abrasion of car tyres moving on the road surface creates small particles that are released and end up in the riverine and marine environment where they can harm ecosystems and human health. Car tires are indeed now considered to be a major source of river and ocean microplastics, with studies estimating that between 15% and 31% of the estimated 9.5 million tonnes of microplastics in the ocean come from synthetic rubber, which is used in tyres manufacturing (IUCN, 2017)[1].

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systems, wastewater treatment plants, rivers and eventually into the ocean. The fractions that get trapped on the way in sediments is not known. Airborne transport of these particles is also of particular concern, as wind-borne microplastics can be easily blown furth and remain suspended in the atmosphere, finally depositing on land and in the oceans. Looking at it from a life cycle perspective, re-use (e.g. as infill for artificial turfs) and improper disposal of tyres into the environment has also the potential to generate and release microplastics.

Particles released by tyre wear are so small that they can easily be comparable to the traffic pollution particles released from car exhausts into the atmosphere (smaller than 2.5 microns) , known to negatively impact human health. The environmental issue is highly amplified by the fact that tyre wear particles are composed of a wide range of potentially harmful compounds, including fillers (such as carbon black, clay, silica, and calcium carbonate), stabilizers (antioxidants, antiozonants, and waxes), cross-linking agents (sulfur, accelerators, and activators), and secondary components such as pigments, oils, resins, and short fibers.

It is anticipated that road traffic will surge, including the usage of electric vehicles. According to EU projections, passenger transportation is estimated to rise by 42% by 2050, while freight transport is expected to increase by 60% (EC 2019)[2].

Moreover, the passenger car fleet is getting larger, more massive, and more potent, exemplified by the rise of sport utility vehicles. Therefore, it is essential that solutions and strategies are found and put in place in order to (1) reduce car tyre particle emissions, (2) minimize their fluxes into the ocean, and 3) mitigate their toxicological impact on biota and human health.

Currently, there is no specific EU regulation or directive in place to tackle the problem of particle emissions from car tyres. However, there are existing regulations and directives that indirectly address this issue. For example, the EU has set limits for particle emissions from vehicles under the Euro emissions standards, which indirectly affect tyre wear emissions. Additionally, the EU has established the Tyre Labelling Regulation, which requires all tyres sold in the EU to be labelled with information on their fuel efficiency, wet grip, and external rolling noise. This regulation encourages the production of more fuel-efficient and eco-friendly tyres, which can indirectly reduce tyre wear emissions.

Nevertheless, regulations and directives need to promote a more comprehensive approach that includes encouraging the adoption of technologies that reduce tyre emissions into the environment and associated chemical hazards, as well as pushing forward the use of alternative modes of transportation, and other actions such as the responsible tyre disposal practices and the increase in scientific and public awareness. In the optic of the LABPLAS project, it is needed to strengthen the understanding of the fate and transport behavior of plastic from different sources to the ocean, in particular from tyre wear particles. It is essential to identify and quantify their main sources and processes that influence the fragmentation and transport of these particles and how they negatively impact biota and human health.

Relevance to Legislation

The Euro 7 standards will be the first global emission regulations to go beyond controlling exhaust pipe emissions and establish additional restrictions on brake particulate emissions, as well as regulations on microplastic emissions from tires. These requirements will be applicable to all types of vehicles, including electric ones. (https://ec.europa.eu/commission/presscorner/detail/en/ip_22_6495)

The EU tyre label regulation (EU 2020/740) (https://www.etrma.org/key-topics/tyre-regulations/)

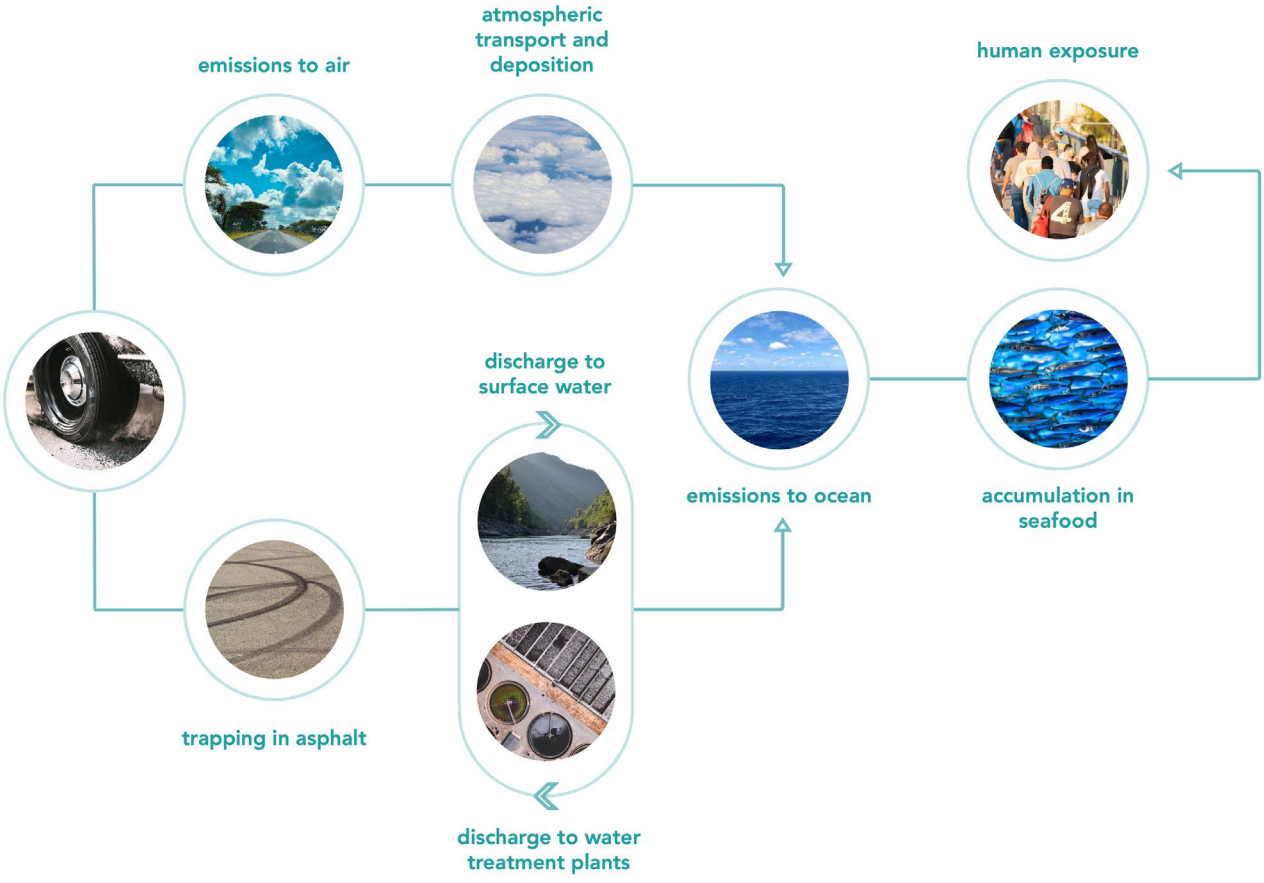
EU planned actions to tackle the issue of plastic pollution addressing both intentional and unintentional sources of microplastics https://environment.ec.europa.eu/topics/plastics/microplastics_en

Policy Challenges

The generation of tyre wear particles (TWP) is complex and influenced by various factors such as tyre characteristics, vehicle characteristics, road surface characteristics, driving behavior, tyre maintenance, composition and intensity of road traffic, and weather conditions. However, despite the EU's implementation of stringent policies and regulations, certain manufacturers may not adhere to them as tyres are manufactured and sold globally. Therefore, balancing environmental concerns with economic considerations of an increasing automotive industry is critical in the reduction of car tire emissions.

Policies and regulations that are too strict can lead to increased costs for manufacturers, which can ultimately impact consumers. To prevent the generation of TWPs, and retain the emitted particles, additional research is needed on the development of mitigation measures, their feasibility of implementation and their potential effectiveness. Nevertheless, the understanding of TWP is limited due to relatively recent concerns about its environmental impact and the lack of good methods to detect these particles, creating knowledge gaps regarding the sources, emission drivers, fate, and impacts of TWP in the environment as well as on human health.

The LABPLAS project is focused on contributing to overcome some of the challenges. Firstly, it aims to develop reliable analytical methods for determining microplastics and tyre wear markers in environmental samples, such as road dust and water run-off. This will help to evaluate the contribution of run-off waters to microplastic emissions. The project also seeks to identify the main sources, transport mechanisms, and fate of microplastics and tyre wear particles, in order to fill knowledge gaps and propose targeted mitigation measures that are effective in reducing their impact on the environment. Additionally, a unique aspect of LABPLAS is that it will map the TWP problem together with stakeholders (e.g., the tyre industry) in order to develop a common understanding of the problem and to identify appropriate mitigation measures.



Policy Recommendations

- Incentivize the research and adoption of technologies reducing the amount of plastic released through wear and tear, such as using more durable and natural materials as well as improving the lifespan of tyres.

- Require that regulations and standards addressing reducing plastic pollution take into account the unique characteristics, like different types of tyres and environmental conditions determining abrasion or that heavy-duty vehicles meet stricter emissions standards.

- Regulate the use of additives and chemical substances in tyre production, such as setting maximum limits, and encouraging the use of safer alternatives with a certification system. Increasing transparency allows consumers to make informed decisions when purchasing tyres.

- Collaborate with international partners, as car tyres are manufactured and sold globally, the EU must work collaboratively with international partners to ensure that its policies and regulations are effective.

- Promote responsible tyre disposal practices, like requiring tyre retailers to take back used tyres from customers, foster end-of-life programs for tyres as well as incentivize owners of older cars to replace them with newer, more environmentally friendly models. Promoting sustainable mobility solutions and improving road maintenance.

- Encourage research that can inform policy decisions concerning the environmental impact of tyre wear particles (TWP) and increase public awareness of the plastic pollution caused by tyre emissions.

- Foster research and development focused on harmonizing sampling, sample preparation, and analytical methods to gain better understanding of the issues related to tyre wear particles.

1 Boucher, J. and Friot D. (2017). Primary Microplastics in the Oceans: A Global Evaluation of Sources. Gland, Switzerland: IUCN. 43pp.

2 European Commission - Directorate-General Mobility and Transport (2019). Transport in the European Union – current trends and issues. Brussel, Belgium: DG MOVE. 171 pp.

POLICY BRIEF

Supporting environmentally safe biodegradable plastics

Summary

Plastic pollution is a major environmental problem that requires urgent action. Biodegradable plastics can help reduce the accumulation of plastic in the environment, when used in specific and relevant applications. However, use of ambiguous terms such as biopolymers and bioplastics needs to be discouraged, and the existing labelling should be improved to enable informed consumer choice. Furthermore, there is a need for a better understanding of environmental biodegradability and development of improved testing methods and certification schemes. This policy brief highlights current challenges regarding biodegradable plastics and provides recommendations for policymakers in order to better develop the legislative framework.

Description of the Problem

Biodegradable plastics were developed, as an alternative to conventional plastics, for specific applications. These types of plastics can be metabolized by microbes into carbon dioxide and biomass, and their behavior and properties are often similar to those of conventional plastics. Hence, the introduction of biodegradable plastics in specific applications such as mulch films helps prevent the accumulation of persistent (micro and nano) plastics in the environment.

In parallel to biodegradable materials, bio-based plastics have been developed in an effort to strive for a circular use of resources and for defossilization. However, the term biopolymer or bioplastics is often used to describe both bio-based and biodegradable plastics, although the products often do not fulfill both requirements. Examples include

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terms such as bio-PE or bio-PET that contain the prefix bio- to describe products that are bio-based, but are not biodegradable. This ambiguous terminology results in confusion for consumers. Such confusion is further amplified by similar green marketing claims such as "self-destructing" or "undergoing biotransformation", which are sometimes misused to refer to oxo-degradable technologies and which has nothing to do with biodegradable plastics and can mislead consumers. Over the years, great efforts have been put into the development of standard methods, certification schemes and labels to assess plastic biodegradability and renewable content. However, green claims are often not appropriately regulated by a legislative framework.

For applications in which the use of biodegradable plastics is considered beneficial, the materials used should be certified through recognized schemes based on validated and standardized tests. Still, there is a need for a deeper understanding of environmental biodegradability as well as for further development of test methods and certification schemes. Environmental conditions vary substantially depending on the climate zone, nutrient availability and microbial consortia. Additionally, current test methods require long testing times and high costs (e.g. testing for soil and marine biodegradability is currently performed for up to two years) and are only partially suitable to investigate slow degrading materials. Therefore, methods with high environmental relevance and reproducibility and shortened testing times are necessary to complement the already existing methods.

Environmentally-biodegradable materials and products should be truly benign in the application and at their typical end of life. Therefore, the ecotoxicity of the materials and all their components, e.g. additives, as well as their intermediate biodegradation fragments in the micro and nano-size range should be investigated. This is already part of existing testing schemes and certifications, for example, ecotoxicity testing of intermediate products and mandatory testing for additives, but gaps are still present, e.g. specific methods and specifications for plastics products designed for application in the marine and freshwater environments.

All these aspects are key for the sustainable development of environmentally safe and sustainable biodegradable materials capable of replacing persistent conventional plastics and ensuring that the cure will not be worse than the disease.

Policy Challenges

The current greatest policy challenge is to support consumer choices to deal with biodegradable and biobased plastics. The EC identified the lack of reliable labeling information on those products as a problem, but associates this problem only to the use of the confusing term "biopolymer", which encompasses bio-based plastics (BBP) and biodegradable and compostable plastics (BDCP). In fact, these two materials are very different in terms of the environmental problems they target and the end-of-life management they demand: the waste of bio-based plastics (BBP) must be managed just like conventional plastics, whereas biodegradable and compostable plastics (BDCP) facilitate composting and may reduce the environmental impacts associated with accidental loss.

The LABPLAS Project aims to provide scientific information to plastic producers, regulatory agencies and certifiers (TUV Austria, DIN) to manufacture, certify and label biodegradable plastic materials. The goal is to further improve the available standard methods to ultimately give consumers access to clearer and more trustworthy information when making their purchasing decisions.

Relevance to Legislation

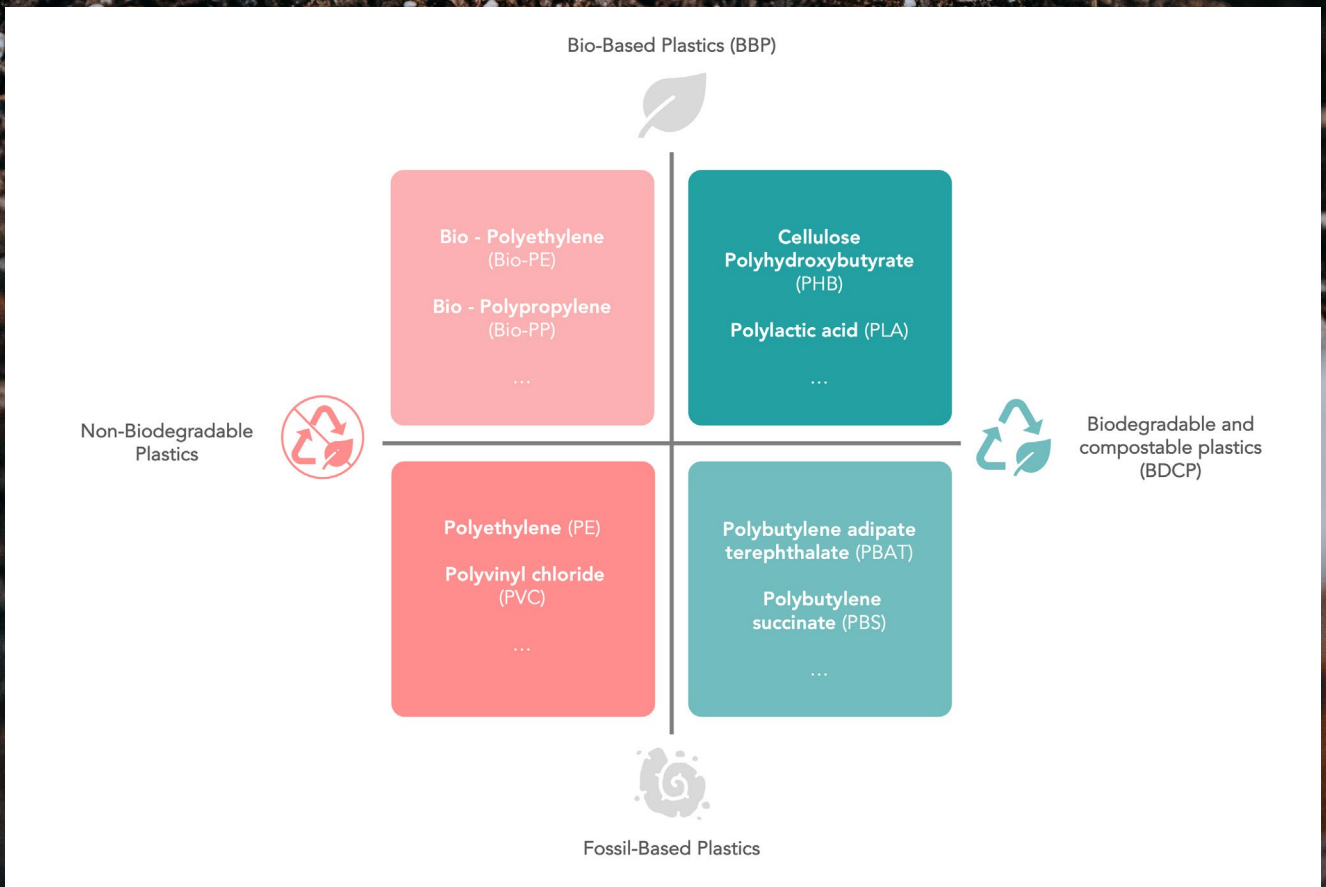
- Plastics Strategy (2018)
- SUP Directive (Directive EU 2019/904)
- Packaging and packaging waste Regulation
- Revision of the Waste Framework Directive
- Empowering consumers in the green transition Directive
- Ecodesign for Sustainable Products Regulation
- Green Claims Directive (Product Environmental Footprint)
- Unintentionally-added microplastics
- Intentionally-added microplastics
- Taxonomy

Bio-Based plastics are manufactured biologically (using plant-based sources, naturally existing structures, or generated through biological processes like microbial activity), rather than relying solely on fossil raw materials. Nevertheless, it should be noted that their biodegradability or compostability is not guaranteed.

Biodegradable plastics have the potential to breakdown through microorganisms into CO2, water, and biomass, as it depends on the chemical structure of the molecule and not on the origin of the raw material. The efficiency and outcome of biodegradation are contingent upon various factors, including the environmental conditions specific to the given location and the nature of the material or application. As a result, the process and its results can vary significantly.

Compostable plastics are biodegradable plastics derived from biological resources or fossil raw materials, that generally break down in composting facilities under specific conditions (e.g. location, temperature, timeframe, etc.)

Using the terms "biodegradable" or "compostable" alone without specifying the applicable standards or environments where the process occurs, is deceptive and these terms are vulnerable to greenwashing.



Policy Recommendations

- The general term "bioplastics" as well as the general prefix "bio-" on final products is misleading and akin to greenwashing. Bio-based and biodegradable products should be clearly differentiated. For both classes of materials, claims should be used referring to the exact properties of the products and their intended end of life, determined through internationally recognized and accepted testing schemes.

- Renewable content and biodegradability claims should be regulated by law, specifically describing the exact properties of the material and product and the dedicated end of life. According to current certification schemes, these subdivisions can be "Marine biodegradable", "Freshwater biodegradable", "Soil biodegradable", "Home compostable" and "Industrial compostable". In addition, claims should always be substantiated by results generated according to internationally-recognized standards and be certified. Claims on standard methods or on standards not suitable for proving biodegradation should be forbidden.

- Claims about biodegradability in the open environment, such as marine, water and soil biodegradability should occur exclusively in business-to-business communications. These claims on the end consumer products might encourage littering behaviors and therefore should be forbidden.

- To support a science-based discussion, minimum criteria should be defined for biodegradation and ecotoxicity studies to be considered for the drafting of regulations. Tested materials should be unequivocally characterized as well as inocula used for the tests. Positive controls should always be included as well as negative controls, when potential negative effects are investigated. Results should refer to the actually tested materials and conditions and not be extrapolated for a class of products. Similarly to greenwashing marketing claims for the consumer products, generic statements about biodegradable materials should be avoided.

- More efforts must be invested in the development of new biodegradability and ecotoxicity test methods. Cost-effective, ecologically-relevant and high throughput standard tests representative of biodegradation under environmental conditions to complement existing methods and standards are needed. Shortened testing times as well as

complementary testing for slow-degrading materials should be developed. Validation of these test methods should be performed through relevant field testing. Ecotoxicity tests should be developed to take into consideration fragmentation scenarios and reflect realistic scenarios (e.g., concentrations).

- Labels should be clear and unambiguous. Solutions on how to provide a necessary indication of the composition of the commercial products, in terms of the polymer and the intentionally-added chemicals, should consider intellectual property, and innovation at the industrial level should also be taken into account. A balanced approach should be elaborated in a multi-sectorial manner to complement the already existing mandatory certifications of the materials.

References

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.

European Bioplastics (2021) - Claims on biodegradability and compostability on products and packaging. Berlin: European Bioplastics 3pp.