

Recommendations towards the EU Plastics Strategy

Discussion paper from the Interest Group Plastics of the European Network of the Heads of Environment Protection Agencies (EPA Network)

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Table of Contents

Preface.....	3
Framing the problem.....	5
1. Prevention	8
2. Individual Targets	9
3. Green Public Procurement	10
4. Standardization	12
5. Recycling.....	13
6. Deposit Systems	14
7. Bioplastics.....	16
Conclusion	18
Specific Recommendations of the IG Plastics	19
Bibliography.....	20

Preface

The Interest Group Plastics (IG Plastics) is a working group of the EPA Network. The idea to found the IG Plastics came up during the Conference “Eliminating Plastic and Microplastic Pollution” in May 2015, organized by Austria. It was established to specifically work on plastics as one of the major topics of the EU Circular Economy Action Plan. This was agreed with the Interest Group Green and Circular Economy, to which it is thematically closely related. The focus of the IG Plastics work lies on land-based plastic inputs into the environment, as it is assumed that large amounts of plastics ending up in the oceans stem from land, however with significant regional differences.

The IG Plastics is currently composed of representatives from European Environment Agencies from 13 states, namely Austria, Denmark, Finland, Iceland, Germany, Netherlands, Norway, Portugal, Romania, Scotland, Slovenia, Spain, and Switzerland. The group takes an interdisciplinary approach and is comprised of experts in various fields, such as waste management or marine environmental protection. Their expertise and day-to-day practical experience with regulative measures pertaining to plastics enables the IG Plastics to identify relevant policy fields and to address the most efficient measures.

In this discussion paper, the IG Plastics shares views and recommendations on the Roadmap published by Directorate General Environment prior to the publication of the EU Plastics Strategy. Developed within the EU Action Plan for a Circular Economy, the proposed EU Plastics Strategy seeks to promote new approaches for the management of plastics, plastic products and plastic waste. The group understands plastics as the sum of the materials associated with elastomers, thermosets and thermoplasts. The main intention of the strategy is to keep unwanted plastic inputs out of the environment (waters¹, soil and air) by (1) promoting reuse and recycling, (2) by avoiding losses and littering and (3) by promoting innovations in product and process design.

The IG Plastics welcomes the Commission’s initiative to address plastics specifically in EU legislation and supports the European Parliament’s *Report on a European Strategy on plastic*

¹ Marine, coastal, inland and groundwaters.

waste in the environment, as well as the Committee of the Regions Opinion on *An EU action plan for the Circular Economy* and its parts on the European strategy on plastic waste.

Furthermore, the IG Plastics shares the three main concerns raised in the Roadmap of the Strategy on Plastics in a Circular Economy:

1. High dependence on virgin fossil feedstock;
2. Low rate of recycling and reuse of plastics;
3. Significant leakage of plastics into the environment.

The EU Strategy on Plastic will also support the relevant activities to reduce marine litter. Since the identification of garbage patches in the Pacific Ocean several years ago, marine litter is recognized as a major environmental problem and therefore several intergovernmental structures address this problem. Regional action plans to reduce marine litter have been agreed by MEDPOL, OSPAR and HELCOM and are under development for the Black Sea. They are usually backed up by national programs of measures according to the EU Marine Strategy Framework Directive. In 2015, the G 7 agreed on an action plan to reduce marine in litter at a global level.

In this context, the IG Plastics welcomes the aspirational 30% reduction target for litter items found on beaches and for fishing gear found at sea in order to reduce the pressures of marine litter on the marine environment, but assumes that a significantly higher reduction should be envisaged. In addition, the IG Plastics points out that coordinated and harmonised monitoring methods are needed to measure the success.

With this paper, the IG Plastics puts topics in focus which from their perspective need to be addressed at the European level, helping to reduce or prevent unwanted plastics entries. It should be noted that the goal is not to provide an encompassing overview of all issues related to plastics. Rather, the paper addresses seven main points deemed relevant in the view the European Environment Agencies. Starting from prevention of plastic waste, the paper addresses the importance of individual targets for each state, the potential that lies in green public procurement, standardization as a measure to regulate plastic materials, measures to increase recycling, the role increased deposit schemes should play, as well as a critical assessment of bioplastics.

Framing the problem

Plastics entering the environment can have negative impacts on all environmental media. However, knowledge gaps still need to be closed when it comes to analyzing sources, pathways and effects of plastic particles and their additives in soil, water and air. Therefore, monitoring of plastics in the environment according to harmonized methods in all media and research are needed. Based on them, tailored approaches can be developed to prevent unintended leakages as well as material-specific measures for plastics in order to avoid harm to ecosystems.

Marine litter² accumulates in seas and coasts and impacts marine ecosystems including marine animals. It can also cause problems to human activities that use and depend on the sea and can raise human health concerns as a consequence of seafood consumption. Ingestion of plastic particles has been shown in a variety of marine organisms and is a pathway for the transfer of chemical additives and pollutants into biota. There is some evidence of transfer of microplastics into the food web, which can result in bioaccumulation. Marine litter is globally acknowledged as a major societal challenge due to its environmental, economic, social, political and cultural implications.

Plastic particles in the environment can generate injuries, entanglement and reduction of wildlife's fitness. Weathering and wear and tear of plastic products lead to the formation of micro-plastic particles, which can affect species, particularly at the low end of the size fraction. Microplastics are also reported to be a carrier of environmental contaminants and vector for several pathogens. In this context, it is necessary to relate plastic particles to the occurrence of natural particles. The IG Plastics supports further research on the impacts of plastic including their different additives on ecosystems and human health.

Litter can enter the coastal and marine environment from diverse point and non-point sources, which can be both land and sea-based. Detecting the source is fundamental for identifying targeted measures for each environmental medium. It is important to note that the

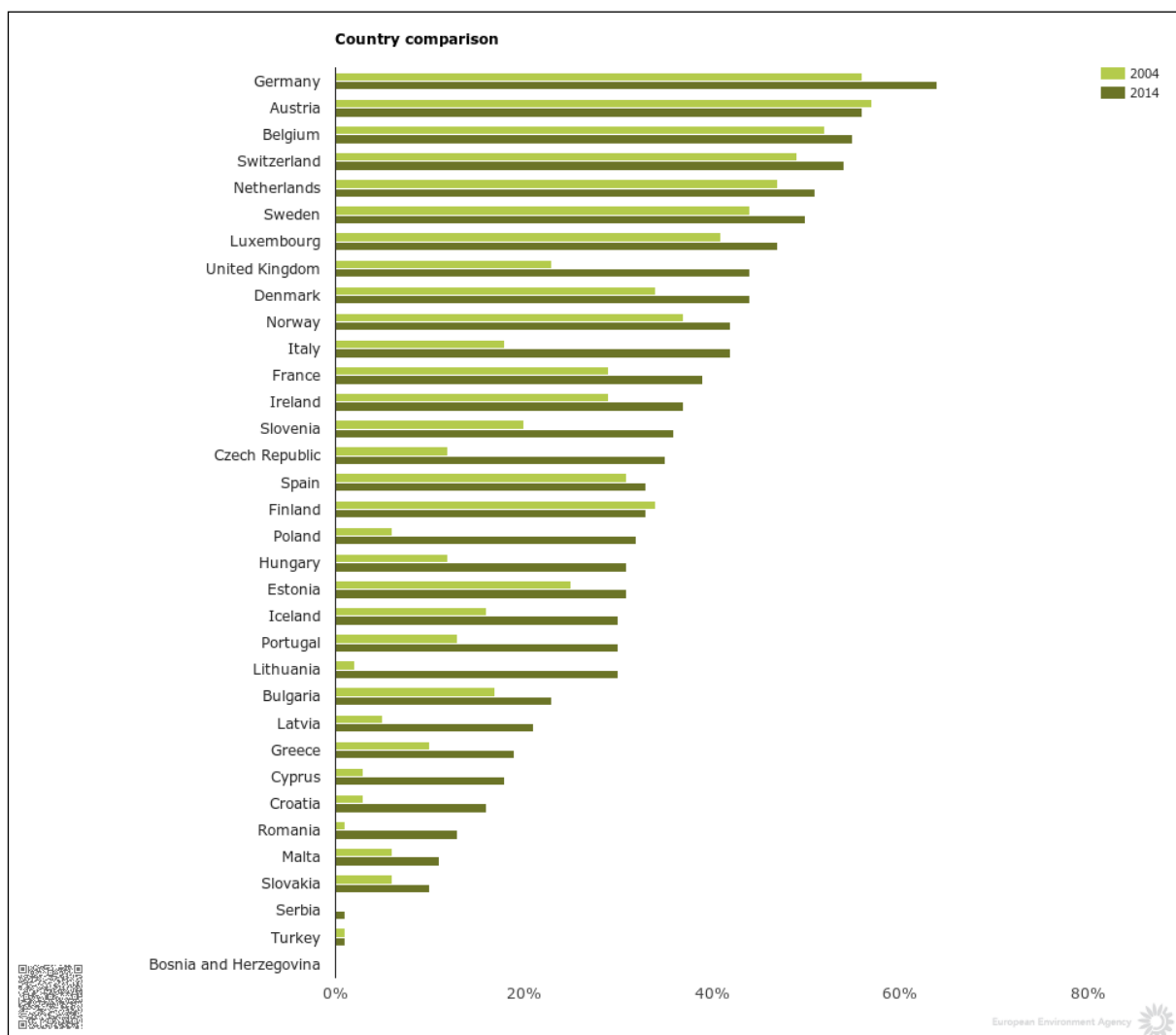
² Marine litter: Any persistent, manufactured or processed solid material discarded, disposed or abandoned in the marine and coastal environment (see: Vlachgianni, 2017).

pathways of land-based inputs can lead through different environmental media, and the impacts and behavior of plastics in each medium vary. In order to understand the effects better, further research is needed.

One major source for microplastics found in the environment stems from the degradation of macroplastics released into the environment. Consequently, measures to reduce inputs should primarily tackle the releases of macroplastics. Depending on regional specifics, major land-based sources for plastic releases into the environment include i.a. inadequate waste management, such as littering, landfilling of untreated waste, or inputs of stormwater overflows.

Among others, measures proposed in this document focus on these sources, while taking the diverse situation in different European States into account. Measures to increase the rate of recycling are also addressed in this context.

While the average total recycling rate increased in European countries from 37 % in 2004 to 44 % in 2014, the performance of individual countries varies. Whereas some countries (Germany, Austria, Belgium, Switzerland, the Netherlands and Sweden) recycled at least half of their municipal waste in 2014, in other European states, particularly from Eastern and Southern Europe, the proportion of recycled municipal waste barely changed, even decreased (Fig. 1).



Municipal waste recycling in European countries (2004 and 2014).
 Source: <http://www.eea.europa.eu/themes/waste/municipal-waste>

Other sources, such as urban waste water, are covered by existing EU-legislation (i.e. Directive 91/271/EEC). The IG Plastics does see other priorities for its work and is therefore not considering this aspect.

Apart from inadequate waste management and product use of plastics being a significant problem, the IG Plastics highlights that plastics have a number of interfaces with ecological and human health along their whole life-cycle. Being a complex material with many additives to fulfill specific purposes, chemicals may leach out of plastics resulting in dermal, oral and inhalative exposure to humans and wildlife. Some of these additives can act as endocrine disruptors which cause detrimental effects on the reproductive systems. Particular concern is in long term exposures to these chemicals, especially of sensitive populations. Other characteristics are persistence and lipophilicity, which can increase the risk of bioaccumulation.

1. Prevention

Short-lived single-use plastic items such as plastic cups or lids from drinks, crisp packs, candy wrappers, shopping bags, drink bottles, as well as agricultural foils highlight the fact that plastic litter is not merely a waste management issue. Instead, ways should be identified to avoid or reduce the use of single-use plastic items or to make sure that an entry into the environment is avoided. Therefore, emphasis should be put on the prevention of plastic waste formation in the first place. On the one hand, measures should focus on raising awareness of consumers and citizens of negative impact of single-use items and other plastics, and on the other hand on fully implementing circular economy schemes (e.g. policy instruments that promote multi-use of products or eco-design) and/or policies that will drastically reduce the use of such items (e.g. banning or putting a levy on single use plastic bags).

As one practical example, the IG Plastics highlights actions undertaken to prevent plastic waste in Slovenia: The initiative “Zero Waste Slovenia” has an economical, ethical and efficiency-oriented goal, leading society to adapt its lifestyle, consumer habits, as well as behavior towards more sustainable consumption. *Zero Waste* means designing and managing products and processes to reduce volume and toxicity of waste, maintaining and processing all kinds of material without incineration or landfill deposition. At the moment, three municipalities are part of the *Zero Waste Slovenia* initiative, with highly visible results such as a 10% increase (2013-2016) of collected waste suitable for recycling, and a 20% drop in quantities of municipal waste (landfill deposit).

Slovenia's capital, Ljubljana, was the “Green capital of EU”³ in 2016 due to its good practices on waste management (63% of all collected waste was suitable for recycling processes). The following gives examples of some of the main actions undertaken to reduce waste:

- Establishment of a Regional Center for waste management;
- Establishment of a RE-USE Center;
- Establishment of underground collection units to prevent littering (and to avoid wind effects).

³ <http://www.greenljubljana.com/funfacts/zero-waste>

In addition to the measures undertaken by municipalities or at national level, the discussions on the prevention of unwanted plastic inputs into the environment tend to focus on plastic producers and consumers, as it is outlined in the Green Paper on Plastic Waste of the EC. The importance of these notwithstanding, the IG Plastics additionally highlights the importance of raising awareness among practitioners, such as farmers, factory workers and fishermen, who work with plastics on a regular basis.

The IG Plastics proposes to develop and perform training programs for this target group to encourage practitioners to adopt a mindful approach when dealing with plastics in order to avoid unintended leakages into the environment. To ensure a common methodology, European associations could be involved in conceptualizing and implementing such curricula. Best practices already exist in several European states. For example, the Austrian Ministry for the Environment and the Association of the Austrian Chemicals Industry adopted a “Zero Pellet Loss” initiative in order to reduce pellet losses into the environment during production and conversion. The initiative raises the awareness of employees by means of easily applicable, low cost procedures.

RECOMMENDATIONS OF THE IG PLASTICS

- Prevent plastic waste formation;
- Raise awareness on negative impacts of single-use plastics;
- Share best practices in waste management;
- Establish tailor made training programs among practitioners.

2. Individual Targets

Targets are an important instrument in order to achieve an increase in collection and recycling rates of plastic waste. Therefore, the IG Plastics wants to encourage that all European countries, regardless of their current waste and recycling infrastructure and recycling rates, in using individual ambitious targets. In determining these targets, the current performance in waste management should be taken into account, and it should be ensured that the numbers do not fall below the current status. In order to support this process, the group encourages all states to share best practices on waste management, and to develop instruments to ensure that ambitious reduction targets can be achieved.

RECOMMENDATIONS OF THE IG PLASTICS

- Establish ambitious individual recycling targets;
- Take regional realities in waste management into account.

3. Green Public Procurement

“Every year, over 250 000 public authorities in the EU spend around 14% of GDP on the purchase of services, works and supplies”⁴ – with these numbers, the public sector is the biggest single spender in the EU. Clearly, the way these procurements are spent has a considerable environmental impact. With the regulative framework on public procurement⁵, the EU has the chance to increase the share of green practices in this sector by including environmental requirements in the legislation. The positive effects green procurement can have on production and consumption patterns will have the potential to considerably speed up the EU’s transition to a Circular Economy.

The IG Plastics supports the analysis and measures proposed in the 2008 Communication “Public procurement for a better environment”⁶, as well as in the report “Waste Prevention through GPP – with focus on plastic” and the “Green Public Procurement Manual on Plastic Waste Prevention”. In addition, the IG Plastics asks the Commission to promote the application of the waste hierarchy and ambitious green standards in public procurement within the framework of the EU Plastics Strategy.

The EU Public Procurement reform⁷, introduced in 2016, provides more opportunities to choose socially responsible goods, services and works. Public authorities are able to require that bidders not only comply with environmental obligations, but also deliver goods fulfilling the requirements of environmental labels. In addition, they can ask bidders to enhance environmental factors when producing goods or to integrate environmental costs in an offer based on a life-cycle cost approach. By using their purchasing power to choose environmentally

⁴ https://ec.europa.eu/growth/single-market/public-procurement_en

⁵ <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:02014L0024-20160101>; <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:02014L0024-20160101>; <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:02014L0023-20160101>

⁶ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0400:FIN:EN:PDF>

⁷ http://ec.europa.eu/growth/tools-databases/newsroom/cf/itemdetail.cfm?item_id=8562

friendly goods, services and works, Europe's public authorities can make an important contribution to sustainable consumption and production. The EU can increase the effect of these regulations by providing trainings to procurement officers.

The IG Plastics urges the Commission to enable speeding up green innovation. To do so, the new possibilities for light tendering should be used. One example could be to allow contracts for one year for specific innovators that give the time to catch up with front-runners for the next procurement round. The new possibilities should be brought to the attention of procurement officers with special emphasis that the EU aims at speeding up green innovation and that they hold the keys to do so.

Furthermore, the IG Plastics encourages to apply the *three easy rules of thumb* described in Plastic Zero's "Green Public Procurement Manual on Plastic Waste Prevention" (an EU-Life project) and the other recommendations in the developed manual:



Source: www.plastic-zero.com/publications/plastic-zero-launches-a-green-public-procurement-manual-on-plastic-waste-prevention.aspx

In addition, the IG Plastics urges the Commission to extend the recommendations on green procurement to also include the private sector. Any guidelines and recommendations should be applicable to both sectors.

RECOMMENDATIONS OF THE IG PLASTICS

- Give preference to product design that puts emphasis on reuse, reparability, recyclability and a long life span of the product and that can be returned to their producer, motivated by LCA-assessment of products (even if it is more expensive);
- Give preference to preventive measures implemented for plastic packaging waste;
- Give preference to products that contain a high proportion of recycled material;
- Give preference to products labeled with the EU Eco-label, the Nordic Swan, the Blue Angel or similar;
- Establish environmental criteria for products / services;
- Include guidelines for product and waste management for the public sector taking the waste hierarchy into account.

4. Standardization

Standardization is an important tool that specify requirements for products, services or procedures, and are used to set benchmarks and criteria to harmonize behavior in industry and society. The International Organization for Standardization (ISO) and the European Committee for Standardization (CEN) and national standardization bodies are suitable platforms to bring different stakeholders together and to agree on standards that serve the safety of humans, the environment and products. Within the context of the EU Plastics Strategy, the IG Plastics supports the development and application of standardization as they play an important role for planned regulative measures in the sector, such as ISO 17422 -EN 15344:2007 for Recycled Plastics, and EN 14995:2006, Plastics for the Evaluation of compostability. An important instrument for accelerating the development of standards is the allocation of mandates. Mandates are the mechanism by which the European Commission (EC) calls upon the European standardization bodies (CEN) to develop and adopt European standards to support European policies and legislation.

In addition to important topics such as recycling and biodegradation, the methodical work on the detection of plastics in environmental media (inland and marine water, soil, air) and various products (including secondary raw material fertilizers, construction products) should be prioritized together with methods for identification and characterization of the type and origin of plastic detected in these media. For instance, there is a need for standardization of methodology in detecting (micro)plastics in water and wastewater.

RECOMMENDATION OF THE IG PLASTICS

Award a mandate to the CEN TC 249 in order to speed up the necessary standardization work in a timely manner.

5. Recycling

The IG Plastics emphasizes the importance of the general requirement that all European States have to reduce the amount of landfilled biodegradable municipal solid waste significantly. This is considered a key issue and the pretreatment of biodegradable municipal solid waste is a basic requirement to ensure comprehensive recycling of valuable wastes, such as plastics. Countries like Switzerland, Sweden, and Denmark have introduced a restriction on landfilling of plastic waste⁸. In Germany, a limit value for the organic fraction of settling waste before disposal of 3% is now applicable. This includes plastic.

Low rates of recycling as well as reuse of plastics is one main area of concern addressed in the Roadmap of the EU Plastics Strategy. Compared to other waste streams (such as paper or metal), it seems that rates of plastics recycling remain an untapped potential. In 2014, only 30% of 25 million tons of post-consumer plastic waste generated were recycled, whereas 39% went to incineration and 31% were landfilled⁹. Obstacles to plastics recycling are manifold and include:

- Lack of plastic waste separation and collection;
- Competition for energy recovery;
- The absences of plastic-specific recycling targets for specific waste streams;
- Additives in recyclates which hinder their selling;
- Missing standardized quality criteria, which leads to a presumed lower quality of recyclates than virgin materials, and an assumed lower consumers' acceptance.

In addition to these challenges, it should be highlighted that the state of plastics recycling differs considerable from country to country and depends on individual factors. While in some countries, separate collection is the biggest challenge, in others, large amounts of plastics are landfilled or go to incineration. Therefore, there is no single solution to increase recycling rates

⁸ ENV/EPOC/WGWPR(2009)10/REV1

⁹ <http://www.plasticseurope.de/Document/plastics---the-facts-2016-15787.aspx?FolID=2>

across Europe. However, one measure which would have beneficial effects in all countries is an increased separate collection of plastic waste. This measure avoids plastic waste streams to be contaminated with other materials and promotes high-quality recycling.

Furthermore, the IG Plastics encourages to include minimum requirements for recyclability in the implementing regulations of the Ecodesign Directive (Directive 2009/125/EC), as recyclability starts in the design phase of a new material or product.

In order to expand the demand side for recyclates (made of post-consumer plastic waste) and to strengthen the market thereof, minimum recyclate targets for specific plastic products should be considered, such as dustbins or disposable plastic carrier bags. In addition, ambitious targets should be set in public procurement tenders (see paragraph on Green Public Procurement).

When defining the recycling targets, different starting points regarding waste management and recycling infrastructure and rates in the European States should be taken into account. Therefore, the IG Plastics encourages that all European States should set individual but ambitious recycling targets based on the current status. These targets should have a steering function for each state and be set according to state-of-the-art technology. This would encourage those states with less developed waste infrastructure to set striving goals and would ensure that all make progress at their own speed within determined timescales.

RECOMMENDATIONS OF THE IG PLASTICS

- Reduce amount of biodegradable municipal solid waste landfilled;
- Increase separate collection;
- Include minimum requirements for recyclability in Ecodesign Directive;
- Establish minimum recyclate targets for specific plastic products.

6. Deposit Systems

Deposit systems refer to collection systems for either single-use or reusable packaging, or both. They are mostly used for beverage containers made of plastics, glass or metal, or other goods such as batteries, gas bottles, foils used in agriculture, or crates used in the wholesale market. The reusable containers (or foils / batteries) are borrowed from the producer for a small fee, which is returned once the container is returned. The containers usually carry a label

which identifies them as returnable goods so that the consumer can distinguish them from single-use items.

Deposit systems have several advantages: They help *reduce the inclination to litter*, as there is a financial incentive to return bottles or cans to collection points where the consumers get the refund part of the deposit imposed on the beverages containers when imported/produced. *Recycling is promoted*, which keeps secondary raw materials in the system. Furthermore, the system facilitates *high-quality closed loop recycling*, allowing for food grade recycled material. Introducing deposit systems *promotes the recycling infrastructure*, which has beneficial effects on waste management in general. Often, the system is applicable for single- as well as multi-use beverage packaging, and should in a circular economy preferably promote multi-use when this is the most environmentally friendly option. In order to make deposit systems work, the visibility of it and diverse/accessible return facilities are crucial in order to help consumers to use the system.

The IG Plastics promotes an increased use of deposit systems for beverage containers and other suitable product groups, e.g. other plastic containers, hay roll plastics or other foils used in agriculture and fishing gear, as well as expanding existing systems. In addition, an analysis of the feasibility to add deposit system on other types of single-use plastic items, e.g. cutlery, should be considered. Another measure to be considered addresses retailers, which often only carry single-use bottles. As a measure to promote multi-use packaging, an obligation for retailers to provide single-use as well as multi-use return bottles could be considered. The IG Plastics also encourages an open exchange between European States on experiences and best practices with deposit systems.

The pros and cons of joint common return-deposit systems across borders have been debated several times in the Nordic Co-operation without reaching a conclusion¹⁰. If the Commission is considering a common European system, the Nordic co-operation would be able to deliver input to this discussion.

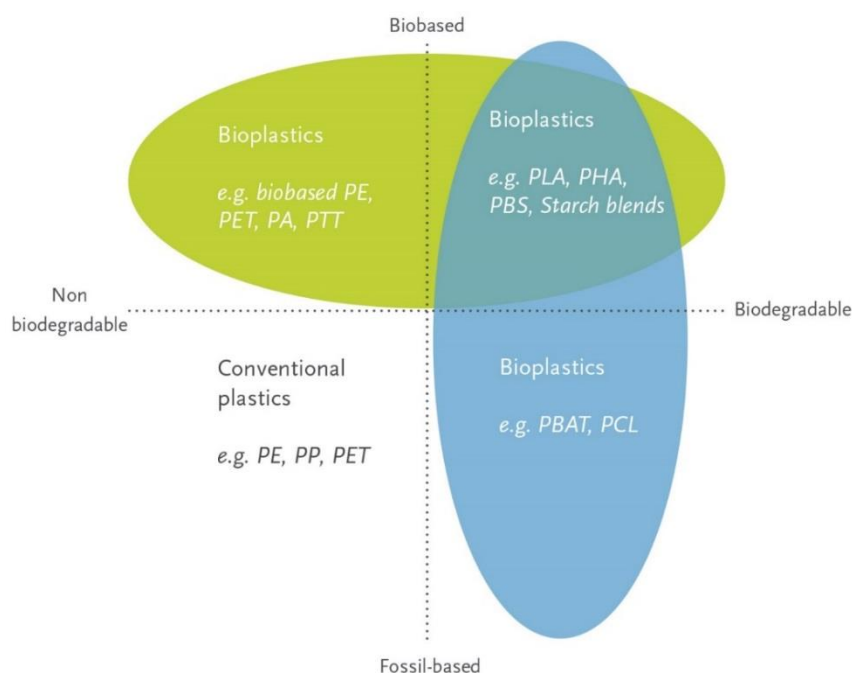
RECOMMENDATIONS OF THE IG PLASTICS

- Increase deposit systems for different product groups;
- Encourage best practice sharing on deposit systems among European States.

¹⁰ <http://www.norden.org/en/news-and-events/news/nordic-deposit-system-costs-too-much>

7. Bioplastics

As an alternative to conventional plastics in packaging or single use applications, so-called “*bioplastics*” are on the rise. Bioplastics can refer to bio-derived or biobased plastics (derived from biomass such as organic waste or specifically grown crops) and / or biodegradable plastics, which describe polymers capable of being broken down into water, CO₂/CH₄ and biomass by microbial activity under certain conditions. However, bio-derived plastics may lead to competition for land use with food crops and threats to sensitive habitats. In order to ensure that a given bio-based plastic product is in fact a better environmental option than alternative fossil options, a comprehensive approach on a case by case basis is needed. It should be carefully evaluated if bio-derived plastic products are environmentally preferable to fossil-based plastic products, which is a common, but unsubstantiated assumption. So far, plastics certified as compostable and biodegradable according to European standards¹¹ meet the requirements for treatment in industrial composting plants under specific and controlled conditions. Nevertheless, due to deviations from standardised laboratory conditions, in practice, problems exist with disintegration and degradability. Standards for biodegradability in other environments than in industrial composting plants so far exist only at national level without harmonised approaches.



Source: www.european-bioplastics.org

¹¹ European standard EN 13432:2000 Packaging and EN 14995:2006 Plastics.

Due to these issues, biodegradable plastics cannot be considered truly biodegradable at this stage. Reliable data on environmental outcomes, especially in soil and (marine) waters, are not available. Moreover, labelling products as compostable and biodegradable has the potential to increase the risk of littering. In addition, the widespread adoption of biodegradable plastics would require their separation from non-biodegradable waste streams for plastics recycling to ensure the quality of the final product (fossil and non-fossil). Biodegradable plastics might be appropriate for a small range of products that are intended to end up in nature and are not being collected, or in other types of products, e.g. in medical applications. This should be done on a case by case assessment.

In order to promote the production and usage of biodegradable plastics at large scale, these products will have to measure up against the promise to be fully degradable. So far, biodegradable products do not contribute to a significant decrease of inputs into the environment or the physical and chemical risk thereof. The IG Plastics therefore encourages further research in this field, and refrains from supporting the further adoption of biodegradable and bio-derived plastics until the issues mentioned above are addressed. Also, it should be emphasized that uniform definitions and standards are needed for biodegradable plastics considering the practice and realistic conditions. Substituting fossil-based plastic with bioplastic alternatives are unlikely to solve the current plastic issues with land and marine litter and the low reuse and recycling rate, and might instead create new problematic issues.

In particular, conventional polymer types with special additives designed to fragment but not fully degrade at the molecular level (oxo- degradable) should be avoided. If not entirely degraded and metabolised, the fragmented microplastic particles will enter in different environmental compartments.

RECOMMENDATIONS OF THE IG PLASTICS

- Avoid broad use of biodegradable plastics unless they degrade fast in natural conditions (both land and marine);
- Avoid so-called oxo- degradables;
- Ensure uniform definitions and standards for biodegradable plastics.

Conclusion

The IG Plastics asks the European Commission to consider its recommendations and include them in the EU Plastics Strategy. In addition, the IG Plastics recommends to regularly update the Plastics Strategy, to develop it further and to adapt it if necessary. In order to do so efficiently, the IG proposes to set up a monitoring mechanism which will show the effectiveness of the implementation of the Plastics Strategy. Environmental monitoring results would also inform and support the existing and upcoming global (G7 and G20), regional (e.g. HELCOM, OSPAR, MEDPOL, Black Sea) and national action plans to reduce marine litter.

Should it turn out that countries lag behind in the implementation process, the IG Plastics suggests to make use of appropriate support mechanisms such as Twinning projects, structural funds and the sharing of best practices. To ensure regular intervals for updating the Plastics Strategy, the IG Plastics encourages to set up a stakeholder group composed of representatives of the entire material chain. In a structured procedure, this group should discuss the Strategy's progress and recommend adaptations should they be necessary.

Specific Recommendations of the IG Plastics

PREVENTION

- Prevent plastic waste formation
- Raise awareness on negative impacts of single-use plastics
- Share best practices in waste management
- Establish tailor made training programs among practitioners

INDIVIDUAL TARGETS

- Establish ambitious individual recycling targets
- Consider regional realities in waste management

GREEN PUBLIC PROCUREMENT

- Encourage reuse, reparability, recyclability and a long life span in product design
- Give preference to preventive measures implemented for plastic packaging waste
- Give preference to products that contain high proportion of recycled material
- Give preference to products labeled with the EU Eco-label
- Establish environmental criteria for products / services

STANDARDIZATION

Award mandate to CEN TC 249 to speed up necessary standardization work

RECYCLING

- Reduce amount of biodegradable municipal solid waste landfilled
- Increase separate collection
- Include minimum requirements for recyclability in Ecodesign Directive
- Establish minimum recyclate targets for specific plastic products

DEPOSIT SYSTEMS

- Increase deposit systems for specific product groups
- Encourage best practice sharing on deposit systems among European States

BIOPLASTICS

- Ensure uniform definitions and standards for biodegradable plastics before promoting further use
- Avoid so-called oxo-degradables.

Bibliography

- Assanta MA, Roy D, Lemay M-J, Montpetit D, 2002: Attachment of *Arcobacter butzleri*, a new water-borne pathogen, to water distribution pipe surfaces. *J Food Protect* 65:1240–1247;
- Bakir, I. A. O'Connor, S. J. Rowland, A. J. Hendriks, R. C. Thompson, 2016: Relative importance of microplastics as a pathway for the transfer of hydrophobic organic chemicals to marine life. *Env. Pollut. Bull.*, 219, pp. 56–65;
- Bakir A., Rowland S.J., Thompson R.C., 2014: Enhanced desorption of persistent organic pollutants from microplastics under simulated physiological conditions. *Environ Pollut* 185:16-23;
- Batté M, Appenzeller BMR, Grandjean D, Fass S, Gauthier V, Jorand F, Mathieu L, Boualam M, Saby S, Block JC: Biofilms in drinking water distribution systems. *Rev Environ Sci Biotechnol* 2003, 2:147–168;
- Browne M.A., Niven S.J., Galloway T.S., Rowland S.J., Thompson R.C., 2013: Microplastic moves pollutants and additives to worms, reducing functions linked to health and biodiversity. *Curr Biol* 23:2388-2392;
- Choy C.A. & Drazen, J.C., 2013: Plastic for dinner? Observations of frequent debris ingestion by pelagic predatory fishes from the central North Pacific. *Mar. Ecol. Prog. Ser.*, 485, pp. 155–163;
- Claessens M., Van Cauwenberghe L., Vandegehuchte M., Janssen, C., 2013: New techniques for the detection of microplastics in sediments and field collected organisms. *Marine Pollution Bulletin* 70(1-2):227-233;
- Consultic, 2016: Produktion, Verarbeitung und Verwertung von Kunststoffen in Deutschland 2015. Alzenau.
- de Witte B., Devriese L., Bekaert K., Hoffman S., Vandermeersch G., Cooreman K., 2014: Quality assessment of the blue mussel (*mytilus edulis*): Comparison between commercial and wild types. *Mar Pollut Bull* 85:146-155;
- EFSA, Panel on Contaminants in the Food Chain, 2016: Presence of microplastics and nanoplastics in food, with particular focus on seafood. *EFSA Journal* 2016; 14(6):4501 [30 pp.]. doi: 10.2903/j.efsa.2016.4501;
- European Parliament, 2013: Report on a European strategy on plastic waste in the environment (2013/2113(INI))
- European Committee of the Regions, 2016: Opinion - Closing the loop – An EU action plan for the Circular Economy (ENVE-VI/011)
- van Franeker J.A., and Law K.L., 2015: Seabirds, gyres and global trends in plastic pollution. *Env. Pollut.*, 203, pp. 89-96;
- Harrison, J.P., Schratzberger M., Sapp M., Osborn A.M., 2014: Rapid bacterial colonization of low-density polyethylene in coastal sediment microcosms. *BMC Microbiol.* 14 (1), 232;
- Herzke D., Anker-Nilssen T., Nost T.H., Gotsch A., Christensen-Dalsgaard S., Langset M., 2016: Negligible Impact of Ingested Microplastics on Tissue Concentrations of Persistent Organic Pollutants in Northern Fulmars off Coastal Norway. *Environ Sci Technol* 50:1924-1933;
- Hussain N., Jaitley V., Florence AT., 2001: Recent advances in the understanding of uptake of micro-particulates across the gastrointestinal lymphatics. *Advanced Drug Delivery Reviews* 50:107-142;
- Kirmizi S., 2014: Microplastic as vector for potentially pathogenic *Vibrio* spp., Master thesis, Biofilm Center, University of Duisburg – Essen;
- Kirstein I. V., Kirmizi, S., Wichels, A., Garin-Fernandez, A., R. Erler, M. Loder and G. Gerdt, 2016: Dangerous hitchhikers? Evidence for potentially pathogenic *Vibrio* spp. on microplastic particles. *Mar. Environ. Res.*, 120, 1 – 8;

- Koelmans A.A., 2015: Modeling the role of microplastics in bioaccumulation of organic chemicals to marine aquatic organisms. A critical review. *Marine Anthropogenic Litter*. (ed. M. Bergmann, L. Gutow, M. Klages), Springer Cham Heidelberg New York; Dordrecht London, pp 309-324;
- Lönngstedt O. M. and Eklöv P., 2016: Environmentally relevant concentrations of microplastic particles influence larval fish ecology. *Science* 352(6290); 1213-1216;
- Lusher A.L., McHugh M., Thompson R.C., 2013: Occurrence of microplastics in the gastrointestinal tract of pelagic and demersal fish from the English Channel. *Mar. Pollut. Bull.*, 67, pp. 94–99;
- Marine conservation Society, 2013: Results of the UK annual beach clean and survey. UK;
- Morris J.J.G., 2003. Cholera and other types of vibriosis: a story of human pandemics and oysters on the half shell. *Clin. Infect. Dis.* 37, 272-280;
- Oberbeckmann S., M. G. J. Loder and M. Labrenz, 2015: Marine microplastic-associated biofilms - a review. *Environ. Chem.* 12: 551-562;
- Plastic ZERO, 2014: Green Public Procurement Manual on Plastic Waste Prevention. www.plastic-zero.com/publications/plastic-zero-launches-a-green-public-procurement-manual-on-plastic-waste-prevention.aspx;
- Plastic ZERO, 2014: Waste Prevention through GPP – with focus on plastic. http://www.plastic-zero.com/media/54979/waste_prevention_through_gpp_october_2013.pdf;
- Quilliam R.S., Jamieson J., D.M. Oliver, 2014: Seaweeds and plastic debris can influence the survival of faecal indicator organisms in beach environments. *Mar. Pollut. Bull.*, 84: 201–207;
- Rebolledo E.L.B., J.A., Jansen, O.E., Brasseur S. M. J. M., 2013: Plastic ingestion by harbour seals (*Phoca vitulina*) in The Netherlands. *Mar. Pollut. Bull.*, 67, pp. 200–202;
- Rochman C.M., Hoh E., Kurobe T., Teh S.J., 2013: Ingested plastic transfers hazardous chemicals to fish and induces hepatic stress. *Sci Rep* 3:3263;
- Ryan P.G., Connel A.D., Gardner B.D., 1988: Plastic ingestion and PBCs in seabirds; is there a relationship? *Marine Pollution Bulletin* 19:174-176;
- Seltenrich N., 2015: New link in the food chain? Marine plastic pollution and seafood safety. *Environ. Health Perspect.*, 123 (2), pp. 35–41;
- Setälä O., Fleming-Lehtinen V., Lehtiniemi M., 2014: Ingestion and transfer of microplastics in the planktonic food web. *Env. Poll.*, 185, pp. 77-83;
- Teuten E.L., Saquing J.M., Knappe D.R.U., Barlaz M.A., Jonsson S., Bjorn A., 2009: Transport and release of chemicals from plastics to the environment and to wildlife. *Philos T R Soc B* 364:2027-2045;
- Thompson F.L., Iida, T., Swings J., 2004: Biodiversity of vibrios. *Microbiol. Mol. Biol. Rev.* 68, 403-431;
- Veiga J.M., Fleet D., Kinsey S., Nilsson P., Vlachogianni T., Werner S., Galgani F., Thompson, R.C., Dagevos, J., Gago, J., Sobral, P. and Cronin, R., 2016: Identifying Sources of Marine Litter. MSFD GES TG Marine Litter Thematic Report. JRC Technical Report;
- Vlachogianni et al., 2017: Marine litter assessment in the Adriatic and Ionian seas. DeFishGear project;
- Wick P., Malek A., Meili D. X. M-A., Diener L., Diener PA., 2010: Barrier capacity of human placenta for nanosized materials. *Environ Health Persp* 118:432-436;
- Yang D.Q., Shi H.H., Li L., Li J.N., Jabeen K., Kolandhasamy P., 2015: Microplastic pollution in table salts from china. *Environ Sci Technol* 49:13622-13627;
- Zettler ER, Mincer TJ, Amaral-Zettler LA., 2013: Life in the "Plastisphere": microbial communities on plastic marine debris. *Environmental Science & Technology.* 47:7137-7146.