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MI	**191**
IND	**66**
CONSOM	**39**
MARE	**8**

COVER NOTE

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GREEN PAPER

On a European Strategy on Plastic Waste in the Environment

TABLE OF CONTENTS

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On a European Strategy on Plastic Waste in the Environment

The purpose of this Green Paper is to launch a broad reflection on possible responses to the public policy challenges posed by plastic waste which are at present not specifically addressed in EU waste legislation. The follow-up to the Green Paper will be an integral part of the wider review of the waste legislation that will be completed in 2014. This review will look at the existing targets for waste recovery and landfill as well as an ex-post evaluation of five directives covering various waste streams.

The inherent characteristics of plastic create specific challenges for waste management. Plastic is relatively cheap and versatile with many industrial applications, leading to exponential growth over the past century; a trend that is set to continue. Secondly, plastic is a very durable material which outlives the products made of it. As a result, the generation of plastic waste is growing worldwide. The durability of plastic also means that uncontrolled disposal is problematic as plastic can persist in the environment for a very long time. The need to continue efforts to reduce the incidence and impacts of plastic in the marine environment was particularly highlighted at the Rio+20 Summit.

There are not only challenges, but also opportunities arising from better management of plastic waste. Although plastic is a fully recyclable material, only a small fraction of plastic waste is at present recycled. Enhanced recycling would contribute to the aims of the Roadmap to a Resource Efficient Europe adopted in 2011[1] and help to reduce greenhouse gas emissions and imports of raw materials and fossil fuels. Appropriately designed measures to recycle plastic can also improve competitiveness and create new economic activities and jobs.

This Green Paper will help reassess the environmental and human health risk of plastic in products when they become waste, addressing their environmentally sound design, both functionally and chemically, and open a reflection process on how to tackle the problem of uncontrolled disposal of plastic waste and marine litter. It should also help move forward the reflection on internalization of life-cycle impacts, from raw material extraction to the end of life phase, into the costs of plastic products.

The Commission launches this consultation in order to collect the facts, assess the stakes and to gather the views of all interested stakeholders on a phenomenon that has many dimensions.

Comments are invited on all or some aspects of the document. Specific questions are listed after each section on policy options.

Member States, the European Parliament, the European Economic and Social Committee and all other interested parties are invited to submit their views on the suggestions set out in this Green Paper. Contributions should be sent to the following address to reach the Commission by 7 June 2013 at the latest: http://ec.europa.eu/environment/consultations/plastic_waste_en.htm.

Please note that the majority of references in this text based their data on official statistics from EUROSTAT and the EEA.

[1] COM(2011) 571.

1. PLASTIC WASTE, DESCRIPTION OF A GROWING PROBLEM

Plastic production

Plastic is a relatively new material which went into industrial production only in 1907[2]. It now pervades industrial and consumer goods, and modern life is unthinkable without it. At the same time the characteristics that make plastic so useful, such as its durability, light weight and low cost, also make its disposal problematic[3].

Global plastics production grew from 1.5 million tonnes (Mt) per annum in 1950 to 245 Mt in 2008, with 60 Mt[4] in Europe alone. Production during the last 10 years equalled production during the whole of the 20th century combined[5]. It is estimated (under a business as usual scenario) that 66.5 Mt[6] of plastic will be placed on the EU market in 2020 and global plastic production could triple by 2050[7].

Plastic waste

In the European Union (EU 27), it is estimated that around 25 Mt of plastic waste was generated in 2008. Of this 12.1 Mt (48.7%) was landfilled while 12.8 Mt (51.3%) went to recovery[8], and only 5.3 Mt (21.3%) was recycled[9]. While a projection to 2015 assumes an overall increase of 30 % in the level of mechanical recycling (from 5.3 Mt to 6.9 Mt), landfilling and incineration with energy recovery[10] are expected to remain the predominant waste management pathways[11].

Plastic production is going up with GDP[12] and an associated overall increase in the generation of plastic waste between 2008 and 2015 of 5.7 Mt (23%)[13]. This is largely driven by a 24% rise in the packaging sector and is part of an unbroken trend of increasing plastic waste in Europe. In the absence of improved product design and improved waste management measures, plastic waste will increase in the EU as production increases.

Trends observed in the EU are likely to be stronger in fast-growing economies like India, China, Brazil and Indonesia, but also in developing countries. The world's population is forecast to grow by 790 million every decade and may reach over 9 billion by 2050 with a

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2 Gerhard Pretting/Werner Boote, Plastic Planet, Ornage Press, Freiburg 2010, p.8.

3 In depth report Plastic Waste: Ecological and Human Health Impacts, Science for Environment Policy, November 2011, p.1.

4 (BIOIS) Plastic waste in the Environment, final report, European Commission, November 2010, *http://ec.europa.eu/environment/waste/studies/pdf/plastics.pdf.*

5 KPMG International (2010). The future of the chemical industry.

6 Plastic waste in the Environment, loc.cit, p. 163.

7 Wurpel G.,Van den Akker J.,Pors J., Ten Wolde, Plastics do not belong in the ocean. Towards a roadmap for a clean North Sea. IMSA Amsterdam (2011), p. 39.

8 Member State's statistics do generally only report on plastic packaging. The actual amount of plastic waste can be assumed to be higher. See: FORWAST, 2010, Policy recommendations, p. 43. (http://forwast.brgm.fr/Documents/Deliverables/Forwast_D63.pdf).

9 (BIOIS) Plastic waste in the Environment, loc.cit., p. 73.

10 R 1 recovery operation under Annex II of the Directive on Waste 2008/98/EC.

11 (BIOIS) Plastic waste in the Environment, loc.cit, p. 123.

12 (BIOIS) Plastic waste in the Environment, op.cit., p. 122 ff.

13 (BIOIS) Plastic waste in the Environment, loc.cit., p. 123.

new middle class of around 2 billion[14]. This is likely to increase demand for plastic and the amount of plastic waste worldwide.

The plastics industry

The plastic industry plays an important economic role in Europe, employing in total around 1.45 million people in over 59 000 companies and generating turnover in the region of around € 300 billion per year. The producing sector provides 167 000 and the converters 1.23 million jobs (EU 27, 2005-2011, ESTAT) mostly in SMEs[15].

On the waste management side, collection and sorting of waste from electric and electronic equipment (WEEE) and plastics provide the greatest job opportunities, with a total of 40 and 15.6 jobs respectively being created per 1 000 tonnes of material processed. Plastic recycling alone has the potential to create 162 018 jobs in the EU 27 if the recycling rate increases up to a level of 70% by 2020[16].

Plastic is mostly used in packaging as a low-cost one-way product that is most often not reusable or not foreseen for reuse. The plastics converting market is dominated by plastic packaging (40.1%) followed by the building and construction sector (20.4%). The Plastics industry expects a long-term growth of around 4% globally, well ahead of expected global GDP growth[17]. Europe is still a net exporter of plastic products with a value of €13 billion in 2009, but Chinese production has reached similar levels since 2008[18].

Fate in the environment

Once in the environment - particularly in the marine environment - plastic waste can persist for hundreds of years[19]. Harm to the coastal and marine environment and to aquatic life follows from the 10 million tonnes of litter, mostly plastic, which end up in the world's oceans and seas annually, turning them into the world's biggest plastic dump. Waste patches in the Atlantic and the Pacific oceans are estimated to be in the order of 100 Mt, about 80% of which is plastic. Plastic debris causes sea species to suffer from entanglement or ingestion[20]. "Ghost fishing"[21] through derelict plastic fishing gear causes high economic cost and substantial environmental harm. Invasive species use plastic debris to travel long distances in oceans. Most plastic debris eventually comes to rest on the seabed[22].

Plastic is not inert. Conventional plastic contains a large number, and sometimes a large proportion, of chemical additives which can be endocrine disruptors, carcinogenic or provoke other toxic reactions and can, in principle, migrate into the environment, though in small

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14 WBCSD, Vision 2050, ttp://www.wbcsd.org/templates/TemplateWBCSD5/layout.asp?type=p&MenuId=MTYxNg&doOpe.

15 Plastics Europe, plastics – the facts, 2012, p.5.

16 Friends of the Earth, Report of September 2010, more jobs, less waste, p. 16, p. 31.

17 Plastics Europe, loc.cit., p 5.

18 Plastics Europe, loc.cit., p. 12.

19 Wurpel G. et al, loc cit., p. 13.

20 UNEP, 2009, Marine Litter: A global challenge, http://www.unep.org/pdf/unep_marine_litter-a_global_challenge.pdf.

21 A phenomenon by which large lumps of derelict fishing nets float in water, unintentionally catching large amounts of fish.

22 Near large cities and offshore canyons, the density could extend to 100.000 pieces per /km2. See further: Wurpel,G. loc.cit., p. 32, 35.

quantities[23]. Persistent organic pollutants (POPs), such as pesticides like DDT and polychlorinated biphenyls (PCBs)[24], can attach themselves from the surrounding water to plastic fragments which can be harmful[25] and enter the food chain via marine fauna which ingest the plastics (Trojan horse effect)[26]. These POPs do not break down naturally very easily but accumulate in body tissue, potentially having carcinogenic, mutagenic and other health effects[27].

Small and fine particles (so called micro plastics), result from decades of photo degradation and mechanical abrasion and are of particular concern. They are ubiquitous and reach even the most remote areas[28] with a concentration in water sometimes higher than that of plankton. These micro plastics, and the chemical additives they contain, if ingested in large quantities by marine fauna may have a high potential for contaminating the food chain through predator-prey interaction.

Poor waste management on land, in particular only marginal plastic waste recovery rates, aggravate the problem of plastic marine pollution which is one of the most important emerging global environmental issues[29]. Experts judge that around 80% of marine plastic waste is coming from land[30].

Major land based sources of plastic marine litter appear to be: storm water discharges, sewer overflows, tourism-related litter, illegal dumping[31], industrial activities, improper transport, consumer cosmetic products, synthetic sandblasting media or polyester and acrylic fibres from washing clothes[32]. Plastic pellets can be found in most of the world's oceans, even in non-industrialised areas such as the Southwest Pacific[33].

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23 Most additives are fillers and reinforcements,, plasticizers, colorants, stabilizers, processing aids, flame retardants, peroxides and antistats, each representing a whole family of chemicals.

24 Mato Y., Isobe T., Takada H., Kanehiro H., Ohtake C. and Kaminuma T. (2001) "Plastic resin pellets as a transport medium for toxic chemicals in the marine environment" in *Environmental Science and Technology* 35(2): 318-324.

25 Rios, L.M., Moore, C. and P.R. Jones (2007) "Persistent organic pollutants carried by synthetic polymers in the ocean environment" in *Marine Pollution Bulletin* 54: 1230-1237.

26 Rios, L.M., Jones, P.R., Moore, C. and U. Narayan (2010) "Quantification of persistent organic pollutants adsorbed on plastic debris from the Northern Pacific Gyres' "Eastern Garbage Patch"", accepted in *Journal of Environment Monitoring*.

27 (BIOIS) Plastic waste in the Environment, loc.cit, p. 117.

28 (BIOIS) Plastic waste in the Environment, loc.cit, p. 114.

29 UNEP yearbook; Emerging issues in global environment, Nairobi 2011; GESAMP (2010,IMO/FAO/UNESCO-IOC/UNIDO/WMO/IAEA/UN/UNEP Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection); Bowmer, T. and Kershaw, P.J., 2010 (Eds.), Proceedings of the GESAMP International Workshop on plastic particles as a vector in transporting persistent, bio-accumulating and toxic substances in the oceans. GESAMP Rep. Stud. No. 82, 68 pp., p.8.

30 UNEP (2005). Marine litter, an analytical overview: http://www.unep.org/regionalseas/marinelitter/publications/docs/anl_oview.pdf.

31 Liffman M. and Boogaerts (1997) "Linkages between land-based sources of pollution and marine debris" in Marine Debris. Sources, Impacts, Solutions pp. 359-366.

32 Browne, M.A., Crump, P., Niven, S.J., Teuten, E., Tonkin, A., Galloway, T., Thompson, R. (2011). Accumulation of microplastics on shorelines worldwide: sources and sinks. Environ Sci Technol, 45(21), 9175-9179.

33 Derraik J.G.B (2002) "The pollution of the marine environment by plastic debris: a review" in Marine Pollution Bulletin 44:842-852.

2. REGULATION ADDRESSING PLASTIC WASTE IN EUROPE

Waste legislation

Plastic waste is not specifically addressed by EU legislation despite its growing environmental impact. Only the Packaging Directive 94/62/EC has a specific recycling target for plastic packaging. The Framework Directive on waste 2008/98/EC sets a general recycling target for household waste which covers, among other materials, plastic waste. The Waste Framework Directive is relevant in some other respects. For instance, the Directive establishes extended producer responsibility as a key principle in waste management. It also sets out the waste hierarchy giving precedence to waste prevention, reuse and recycling over recovery, including energy recovery, and disposal. There persists, however, a sharp contrast between legislative requirements and actual waste management practice.

The Waste Framework Directive invites the Commission to review its targets and to consider additional targets for other waste streams if appropriate. In addition, the Commission has also been asked to review the targets in the Landfill Directive for the reduction of landfilling of biodegradable waste as well as the recycling and recovery targets in the Packaging and Packaging Waste Directive 94/62/EC for several categories of packaging waste.

The Commission has decided that it will conduct a wide ranging review of the existing waste legislation and the various targets which will be completed in 2014. This review also involves an ex-post evaluation ("fitness check") of five existing waste stream Directives[34] that will assess effectiveness, efficiency, coherence and relevance. The follow-up to this Green Paper will form an integral part of this wide ranging review of the waste legislation.

Chemicals legislation

The REACH Regulation 1907/2006/EC is of some relevance for plastics recycling. While the Regulation contains specific provisions[35] that facilitate the placing on the market of recycled materials, in some cases, the use of additives in plastics may hinder compliance within REACH if the additives are not allowed in new products. Some REACH processes are also relevant for improving the resource efficiency of plastics, including its recyclability, and the risks associated with plastic in the environment. In particular, restrictions remain key tools to reduce the hazards associated with certain plastics. Authorisation could be used to achieve the progressive substitution of those plastic additives posing the highest concern in EU-produced plastics.

The Classification, Labelling and Packaging Regulation 1272/2008/EC (CLP) allows identification of hazardous chemicals and informs users about these hazards through standard symbols and phrases on the packaging labels and through safety data sheets. This information is crucial for stimulating the production of less hazardous plastics in Europe and is, therefore, crucial for enhanced plastic recycling in Europe.

The hazards of plastic waste in the environment would be significantly lower if existing European waste legislation was properly implemented. Landfilling remains the predominant

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[34] Batteries Directive 2006/66/EC,,*OJL 266, 26.0.2006, p. 1-14, End of Life Vehicles Directive 2000/53/EC. OJ L 269, 21.10.2000, p.34; Packaging and Packaging Waste Directive 1994/62/EC, OJ L 365, 31.12.1994, p. 10–23;PCB/PCT Directive, 1996/59/EC, OJ L 243, 24.9.1996, p. 31–35;Sewage Sludge Directive , 1986/278/EEC; OJ L 181, 4.7.1986, p. 6–12.*

[35] Especially, Article 2.7 (d).

disposal route for plastic waste[36] in many Member States. Moreover, illegal dumping has not been fully eradicated and many landfills are illegal or are badly managed[37]. More worrying still are the number of households not covered by any municipal waste collection system[38]; a situation where plastic waste is under no control increasing the likelihood of lightweight plastic reaching water bodies and finding its way to the sea.

Implementation of waste legislation

Compliance with waste legislation can significantly contribute to fostering economic growth and job creation. A recent study suggested that full implementation of EU waste legislation could save €72 billion a year, increase the annual turnover of the EU waste management and recycling sector by €42 billion and create over 400,000 jobs by 2020[39].

Since plastic waste is categorized non-hazardous, it can be exported to non-OECD countries following the procedure of the Waste Shipment Regulation (WSR) and provided the import is not prohibited by the country of destination. Total exports of plastic waste from EU Member States increased by a factor of five between 1999 and 2011. Most exports went to Asia[40].

Insufficient enforcement of the WSR results in illegal shipment of high quantities of waste outside the EU[41]. One of the most common types of waste involved is e-waste, rich in plastic. Such exports contribute to environmental pressures, particularly in countries with poorly developed waste management systems. Illegal shipments of plastic waste also represent an important loss of potential resources and lost opportunities for recycling in Europe.

The Commission has recently published a communication[42] stressing the need to improve responsiveness at national, regional and local level for implementation of environmental legislation. This communication recognises that improvements may be available by upgrading the existing framework for inspections and surveillance.

3. PLASTIC WASTE MANAGEMENT AND RESOURCE EFFICIENCY

More sustainable patterns of plastic production and better plastic waste management - particularly higher recycling rates - offer considerable potential for improving resource efficiency. At the same time, they would help to reduce imports of raw materials as well as greenhouse gas emissions. Resource savings can be significant. Plastic is produced almost exclusively from oil and, at present, plastic production accounts for approximately 8% of

36 (BIOIS) Plastic waste in the Environment, loc.cit., p. 74.

37 Follow-up study on the implementation of Directive 1999/31/EC on the landfill of waste in EU-25, COWI consultants, June 2007, p. 79.

38 COWI study, loc. cit., p. 5. In some EU 10 MS 50% of households are concerned.

39 (BIOIS), implementing EU waste legislation for green growth, final report 2011, pp. 11-13, 88.

40 EEA Report No.7/2012, Copenhagen 2012, "movements of waste across the EU's internal and external borders", p. 20.

41 BiPRO/Umweltbundesamt, "Services to support the IMPEL network in connection with joint enforcement actions on waste shipment inspections and to co-ordinate such actions, Final Report 15 July 2009.

42 ('Improving the delivery of benefits from EU environmental measures; building confidence through better knowledge and responsiveness') COM (2012) 95 final of 07 March 2012.

world oil production, of which 4% as a raw material and 3-4% as energy for manufacturing processes[43].

From a resource efficiency perspective, it is particularly important to prevent landfilling of plastic waste. Any landfilling of plastic is an obvious waste of resources which should be avoided in favour of recycling, or of energy recovery as the next best option. However, plastic landfilling rates remain high in several Member States due to the lack of suitable alternatives and insufficient use of economic instruments which have been shown to be effective.

The need to save natural resources and to enhance resource efficiency could be a driver for increasing sustainability in plastic production. Ideally all plastic products should be fully recyclable and at reasonable costs.

Recycling already starts in the product design phase. Therefore, product design has the potential to become one of the essential tools to implement the recently adopted Resource Efficiency Roadmap[44].

Low recycling rates and exports of plastic waste for reprocessing in third countries are an important loss of non-renewable resources, and of jobs, for Europe. The potential for plastic recycling is still significantly under-utilized. For example, the Irish Marked Development Programme for waste resources identified (inter alia) plastics as offering the greatest potential for recycling activity in Ireland[45]. In Germany, with 60% of plastic waste presently being incinerated, there is also wide scope to increase the rate of plastic recycling[46].

In a recent study, plastic recycling and material savings were found as having the highest contribution to impact savings in climate change, abiotic resource depletion and freshwater aquatic ecotoxicity. Greater material productivity in plastics would deliver the highest contribution to reduced environmental impacts. In relation to greenhouse gases, plastic showed the highest potential for reductions, together with biomass and metals[47].

4. THE INTERNATIONAL DIMENSION

Plastic is a major source of marine pollution globally. Plastic waste travels across borders and international action on marine plastic litter is necessary to tackle it effectively. This was clearly acknowledged at the Rio+20 United Nation Conference on Sustainable Development in June 2012.

Recent UN resolutions, global environmental agreements and decisions of international agencies have raised international attention to the problem. The 5th international Marine Debris Conference in Honolulu, co-organised by UNEP and the NOAA[48] in March 2011, could be a first step towards a global strategy and action plans on plastic marine pollution. It identified poorly developed waste management systems in large parts of the world as an

43 Hopewell, Dvorak, R. & Kosior, E. (2009). Plastics recycling: challenges and opportunities. Philosophical transactions of the Royal Society N 364: 2115-2126.

44 Roadmap to a resource efficient Europe COM (2011) 571 final; for accompanying staff working papers, see: http://ec.europa.eu/environment/resource_efficiency/pdf/com2011_571.pdf.

45 (BIOIS) implementing EU waste legislation for green growth, final report, p. 187.

46 *Trendresearch*: Der Markt für das Recycling von Kunststoffen in Mitteleuropa, Marktentwicklung, technische Machbarkeit und ökologischer Nutzen, Bremen, 2011.

47 (BIOIS) (2011) Analysis of the Key Contributions to Resource Efficiency, final report, p. 101.

48 National Oceanic and Atmospheric Administration.

overriding issue because they are the major factor affecting the transfer of land based plastic litter into the marine environment. Capacity building in waste management is an area where more efforts are needed[49].

The Stockholm Convention on Persistent Organic Pollutants (POPs) is relevant for plastic in that it restricts the use of commercial flame retardants such as penta and octa bromodiphenylether (BDE). The Convention also prohibits the recycling of materials containing POPs such as some brominated flame retardants.

Regional sea Conventions such as OSPAR, Barcelona, Helcom, and the Black Sea can also play a role in tackling the problem of marine litter. For example, the Conference of the Parties of the Barcelona Convention adopted in 2012 a Policy Document and an associated Strategic Framework for Marine Litter management. Action under regional sea agreements would also help Member States to implement better their obligations under the MSFD to achieve or maintain good environmental status in the marine environment by 2020.

5. POLICY OPTIONS FOR IMPROVING MANAGEMENT OF PLASTIC WASTE IN EUROPE

The Directive on Waste 2008/98/EC already paved the way for a new thinking in waste management. It establishes extended producer responsibility (Article 8) and describes strong and innovative drivers for sustainable production taking into account the full life cycle of products. Member States are encouraged to take legislative or non-legislative measures in order to strengthen re-use and the prevention, recycling and other recovery operations of waste. Producers should be encouraged to engage in setting up acceptance points for end-of-life products. They may engage in waste management and take financial responsibility for that activity. They shall make information publicly available on the extent to which a product is re-usable and recyclable. Appropriate measures shall be taken to encourage the design of products in order to reduce their environmental impact and the generation of waste during production and subsequent use. Such measures may encourage development, production and marketing of products that are fit for multiple use, technically durable and fit for environmentally-safe end-of-life management.

The policy options presented in this section follow a life-cycle approach starting with plastic design. It is indeed clear that design of plastics and plastic products play a key role for sustainability and determine further stages in the life-cycle of plastics. For example, plastic recycling depends to a large extent on the composition of plastic materials and on the design of plastic products.

5.1. Application of the waste hierarchy to plastic waste management

As a matter of principle, recycling of plastic waste is a better option than energy recovery or landfilling. Although under a life cycle perspective not all plastic waste may be suitable for recycling, there are no technical reasons why plastic should go to landfill rather than being recycled or exploited for energy recovery. This could be done through a gradual phasing out or a ban on landfilling plastic waste through an amendment to the Landfill Directive 1999/31/EC. Both options are already used for bio waste (phasing out) and tyres, liquids, explosives (ban).

[49] GESAMP (2010), loc.cit., Rep. Stud. No. 82, 68 pp., p.31.

Member States with landfill rates below 5%, such as Germany, the Netherlands, Sweden, Denmark, Belgium, and Austria achieve between 80% and 100% plastic waste recovery, including recycling. All of these countries have enacted measures leading effectively to a diversion of combustible waste from landfills, equivalent to a landfill ban. The majority of less performing Member States apply no such measures and base acceptance of waste in landfills on landfill taxes/fees sometimes as low as only 7€ per tonne.

However, some Member States with high recovery rates and landfill bans still have modest plastic recycling rates of around 28% on average[50]. The present ratio between plastic recycling and plastic waste energy recovery could be improved via measures on separate collection, sorting and material recovery. A landfill ban generating an automatic preponderance of energy recovery over recycling would not be in line with the waste hierarchy. It may be useful to reflect on how economic instruments could be used to steer the waste flow through the waste hierarchy, avoiding a "vacuum cleaner effect" in favour of waste to energy.

Nearly 50% on average of all plastic in the EU goes to landfill, most of it packaging. The widespread absence of separate waste collection and the lack of other alternatives in many Member States help explain the high disposal rate of plastic in landfills[51]. Landfilled plastic contributes nothing to material recovery and energy recovery and is therefore highly resource inefficient. A study on European waste generation projections to 2035 assessed the introduction of strong policies to extend recycling, and found plastic to have the largest potential for reducing the environmental impacts of waste[52].

Questions:

(1) Can plastic be appropriately dealt with in the existing legislative framework for waste management or does the existing legislation need to be adapted?

(2) How can measures to promote greater recycling of plastic best be designed so as to ensure positive impacts for enhanced competitiveness and growth?

(3) Would full and effective implementation of the waste treatment requirements in the existing landfill legislation reduce sufficiently current landfilling of plastic waste?

(4) What measures would be appropriate and effective to promote plastic re-use and recovery over landfilling? Would a landfill ban for plastic be a proportionate solution or would an increase of landfill taxes and the introduction of diversion targets be sufficient?

(5) What further measures might be appropriate to move plastic waste recovery higher up the waste hierarchy thereby decreasing energy recovery in favour of mechanical recycling? Would a tax for energy recovery be a useful measure?

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50 *CONSULTIC Marketing & Industrieberatungs GmbH,* Kunststoffabfälle und Recycling in Deutschland und Europa, Alzenau 2012.

51 BiPRO, Organisation of awareness raising events concerning the implementation of Directive 1999/31/EC on the landfill of waste, Final Report, 30 May 2007, p. 17.

52 FORWAST,2010, Policy recommendations, loc.cit.

(6) Should separate door step collection of all plastic waste combined with pay-as-you-throw schemes for residual waste be promoted in Europe, or even be made mandatory?

5.2. Achievement of targets, plastic recycling and voluntary initiatives

Targets and exports of plastic waste

Approximately 16 Mt/year of plastic waste could be recycled if all current recycling targets were met for municipal solid waste, construction and demolition (C&D) waste, end-of-life vehicles (ELV), Packaging, Battery and WEEE. This figure suggests that there is approximately another 9 Mt of plastic waste (out of the total 24.9 Mt) not specifically covered by mandatory reuse/recovery targets; mainly plastic in furniture and equipment other than EEE[53]. The Packaging Directive is the only EU legal instrument establishing a specific recycling target for plastic packaging. It could be considered to set further specific plastic waste recycling targets beyond plastic packaging waste.

Recycling targets in European waste legislation may also have boosted the supply of recyclable waste, as the EEA concludes[54]. This, together with high prices paid by the booming Asian economy let plastic waste exports to Asia exponentially increase during the last 10 years. While this is not objectionable in itself, it may be argued that recycling plastic waste in Europe is, in environmental terms, a better option and that plastic waste exported to non-EU countries should be recycled in facilities complying with standards equivalent to those applied in the EU. Export of plastic waste ending up in substandard facilities or being disposed could contravene the environmental objective of resource conservation spelled out in the WFD.

(7) Are specific plastic waste recycling targets necessary in order to increase plastic waste recycling? What other type of measures could be introduced?

(8) Is it necessary to introduce measures to avoid substandard recycling or dumping of recyclable plastic waste exported to third countries?

Voluntary Action

Voluntary action could also help significantly ease the problem of plastic waste in the environment and contribute to minimising resource use. An obvious low hanging fruit would be plastic packaging waste, contributing to 63% of the total plastic waste generated. Setting up ***"sustainable packaging guidelines"*** to which producers and retailers would commit could be a step in the right direction. Such an initiative could comprise setting parameters for measuring sustainability of packaging, best available techniques for plastic packaging producers, an independent labelling system to measure consumers' individual footprints, information campaigns raising consumer awareness for plastic hazards and plastic disposal and organising separate collection. Existing initiatives such as the European Retail Forum, EUROPEN, the PET bottle platform and Vinyl 2010+ could bundle their initiatives towards more sustainable plastic production and disposal. Similar schemes could be set up for collection and recovery of non-packaging agricultural plastics which are easy to recycle due to their uniform chemical composition. The UK ***"Agricultural Waste Plastics Collection and***

[53] (BIOIS)(2011), Study on coherence of waste legislation , loc.cit., p. 30.

[54] EEA Report No.7/2012, Copenhagen 2012, "movements of waste across the EU's internal and external borders", p. 21.

Recovery Programme" could serve as an example[55]. Similar initiatives could concentrate on WEEE and ELV plastic, which account for 10% of European plastic waste. Finally, producers' investment in improved product design will become a more important driver to reduce plastic waste. Article 8 of the WFD points in that direction and early voluntary adaptation might lead to better results than change imposed by legislation.

(9) Would further voluntary action, in particular by producers and retailers, be a suitable and effective instrument for achieving better resource use in the life cycle of plastic products?

5.3. Targeting consumer behaviour

Giving plastic a value

Plastic is perceived as a material with no value of its own. This perception favours littering. However, all plastics are high tech and complex materials that consumers should value in order to incentivise re-use and recycling.

Some plastic products (e.g. PET beverage bottles) can be made subject to a deposit and return system, which would motivate the holder of the end-of-life product to recuperate his deposit by bringing the object back to a designated collection point whilst avoiding restrictions of competition or monopolistic structures. For certain plastic items, new entrepreneurial models such as lease systems, where the producer remains the owner of the product, could be a useful tool to ensure that the item is collected and treated in an environmentally sound manner.

Questions:

(10) Is there scope to develop deposit and return or lease systems for specific categories of plastic products? If so, how could negative impacts on competition be avoided?

Empowering consumers to know what they buy

Informed consumers can play a decisive role in promoting more sustainable production patterns for plastic and plastic products that also improve resource efficiency. In targeting consumer behaviour, clear, simple and concise information could be instrumental for informing consumers of the plastic content of a product and its potentially harmful additives/colours, their influence on recyclability and necessary precautions for the use of products.

Such information could also include environmental performance indicators, such as recyclability, compostability and resource efficiency performance of plastic products. For certain plastic products information on recycled contents, recyclability and reparability may also be relevant.

Full consumer product information on the type of plastic and its recyclability could be provided beyond existing schemes, in order to enable consumers to make an informed choice when buying a plastic product. Simple and effective recyclability could be reflected in the product price and could be used as a marketing strategy. Information based on the environmental footprint or eco-labels could also be used to facilitate informed choice in relation to the overall life cycle performance of the product.

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[55] Non-packaging agricultural plastics include bale twine, plant jackets, greenhouse film, horticultural cover, mulch film and silage wrap. See www.defra.gov.uk/corporate/consult/agri-plastics/index.htm.

Question:

(11) What type of information would you consider necessary to empower consumers to make a direct contribution to resource efficiency when choosing a plastic product?

5.4. Towards more sustainable plastics

Plastic design for easy and economic cradle-to-cradle recycling[56]

An important element for achieving more sustainability in plastic production is the design of plastic itself. While there are relatively few basic plastics (polymers), the multitude of additives used in plastic production can be a major obstacle for plastic recycling or lead to more "down-cycling" than cradle-to-cradle recycling.

Reducing hazardous substances in plastics would increase their recyclability. Gradual phasing out of those substances in both new and recycled products would also reduce risks associated with their use. The Roadmap on a Resource Efficient Europe suggests that by 2020 all relevant Substances of Very High Concern should be placed on the REACH Candidate List which would capture relevant plastic additives.

An adequate flow of information from producers to recyclers is also important. Clear safety data sheets for plastic pellets used by converters could enhance high quality recycling. Labelling and information on the chemical content of plastic delivered to converters, including all additives, could also play a useful role.

Question:

(12) Which changes to the chemical design of plastics could improve their recyclability?

(13) How could information on the chemical content of plastics be made available to all actors in the waste recycling chain?

New challenges through innovative materials

New risks may arise from the use of innovative materials such as nano-materials, for example in bottles made from polyethylene terephthalate (PET)[57] or packaging in general, or providing selective gas penetration in food packaging, or from nano-sensors to detect food spoilage[58]. The EU's approach is to assess the risks of individual nano-materials on a case by case basis. The assessment of potential environmental and health risks is, however, difficult due to the scarcity of environmental and toxicological data. A now existing common European

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56 Plastic waste and recycling are addressed in the Public Private Partnership SPIRE (Sustainable Process Industry), under preparation. For details, see: http://www.suschem.org/documents/document/20120124124146-sustainable_process_industry_1209c(1).pdf.

57 Centre for Technology Assessment. Dinner is served! Nanotechnology in the kitchen and in the shopping basket – Abstract of the TA-SWISS study "Nanotechnology in the food sector". 2009: www.ta-swiss.ch/a/nano_nafo/KF_Nano_im_Lebensmittelbereich.pdf.

58 Busch L. Nanotechnologies, food, and agriculture: next big thing or flash in the pan? Agric Hum Values. 2008;25:215–218; Sozer N., Kokini JL. Nanotechnology and its applications in the food sector. Trends Biotechnol. 2009; 27(2): 82-9.

definition of nano-materials may facilitate more effective generation and collection of such relevant data[59].

The increasing use of virgin micro-plastics is also a matter of concern. In some consumer products, such as scrub creams and shower gels, producers add micro-plastic instead of natural scrubbing particles. Those particles may end up in the seas as water management systems are not equipped to hold this material back.

Question:

(14) How can challenges arising from the use of micro plastics in products or industrial processes and of nano-particles in plastics be best addressed?

5.5. Durability of plastics and plastic products

Many challenges in the field of plastic waste management such as increasing volumes and marine plastic are due to the extreme durability of plastic materials, which usually outlive the products containing them. Problems are exacerbated when plastic products are specifically designed for a single use or for a short life–span, or when their life is deliberately shortened.

Product design for a longer life, reuse and repair

To ensure sustainability in production and consumption of plastic goods, and to avoid the loss of non-renewable natural resources, plastic goods should be designed to maximize durability. There are several adverse functions making this a difficult goal to attain, such as planned or technical obsolescence[60], as well as designs that make repair of plastic products uneconomic or even technically impossible.

Plastic products such as electric and electronic equipment are often not designed to make their re-use possible. Because design can just be a marketing tool, even small steps in technical innovation are often used for marketing an entirely new product rather than choosing a modular system designed for making replacement of innovative components cheap and easy. For example it is common to sell an entirely new plastic laptop when a simple replacement of the CPU chip might be technically sufficient to update the equipment.

Any design that deliberately makes plastic products impossible to repair should be avoided[61]. Developing requirements or guidelines for reusability and reparability of plastic products is an option to be explored. Some work on the development of methodologies to measure reusability of products has already started[62]. One solution might be the development of eco-design rules, setting particular criteria on reusability, durability, reparability and modular construction, as already envisaged in Art. 9(1) WFD.

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59 Commission Recommendation of 18 October 2011 on the definition of nanomaterial 2011/696/EU; http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:275:0038:0040:EN:PDF.

60 Planned obsolescence is a business strategy in which the obsolescence (the process of becoming obsolete—that is, unfashionable or no longer usable) of a product is planned and built into it from its conception, see: Slade, G., "Made to Break: Technology and Obsolescence in America", Harvard University Press, 2006.

61 Countless electrical appliances such as mobile phone chargers, are hermetically sealed, and cannot be opened for repair.

62 By the International Electrotechnical Commission (IEC) and Commission services. See: JRC study and reports: "Integration of resource efficiency and waste management criteria in European product policies": http://lct.jrc.ec.europa.eu/assessment/projects#d.

(15) Should product design policy tackle planned obsolescence of plastic products and aim at enhancing re-use and modular design in order to minimize plastic waste?

(16) Could new rules on eco-design be of help in achieving increased reusability and durability of plastic products?

Single-use and short-lived plastic products

From a waste prevention and resource efficiency perspective, it is desirable to take measures to avoid the proliferation of short-lived and single use disposable products (such as plastic bags), if based on a life cycle assessment (LCA) and Product Environmental Footprint (PEF)[63] analysis.

Cheap plastic gadgets, by-packed to consumer products, fun articles, short life toys and similar categories of products are broadly available at prices which do not reflect their full environmental costs including waste management. The same applies to single-use products such as single-use plastic carrier bags.

Plastic carrier bags are emblematic of modern consumer society, light, practical, with no value, often thrown away after single use. Yet the environmental pressure from plastic carrier bags is considerable. In 2010 there were 95.5 billion plastic carrier bags (1.42 Mt) placed on the EU market, most of them (92%) are for single use. More worryingly, plastic bags unnecessarily add to the plastic waste load in the marine environment, having the same detrimental effect as other plastic waste. As a striking example, plastic bags accounted for 73% of the waste collected by trawlers along the Tuscany coast[64]. Subsequent to the public consultation on plastic carrier bags held in summer 2011, the European Commission is (as a separate initiative) assessing options to reduce single-use plastic carrier bags.

The development of market-based instruments on the basis of environmental impact indicators may be an option to steer production and consumption away from short-lived and single use disposable plastic products. This would ultimately find its justification in the polluter pays principle.

More generally, prices may be distorted and discriminate against sound environmental practice[65]. A system reflecting the true environmental costs from extraction of raw materials to production, distribution and disposal would encourage more sustainable production and compensate for market failures. Green public procurement and financial instruments such as environmental taxes could also help to improve this situation.

Questions:

(17) Should market based instruments be introduced in order to more accurately reflect environmental costs from plastic production to final disposal?

(18) How can the waste burden posed by short-lived and single-use disposable plastic products best be addressed?

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63 See http://ec.europa.eu/environment/eussd/product_footprint.htm.

64 ARPA, ARPAT, DAPHNE II (2011), L'impatto della plastica e dei sacchetti sull'ambiente marino.

65 OECD, Environmentally harmful subsidies: challenges for reform, 2005.

5.6. Promotion of biodegradable plastics and bio-based plastics

Biodegradable plastics

Biodegradable plastic[66] products are often perceived as a potential solution to plastic littering and have attracted increasing public attention. Although it is still a small segment of the market, production of biodegradable plastics operates today at industrial scale capacity, with a projected increase in Europe from 0.23 Mt/pa in 2007 to 0.93 Mt/pa in 2011[67].

The term "biodegradable" itself may be misunderstood by customers. While they might interpret the labelling "biodegradable" to mean fit for home composting, in reality, the large majority of biodegradable plastics can only biodegrade under very specific conditions of constantly high temperature and humidity in industrial composting installations and are neither fit for home composting nor do they decompose in reasonable time when littered[68]. A clear distinction between home-compostable and industrially-compostable plastics may be required, along with consumer education about proper disposal channels. Confusion could cause consumers to take insufficient care in their disposal out of a misunderstanding that objects labelled as biodegradable would decay within short time periods under natural conditions.

There are also biodegradability claims that should be scrutinized. For example, fragmentation of plastic enhanced with an oxidising agent (usually a metal salt) in the presence of oxygen, heat and UV light results in microscopic plastic fragments with similar properties as the bulk plastic. Oxo-degradation residues may have unclear impacts[69]. Oxo-degradable plastics might risk contributing to the microplastics load reaching the marine environment and therefore might significantly increase the risk of ingestion by animals[70]. The presence of oxidising agents in the plastic waste streams may also make plastic recycling more difficult[71]. It should be assessed whether the use of the term biodegradable is at all permissible in this case.

Another open question is the extent to which biodegradable plastic can be a solution to plastic marine pollution. Decomposition in the marine environment depends on many factors, such as the type of product, the sufficient presence of relevant micro-organisms, the water temperature and the density of the product. In some Plastral Fidene trials, a starch-PCL[72] blend was found to degrade in 20 to 30 weeks in Australian waters while being able to degrade in 20-30 days in compost[73]. Moreover, many biodegradable plastics may not degrade in the intestines of marine species and injury is likely to remain an issue.

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66 Biodegradable plastics shall be understood as plastics that can be degraded by living organisms – in particular microorganisms into water, CO2, methane (CH4) and possibly non-toxic residues (i.e. biomass).

67 (BIOIS) (2012), Options to improve the biodegradability requirements in the packaging Directive, p. 30.

68 (BIOIS) (2012), Options to improve…, loc.cit., p. 21, 34.

69 (BIOIS) (2012), Options to improve …, loc.cit., p. 15, 16, 23, 37

70 Gregory,M.R., & Andrady, A.L.(2003) Plastics in the marine environment, in: A.L.Andrady (Ed.), Plastics in the Environment, Hoboken, N.J.:Wiley-Interscience, pp. 379-402.

71 STAP (2011). Marine Debris as a Global Environmental Problem. Global Environmental Facility, Washington, DC. 2011, p.21.

72 Polycaprolactone (PCL).

73 Nolan-ITUPty, Ltd, 2002, Report on Biodegradable Plastics – Developments and Environmental Impacts.

There are several barriers for biodegradable plastics to achieve quick market penetration. Without further technical progress in terms of their functional properties, they may not be suitable for some types of packaging applications, such as for fresh food[74]. Existing manufacturing chains, used to petro-plastics, may need costly adaptation to function with biodegradable plastics[75]. The exact influence of biodegradable plastic on aquatic environments, as well as compost toxicity, is yet further to be investigated[76]. Waste treatment systems already in place are not yet capable of separating sufficiently biodegradable plastic from conventional plastic which can jeopardize recycling processes. Technical adaptation might increase separation costs because more sophisticated equipment is likely to be required.

As regards composting of bio degradable plastics, investment into composting facilities providing sufficient pre-processing and an adequate composting process would be needed.

(19) What are the applications for which biodegradable plastics deserve to be promoted, what framework conditions should apply?

(20) Would it be appropriate to reinforce existing legal requirements by making a clear distinction between naturally compostable and technically biodegradable plastics, and should such a distinction be subject to mandatory information?

(21) Would the use of oxo-degradable plastic require any kind of intervention with a view to safeguarding recycling processes, and if so, on which level?

Bio-based plastics

While the market is still dominated for over 99% by petroleum-based plastic[77], there is an emerging and growing market for bio-based plastic produced from renewable resources[78]. Current bio-based plastics are usually made from starch extracted from maize, rice, sugar cane or potatoes.

The prefix "bio-based", is clearly defined by the European Committee for Standardization (CEN)[79]. Yet, consumers need to be fully informed that this relates to the origin of the resource and not to end of life management. Although the majority of biodegradable plastics are currently bio-based plastics, biodegradable plastics can also be made from petroleum based or a combination of petroleum and bio-based resources. Moreover, some bio-based polymers, such as polyethylene (PE) from bio-ethanol are not biodegradable. Competition with food production, already broadly discussed in the context of biofuels, is a problematic and highly disputed issue for bio-based plastics. A significant increase in bio-based plastics production to a level comparable to conventional plastics might negatively impact on the production of food crops used to make bio-based plastics. This could have a negative impact on developing economies and economies in transition. A link between the rises in corn prices subsequent to the rise in ethanol production 2008 in the US has been documented[80]. An increase in land use and raw material prices might result, as well as a loss of biodiversity

74 (BIOIS) Plastic waste in the Environment, loc.cit., p. 61.
75 (BIOIS) (2012), Options to improve…, loc.cit., p. 47/48.
76 For further reference, see: BIOIS (2012), Options to improve…, loc.cit., p. 43.
77 EUROPEN, 2011, Packaging and Packaging Waste Statistics in Europe: 1998-2008.
78 Plastic waste in the Environment, loc.cit, p. 13.
79 ftp://ftp.cen.eu/CEN/Sectors/List/bio_basedproducts/BTWG209finalreport.pdf
80 Fortenbery, Randall T. and Park, Hwanil (2008). The Effect of Ethanol Production on the U.S. National Corn Price, Staff Paper Series, University of Wisconsin-Madison.

through transformation of idle land and forests into fields, increasing agricultural consumption of water and fertilizers. Such concerns would not apply to bio-based plastics made from agricultural waste and food-crops by-products or saltwater algae.

Question:

(22) How should bio-based plastics be considered in relation to plastic waste management and resource conservation? Should the use of bio based plastics be promoted?

5.7. EU initiatives dealing with marine litter including plastic waste

The **Marine Strategy Framework Directive (MSFD) 2008/56/EC** aims to achieve good environmental status (GES) for all marine waters by 2020. The Directive identifies marine litter as one of the factors determining GES for which the "properties and quantities of marine litter do not cause harm to the coastal and marine environment." Marine litter includes all types of waste. However, studies have shown that the majority of waste found in our seas and oceans is plastic.

In 2010 the Commission outlined criteria for Member States to assess the environmental status of their seas in the context of MSFD[81]. Several of these criteria relate to marine litter. A Working Group on marine litter has developed an overview of existing data and methodologies for the monitoring of marine litter, as required by the MSFD. It underlined both the seriousness of the issue and the urgent need for further coordinated research to ensure a common approach to monitoring and mitigation. The group continues to work on (inter alia) the harmonisation of monitoring, estimating the costs involved and assessing the harm done by marine litter[82].

In parallel, the Commission has started a dialogue with stakeholders (plastic producers, recyclers, retailers, packing industry, port and shipping authorities, NGO's) to develop partnerships and voluntary actions to address marine litter. Furthermore, there are a number of projects and initiatives on-going which aim at understanding better the sources and impacts of marine litter as well as the possible solutions. An overview of all initiatives and potential measures that address this problem is given in a separate Commission Staff Working Document SWD (2012) 365.

Successful implementation of waste policy is a key prerequisite to avoid plastic litter entering the marine environment. There are discussions about setting targets to guide policy efforts and to monitor their success (e.g. in the final version of the Ministerial declaration of OSPAR 2010). The upcoming reporting under the MSFD and the on-going projects should allow development of a baseline for the EU in 2013 which could be used to establish benchmarks, milestones and targets for policy.

Within some Regional Seas Conventions, action plans on marine litter are under development. For the Mediterranean, strategy on marine litter was endorsed in February 2012[83]. For the North East Atlantic, next to its marine action plan, 'Fishing for Litter' will be implemented in more areas of the Convention. In addition, there are many initiatives at EU level including

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81 2010/477/EU of 1st September 2010.

82 JRC, Marine Litter – Technical Recommendations for the Implementation of MSFD Requirements, EUR 25009 EN, Luxemburg 2011.

83 http://www.mepielan-bulletin.gr/default.aspx?pid=18&CategoryId=10&ArticleId=95&Article=MEDITERRANEAN-SEA---The-COP-17-of-the-Barcelona-Convention-Adopts-the-Paris-Declaration.

policy developments which take increasing account of the marine litter impacts, such as the revision of the Port Reception Facility Directive (see CSWD for more complete overview). EU waste policy already provides many provisions which, if fully implemented, would reduce the marine litter problem significantly. This Green Paper sets out a number of further policy options which would help to reduce marine litter. However, there are many other actions outside the scope of this Green Paper which would need to be taken, such as conducting behavioural studies for improving the understanding for how to go about raising consumer awareness.

One such action is raising awareness amongst consumers, which has been achieved in several Member States, regions and communities by, for example, organisation of beach clean-up days. Such initiatives are numerous and happen at different levels on different days, however, there is no EU-level coordination of all the on-going activities, including these awareness raising events.

Questions:

(23) What actions other than those described in this Green Paper could be envisaged to reduce marine litter? Should some marine litter related actions be coordinated at EU level (e.g. by setting up a coordinated European Coastal Clean-up Day to raise awareness)?

(24) In its proposal for a new Environment Action Programme the Commission suggests that an EU wide quantitative reduction target for marine litter be established. How can the setting of such a target provide added value to measures that reduce plastic waste generally? How could such a target be developed?

5.8. International action

Article 4 of the Basel Convention (BC) obliges parties to ensure the availability of adequate disposal facilities for the environmentally sound management of hazardous wastes and other wastes that shall be located to the extent possible within the party's territory whatever the place of their disposal. This general requirement applies also to plastic waste.

The ***"new strategic framework"*** for 2012 – 2021, adopted at the 10th Conference of the Parties (CoP) of the Basel Convention in 2011 includes environmentally sound management (ESM) in waste prevention and minimization in its strategic goals. The CoP also decided to mandate a technical expert group to develop a framework for the environmentally sound management of waste on the international level[84].

More recently, the Global Partnership on Waste Management (GPWM) UNEP IETC[85] established in 2010, tries to promote internationally a holistic approach on waste management, serving as a platform to enhance international cooperation among stakeholders. Work plans for sponsored focal areas such as solid waste management, marine litter and waste minimization, all of crucial importance for plastic waste management internationally, are being developed. A focal area for plastic waste could be envisaged.

The EU's ***"new neighbourhood policy"*** (ENP) and pre-accession policy may play a useful role in promoting action to improve plastic waste management and address current challenges.

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84 UNEP/CHW.10/CRP.25 of 20 October 2011.

85 http://www.unep.or.jp/Ietc/SPC/activities/GPWM/GPWMFrameworkDocumentv.11282011.pdf.

For instance, the involvement of neighbouring states in the southern Mediterranean and the Black Sea region are very essential to achieve the -plastic free - good environmental status of the Mediterranean and the Black Sea[86].

Plastic marine litter should also be an issue raised through bilateral and regional discussions/fora/Action Plans etc. (ENP). There is furthermore a clear need for linking these policy frameworks and actions to the actions in the context of UNEP, such as the Mediterranean Action Programme to reinforce implementation of the Barcelona convention and minimize the impact of plastic marine litter.

The Rio+20 Summit offered the opportunity to address the issue of marine litter at global level. The final document acknowledged the need for continuing efforts to reduce the incidence and impacts of marine pollution, including marine debris, especially plastic, from a number of marine and land-based sources, including shipping and land run-off. A concrete commitment was made to take action by 2025, based on collected scientific data, to achieve significant reductions in marine debris to prevent harm to the coastal and marine environment.

Questions:

(25) Should the EU attach a higher priority to plastic waste in the framework of its "New Neighbourhood Policy", particularly in order to reduce plastic littering in the Mediterranean and in the Black Seas?

(26) How could the EU promote more effectively international action to improve plastic waste management worldwide?

[86] 56% of municipal solid waste is landfilled in unregulated dump sites in Turkey.