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IMPACT ASSESSMENT

Accompanying the document

Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL amending Directive 94/62/EC on packaging and packaging waste to reduce the consumption of lightweight plastic carrier bags

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GLOSSARY OF TERMS

Bags for Life: Multiple-use bags, typically made from LDPE
HDPE (High Density Polyethylene): This is the material from which single-use plastic carrier bags are typically manufactured. Single-use plastic carrier bags may also be referred to as HDPE bags.
LCA: Life Cycle Assessment.
LDPE (Low Density Polyethylene): Plastic carrier bags made of LDPE are designed for multiple-use, have a glossy appearance and are commonly referred to as 'Bags for Life'.
Multiple-use Bags: This term covers LDPE 'Bags for Life', PP bags and other bags made of jute, or cotton intended for multiple-use. Paper bags are not considered to be multiple-use bags.
PE: Polyethylene.
PP: Polypropylene.

INTRODUCTION

Plastic carrier bags[1] are a popular and convenient product widely used for transporting shopping items from the store back home. Their ever increasing consumption, and its related impacts, have given rise to strong concerns among the public and policy makers, both within the EU and beyond. Concerns stem in particular from the littering and accumulation of plastic bags in the environment, as well as from inefficient resource use.

Numerous countries and cities around the world have taken measures to reduce the consumption of plastic carrier bags, including bans (e.g. in Switzerland, China, South Africa, Kenya, Rwanda, Congo, Bangladesh, Washington DC and San Francisco in the United States, several states of Australia and India), bans on free provision (Mexico, Hong Kong) and levies (South Korea), as well as voluntary agreements (New Zeeland, Japan, Sao Paolo state in Brazil)[2].

At EU level concerns over the use of plastic carrier bags have led to measures taken in a number of Member States (see Annex I for a full overview). The approaches taken vary both in terms of scope (e.g. measures targeting single-use plastic carrier bags, non-biodegradable plastic carrier bags, bags made of non-renewable materials, promotion of reusable bags) and instruments (e.g. pricing measures, agreements with the retail sector, communication campaigns).

Certain Member States have opted for marketing restrictions. Over the past years, there have been several attempts (e.g. by France and Malta) to ban plastic carrier bags. These measures were withdrawn due, inter alia, to the objections raised by the Commission, inter alia in the light of the provisions in the Packaging and Packaging Waste Directive (Directive 94/62/EC[3]) in its current form. In 2006, Italy adopted a law establishing a ban on the sale of non-biodegradable plastic carrier bags to take effect as of 1st January 2010, later postponed to 1st January 2011. Similarly, in 2011, Spain decided to phase out the placing on the market of single-use non-biodegradable plastic bags leading to a total ban as of 2018.

EU Environment Ministers discussed the issue both at the Environment Council of 14 March and 19 December 2011. On these occasions, a large number of Member States invited the Commission to assess the scope for action at EU level[4].

> In the EU, plastic carrier bags are considered as packaging under Directive 94/62/EC). However, there is no EU legislation or policy *specifically* targeting plastic carrier bags

The measures taken by individual Member States to tackle the unsustainable consumption of plastic bags lack coherence in terms of the objectives pursued (e.g. favouring alternative bags that are not necessarily more environmental friendly from a life-cycle perspective). This and other considerations explain the sense of urgency to address the issue at the European level; this was reflected both in the political discussions at the Environment Council and the massive response to a public consultation conducted by the Commission in the summer of 2011.

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1 A definition of the types of plastic carrier bags considered in this assessment is provided in Annex II.

2 Strange K., 2011. Plastic bags: national policies and practices, Plastics Europe and ACR+.

3 OJ L 365, 31.12.1994 p.10-23

4 http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/envir/119886.pdf

1. PROCEDURAL ISSUES AND CONSULTATION OF INTERESTED PARTIES

This impact assessment (IA) aims at assessing policy options to reduce the use of single-use plastic carrier bags at EU level.

1.1. Consultation and expertise

Studies

A study on the production and consumption patterns of plastic carrier bags, their related impacts and the impacts incurred by the different policy options to reduce their use was performed in preparation of this impact assessment. This study was conducted by BIO Intelligence Services between 11 May and 11 September 2011[5]. An additional study was commisioned to assess in more detail the socio-economic on the impacts of the different policy options. It was carried out by EUNOMIA between July and October 2012.[6]

Internal consultation

An Interservice Steering Group (ISG) was created in June 2011 to follow the preparation of the IA. This group was chaired by DG ENV, with members from the following Commission services SG, SJ and DGs ENTR, RTD, SANCO, MARE, ENER. The ISG with representatives of DGs ENV, ENTR, SG, SJ and SANCO met first to comment on the outline and policy scenarios of the IA. Furthermore, the services were consulted in writing on the progress of the first study conducted by the consultant. A final consultation in writing was performed on the final version of the IA.

External consultation

The preparation of this report was preceded by a public consultation launched on 17 May 2011 via the EUROPA website. The consultation ran until 9 August 2011 and met the minimum standards for consultation.

15 538 responses were provided showing high public concern about the unsustainable consumption of plastic carrier bags and high expectations for EU action to reduce the environmental impacts of plastic carrier bag use. Opinions were divergent on the instruments, but all options received high support with a slight preference for a prevention target on the use of plastic carrier bags. A summary of the responses are available in Annex III.

Comments from the Impact Assessment Board

A first draft of this Impact Assessment was examined by the Impact Assessment Board and discussed during its meeting of 2 May 2012. The Impact Assessment Board made a number of recommendations and requested the submission of a revised version. A second draft was therefore submitted to the Impact Assessment Board on 1 February 2013. This addressed the Board's comments in the following ways: first, it provided additional information on the relevant policy and legislative framework (section 2.7) and it contained more data on the scale of the problems posed by plastic bag littering, especially on marine ecosystems (section 2.1). Member State specific and regional data are presented where available. Second, with respect to the added value of action at EU level, the revised report underlined that the very high consumption of single-use plastic bags in the EU is not only a transnational, but also a *common* problem requiring a common policy response (section 2.5). Third, the options

[5] Bio Intelligence Service, 2011. Assessment of impacts of options to reduce the use of single-use plastic carrier bags. Final Report.

[6] Eunomia, 2012. Assistance to the Commission to complement an assessment of the socio-economic costs and benefits of options to reduce use of single-use plastic carrier bags in the EU. Final Report.

considered to take action were analysed in more detail (section 3) including the option of removing plastic bags from the scope of the Packaging Directive (section 3.1). Fourth, sections 4.3 and 5 offered a more in-depth assessment of the likely environmental, economic and social impacts of the shortlisted options, differentiating across the affected sectors, while acknowledging certain data limitations highlighted in the two preparatory studies commissioned for this Impact Assessment. Finally, the monitoring and evaluation arrangements were further clarified in section 7.

The revised draft was given a positive opinion by the Impact Assessment Board on 15 March 2013, with some suggestions and recommendations to refine the text further. These suggestions were addressed as follows: the added value of EU action was further examined in section 2.5; section 2.7 was expanded to better place the proposal in the current policy context; and option 3 was updated by making all former sub-options integral parts of the measure to be implemented (section 3.2.3 and section 6). In addition, additional information was provided on possible burden to consumers (section 4.2) and on costs to public authorities, including in those Member States that have already implemented plastic bag reduction measures (sections 4.2 and 5.2.2). The report also provides some further explanation on the attribution of comparative scores to the different options (section 5.3). Finally, section 7 provides furher monitoring and evaluation details.

Commission interservice consultation

Further consideration of the policy options during the Commission's interservice consultation led to the conclusion that it would be difficult to design and implement an EU-wide reduction target applying to all Member States. Instead of establishing a common EU target, it is therefore preferable to introduce in Directive 94/62/EC the obligation for all Member States to reduce the consumption of single-use plastic carrier bags, while allowing them to set their own national reduction targets and to choose the measures to reach those targets. At a later stage the establishment of an EU-wide reduction target could however be considered.

2. PROBLEM DEFINITION

2.1. Problems requiring action

The unsustainable consumption of plastic carrier bags has resulted in littering, and an inefficient use of resources, which are underscored by transboundary environmental impacts (e.g. air, water, marine and soil pollution, biodiversity loss, depletion of resources), as well as economic (e.g. loss of raw materials in the EU, losses for the recyclers and the tourism sector, costs of cleaning littering) and social consequences (e.g. loss of aesthetic value of landscapes, potential impacts on human health).

As confirmed by the Commission public consultation, plastic carrier bags are perceived as a symbol of a "throw-away" society. Their waste is seen as a very visible nuisance as they are used in high volumes, often supplied free of charge or for a low charge and discarded after having been used only once.

2.1.1. Plastic carrier bags in the EU: facts and figures

In 2010 there were 98.6 billion plastic carrier bags (1.61 Mt) placed on the EU market. It is estimated that the vast majority of these bags (89%) are single-use. This means that every EU citizen used around 198 plastic carrier bags[7] in 2010 – which represents more than one bag per day for each European household.

Table 1: Weight and number of plastic carrier bags consumed in EU-27 by type, 2010

	Weight (Mt)	Number of bags (billions)	Share (% of total number)	Bags per capita
Single-use non-biodegradable	0.73	85.3	87	171
Single-use biodegradable	0.02	2.3	2	5
Multiple-use	0.87	11.0	11	22
Total plastic carrier bags	**1.61**	**98.6**	**100**	**198**

As shown in figure 1, the consumption of plastic carrier bags varies across Europe due to differences in consumption habits, environmental awareness of consumers, as well as the existence, effectiveness, and enforcement of specific policy measures. Per capita consumption of single-use plastic bags ranges from 4 in the best performing countries to 466 in the worst performing Member States.

[7] Based on an EU population size of around 500 million and average weights per bag of 8.5 g (single-use non-biodegradable), 8.9 g (biodegradable) and 78.9 g (multiple-use) and an amount of 1.61Mt placed on the market.

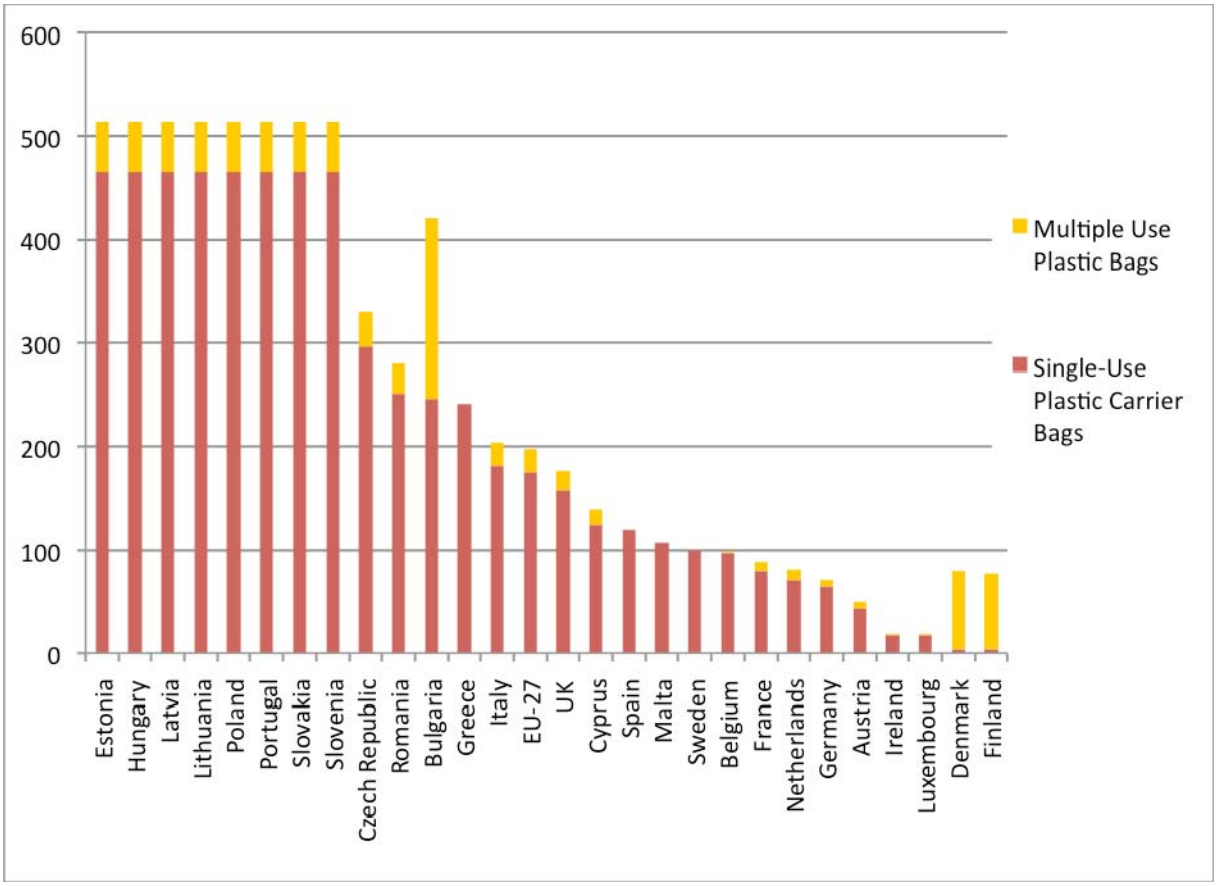

Figure 1: Single and multiple use plastic carrier bags used per person in EU Member States and EU-27 average, 2010 or latest available data[8]

The common factor across Member States with low consumption levels of plastic bags is the fact that plastic bags are not given away for free. Nonetheless, policy measures in place differ from one country to another – from a levy at the point of sale targeting consumers in Ireland, to a tax on producers in Denmark according to the weight of the carrier bags, to voluntary agreements to promote a reusable eco-bag in Luxembourg or to the phase-out of the distribution of thin-walled plastic bags in France. Some Member States (i.e. Austria, Finland and Germany) have strengthened price signals by running public or private awareness-raising initiatives to reduce their use and to promote reusable alternatives (as well as appropriate collection at the end of life). It is important to note that even in countries with low consumption rates such as Austria, consumers still perceive plastic bags as a problem, as

[8] Eunomia, 2012. p.36. For some countries, estimates of bags per person from national authorities, industry and other sources are used. For other countries, and for the EU-27, estimates of total weight are divided by the typical weights for each type of bag to obtain bags per person. For the worst performing countries, no concrete data was available, and so these figures are inferred from data that was available (EU27 consumption and average of known MS consumption). As expected, Member States with no available data have a higher consumption average than those for which data is available, if the average is to match the overall quantity consumed in the EU is to match the BIO IS EU figure. This seems plausible on the basis that the countries with data available tend to be those who have an interest in, or already are addressing, the issue of plastic carrier bag (or all carrier bag) use. However, some of the MS in the lower performing group do have legislation in place (HU, LV, PT), but there is no data on achievements.

confirmed by an opinion poll in which most Austrians expressed support for a ban on plastic bags[9].

At the other end of the spectrum, most Member States with high consumption levels in 2010 had no (or no effective) measures in place to curb plastic bag consumption. For instance, Romania and Italy have both introduced taxation measures that have proved ineffective in tackling the problem, as is explained in more detail in section 2.4.2.

In most EU countries, the bulk of plastic carrier bags consumed are *single*-use. Data is scarce as to the exact consumption in every country. For some countries only the number of single-use bags is available (Ireland, Romania) or the vast majority are considered to be single-use (Czech Republic). The available data indicates however that consumption of single-use plastic carrier bags varies across the EU, with some countries still predominantly relying on single-use carrier bags, while in others consumption is dominated by reusable plastic carrier bags.

An estimation of the EU production of plastic carrier bags is illustrated in the table below:

Table 2: Breakdown of EU plastic carrier bag production by weight[10]

	EU Production (Tonnes)
Single-use non-biodegradable	239 250
Single-use biodegradable	10 831
Multiple-use	873 993
Total plastic bags produced (Tonnes)	**1 124 074**

As indicated in Table 5, below, a non-negligible part of these plastic carrier bags is imported from outside the EU. Around 30% of all plastic carrier bags and 70% of single-use plastic carrier bags on the EU market are imported, mainly from Asia; for the lightest single-use bags the share of imports would be even higher. In general, imports from outside the EU tend to be thinner single-use HDPE bags, while EU producers tend to specialise in higher-value, thicker LDPE bags due to specific machinery required. On the other hand, woven PP plastic bags (very thick) may be more competitively produced in Asia due to the low costs of the labour involved.

It is estimated that there are about 250-300 producers of plastic carrier bags in the EU, with 15 000 – 20 000 employees. A significant part of the EU plastic carrier bag producers are family-owned SMEs[11].

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9 http://www.austriantimes.at/news/General_News/2011-02--01/30219/Most_Austrians_want_plastic_bags_banned

10 Eunomia, 2012, p. 8-9. Eunomia estimates based are on Bio IS report, stakeholder contacts and literature; Single-use biodegradable bags' data from 2012. Other data from 2010.

11 Eunomia, 2012, p.10.The report notes that it was very difficult to obtain further detailed information to that already provided by Bio Intelligence Service (2011) on the exact numbers and location of carrier bag producing companies, as they, too, depended on information from national and European trade associations.

2.1.2. Impacts

Inefficient use of resources

The production and use of plastic carrier bags contributes to the depletion of natural resources and the increase of waste. Due to their short life span, they rapidly enter the waste stream in high numbers. The inappropriate disposal and end-of-life treatment of plastic carrier bags exacerbate this. Only a small proportion of plastic bags are actually recycled (6,6%) in the EU. The mix of different resins that need to be pre-sorted is a challenge that thwarts recycling. With limited separate plastic collection, the availability of high quality material for recyclers is limited, making the recycling of plastic bags uneconomical.

The bulk of plastic bags collected through municipal or private waste collection systems is instead either used for energy recovery (39%) or landfilled (49,7% or 710 000 tons a year). Especially in Member States with very high overall landfill rates, plastic bags are predominantly or exclusively landfilled. Even if energy is recovered, part of the energy embedded in the production is lost. If plastic bags end up in landfills then those resources are squandered and at a very fast rate. As an example, given that the total energy (calorific value) used to produce one HDPE bag is about 0.39 MJ, it is estimated that the equivalent of 19 billion MJ (5276 GWh) is landfilled every year in the EU, representing more than the production of an averaged nuclear power plant (3161 GWh) and around 77.42 Mt of greenhouse gas emissions[12].

Plastic packaging waste is also increasingly exported for treatment outside the EU. As an example, Polyethylene (PE), the most common polymer for plastic carrier bags, is the largest fraction of plastic waste exported outside the EU. This results in a loss of raw materials in the EU and a growing dependency on imported non-renewable materials. Moreover, this practice can potentially result in even greater impacts on the environment and human health, especially in countries with less stringent environmental regulations.

Even though the EU recycling market for plastic carrier bags is expected to grow in the coming years, this will not happen at a high enough pace to counter balance the growth in consumption and the accelerated loss of resources.

Littering

The same properties that have made plastic bags commercially successful – low weight and resistance to degradation – have also contributed to their proliferation in the environment. They escape waste management streams and accumulate in natural habitats, especially in the marine environment.

Those consulted stated that they did not possess such information (number of SMEs producing plastic bags, MS location, etc.) about their members.

[12] Estimate based on 49bn bags littered representing 19 billion MJ or 5276 GWh (kWh/MJ conversion factor 0.28). For the calculation of the power generation of a nuclear power plant the UK data was taken as reference - http://www.world-nuclear.org/info/reactors.html . For the calculation of CO2 emissions a conversion factor of 1.58 kg CO_2 per bag was used assuming 40% secondary reuse –Source: UK Environment Agency (2011) Life cycle assessment of supermarket carrier bags: a review of the bags available in 2006

Table 3 summarises the littering estimates for the EU. These estimates suggest that over 8 billion plastic carrier bags were littered in the EU in 2010, representing over 8% of the plastic bags consumed in the EU. Single-use plastic bags, account for around 90% of the plastic bags used in the EU, represent the vast majority of littered bags.

Table 3: Summary of EU plastic carrier bag flows by number, 2010 (billions)[13]

	Used	Littered
Single-use non-biodegradable	85.3	5.73
Single-use biodegradable	2.3	0.004
Multiple-use	11.0	2.3
Total carrier bags	**98.6**	**8.03**

Even if the proportion (8.03%) of plastic bags littered may appear low, the absolute numbers and their overall impacts are significant. Once discarded in the environment, plastic carrier bags last for hundreds of years although mostly in fragmented form, which makes them difficult to track. Because they last so long, the cumulative number of plastic bags littered increases over the years. Many of the impacts of plastic littering are of a transboundary and global nature, especially in water courses and the marine environment.

Marine littering is a complex phenomenon and no comprehensive overview covering all EU Member States exist. Nonetheless, there is documented evidence available indicating large debris accumulation in European seas – e.g. along the coasts of the eastern Mediterranean (Greece, Cyprus)[14, 15, 16], the North Sea (200 km west of Denmark), the Celtic Sea and Bay of Biscay (Ireland, UK, France, Spain)[17]. The presence of debris has also been recorded on the deep sea floor in the Eastern Mediterranean[18] and the Sicily Channel (Italy)[19].

Plastics make up most of the marine litter. A study based on samples in 27 oceanographic cruises concluded that plastics – mainly plastic bags and bottles – accounted for more than 70% of total debris in the Baltic Sea, the North Sea, the Celtic Sea, the Bay of Biscay and different areas in the north-western basin of the Mediterranean Sea and the Adriatic Sea[20]. The results of a pilot project on monitoring marine beach litter in Belgium, Denmark, France, Germany, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom confirm these findings. Small plastic/polystyrene pieces (smaller than 50 cm) were found to be the most

[13] Figures based on Eunomia and BIO IS analysis, which in turn is based on available data and stakeholder estimates.

[14] Bingel, F., Avsar, D., Unsal, M., 1987. A note on plastic materials in trawl catches in the north eastern Mediterranean,, Meeresforsch.

[15] Stefatos, A., Charalambakis, M., Papatheodorou, G. and Ferentinos, G., 1999. Marine debris on the sea floor of the Mediterranean Sea: examples from two enclosed gulfs in Western Greece,

[16] Marine Pollution Bulletin 36; Katsanevakis, S. & Katsarou, A., 2004. Influences on the distribution of marine debris on the seafloor of shallow coastal areas in Greece (Eastern Mediterranean). *Water Air Soil Pollut.* 159.

[17] Galgani, *et al*., 2000. Litter on the sea floor along European coasts. *Marine Pollution Bulletin* Vol. 40, No. 6.

[18] B. S. Galil, A. Golik, M. Turkay, 1995. Litter at the Bottom of the Sea: A Sea Bed Survey in the Eastern Mediterranean. *Marine Pollution Bulletin*, Vol. 30, No. 1.

[19] Cannizarro, L., Garofalo, G., Giusto, G., Rizzo, P., Levi, D., 1995. Qualitative and quantitative estimate of solid waste in the Channel of Sicily. In: *Proceedings of the second International*, ed. E. Ozhan, Conference on the Mediterranean Coastal environment, 24-27 Oct, Tarragona, Spain.

[20] Galgani, F., *et al.,* 2000. Litter on the sea floor along European Coasts. *Marine Pollution Bulletin,* 40(6).

common type of marine litter items – i.e. found in the highest numbers – on the 100-metre stretches of beach used as reference[21].

While the precise proportion of marine litter attributed to plastic bags is uncertain, research and clean-up projects in different EU regions illustrate the scale of the problem. For example, plastic carrier bags accounted for 73% of the plastic waste collected by trawlers along the Tuscany coast[22]. Similarly, they represented more than 70% of total debris in most stations sampled in the Gulf of Lions and around the cities of Nice and Marseille (France)[23]. Plastic bags were also found on UK beaches, reaching average densities of one bag every 23 metres[24].

The problem of plastic bag waste in water ecosystems does not affect only countries with a marine coastline. Estimates suggest that a considerable amount of the waste from land reaches the sea through rivers. In other words, waste from regions in the interior of the continent can reach the sea along the big European rivers and pollute eco-systems along the way[25].

The impacts of littering

In the marine environment plastic bags can be especially damaging, as documented in many governmental and other reports, as well as in peer-reviewed journals (see references in footnotes 15 to 43). Animals are injured or killed by entanglement or ingestion of plastic bags mistaken for food. At least 267 different species are known to have suffered from entanglement or ingestion of marine litter, including 86% of all sea turtle species, 44% of all seabird species, and 43% of all marine mammal species.[26] Over the past 25 years, 10% of all dead animals found worldwide had been entangled in plastic bags[27]. In the North Sea, the stomachs of 94% of all birds contain plastic, and 55% of all birds exceed the ecological quality objective level of 0.1g of plastic in the stomach[28]. Fragments of plastics were found in the stomachs of 35% of fish in the North Pacific, with an average of two pieces of plastic ingested per fish[29]. Plastic bags have been also found in stomachs of several endangered marine species, such as green turtles[30, 31], loggerhead turtles[32, 33], leatherback turtles[34], black footed albatrosses[35], harbour porpoises[36], etc.

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21 The six-year OSPAR Pilot Project on Monitoring Marine Beach Litter (2000–2006) was the first region-wide attempt in Europe to develop a standard method for monitoring marine litter on beaches in Europe and to assess presence of marine litter on the beaches in the OSPAR region. OSPAR Commission, 2007. OSPAR Pilot Project on Monitoring Marine Beach Litter: Final Project.

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

23 Galgani F., Souplet A., Cadiou, Y., 1996. Accumulation of debris on the deep sea floor of the French Mediterranean coast. *Marine Ecological Programming series,* 142.

24 Marine Conservation Society (MCS), Beachwatch 2010 litter survey, 2010. Available at: http://www.mcsuk.org/downloads/pollution/beachwatch/latest2011/Methods%20&%20Results%20BW10.pdf

25 NOAA Marine Debris Programme. Available at: http://marinedebris.noaa.gov/info/faqs.html#3

26 Derraik J.G.B., 2002. The pollution of the marine environment by plastic debris: a review. *Marine Pollution Bulletin* 44:842-852.

27 ICC, 2011. Tracking Trash, 25 years of Action for the Ocean.

28 Van Franeker, J.A. and S.N.S. Fulmar Study Group, 2008. Fulmar Litter EcoQO Monitoring in the North Sea - results to 2006. Wageningen IMARES Report No. C033/08, IMARES Texel.

29 Boeger C.M. *et al*., 2010. Plastic ingestion by planktivorous fishes in the North Pacific Central Gyre. *Marine Pollution Bulletin* 60, 2275–2278.

30 Balazs, G.H., 1985. Impact of ocean debris on marine turtles: Entanglement and ingestion In: R. S. Shomura and H. O. Yoshid. Proceedings Workshop on the fate and Impact. 27-29 November 1984; Honolulu,.

31 Meylan, A.B., 1978. The behavioural ecology of the West Caribbean green turtle in the interesting habitat, University of Florida.

The true rate of entanglement and ingestion of plastic debris is however difficult to assess given that many animals that die of these causes may sink to the sea floor or be consumed by predators. Therefore, these figures represent most likely conservative estimates of the scale of the problem.

Once plastic bags start degrading, they break into small pieces and end up as micro-particles that pollute the soil, water and the sea-bed, threatening the functioning of ecosystems. The accumulation of plastic fragments is of particular concern as they are difficult to remove from the environment and they have the potential to be ingested by a much wider range of organisms, able to affect fish stocks. The accumulation of plastic debris on the seabed can inhibit gas exchange between the sediment layers and the overlying waters, thus depriving organisms of adequate oxygen supply, interfering with normal ecosystem functioning and altering the make-up of life on the sea floor[37]. Furthermore, small organisms can use plastic debris as raft to grow and travel long distances across the ocean/sea and may settle in areas where they are non-native, and become invasive[38].

Plastic bag litter also pollutes the environment by transferring intrinsic chemical substances into ecosystems. Plastic debris acts as a sponge for persistent organic pollutants (POPs), such as hydrocarbons, pesticides (DDT) and polychlorinated biphenyls (PCBs) present in the environment. Living organisms ingest plastic particles and pass on the toxic substances across the food chain where their concentration increases along the way ("bio-magnification"). Small and microscopic plastic fragments resulting from the fragmentation of plastic bags present a likely route for the transfer of these chemicals due to their large "surface to volume" ratio, meaning that they are available to a wide range of organisms. Adverse effects have been observed in laboratory animals and measurable levels of such chemicals have been found in humans, the main channel for ingestion being through the consumption of fish[39].These effects present potential impacts on human health that have yet to be fully documented.

Besides impacts on the marine environment, public health and the fishing industry, littering also has economic and social costs in terms of wider loss of tourism and the need for litter clean-up activities. In Luxembourg, the annual costs for cleaning littering only along the national roads and highways were estimated to around €1 million[40]. In 2004 UK local authorities, industry and coastal communities spent approximately €17.7 million cleaning up marine litter[41]. Costs can rise even higher if other indirect costs are also taken into consideration. To illustrate this, it was estimated that in a worst case scenario the cost to the Shetland community (population 22,000) could be approx. €7.1 million per year, including

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[32] Plotkin, P. and Amos A.F,, 1990. Effects of anthropogenic debris on sea turtles in the north-western Gulf of Mexico.

[33] Bjorndal, K. A. and Bolten A.B., 1994. Effects of marine debris on sea turtles.

[34] Fritts, T.H., 1982. Plastic bags in the intestinal tracts of leatherback marine turtles. *Herpetological Review.*

[35] Sileo, L., Sievert, P.R. and Samuel, M.D., 1990. Causes of mortality of albatross chicks at Midway Atoll. *Journal of wildlife diseases.*

[36] Walker, W.A. and Coe, J.M., 1990. Survey of Marine Debris ingestion by odontocete cetaceans. *NOAA Technical Memorandum*.

[37] Derraik, J.G.B., 2002. The pollution of the marine environment by plastic debris: a review, *Marine Pollution Bulletin*.

[38] BIO Intelligence Service, 2011. Plastic Waste in the Environment.

[39] Thompson, R.C., Moore, C.J., vom Saal, F.S., Swan, S.H., 2009; Plastics, the environment and human health: current consensus and future trends. In: *Phil. Trans. R. Soc. B* 364. Royal Society Publishing.

[40] See http://www.environnement.public.lu/dechets/dossiers/littering/index.html

[41] UNEP/OSPAR, 2009. Marine litter in the North East Atlantic Region.

the costs of cleaning as well as costs for aquaculture, power generation, farming, fishing, harbours and lifeboat launches[42].

2.2. Underlying drivers of the problem

Several factors have led to the current situation of plastic carrier bags in Europe:

Market failure and low public awareness: The use of plastic carrier bags entails negative environmental externalities (littering, greenhouse gas emissions, contamination of air, soil and water, and impacts on ecosystems and human health) that are not reflected in the prices paid by the end users, which normally receive these bags for free. Customers are not encouraged to limit their use of plastic carrier bags precisely because they receive them for free or for a very low charge, while retailers are not encouraged to limit the hand-out of plastic bags because they are inexpensive to provide. Free distribution prevents consumers from being aware of the value of plastic carrier bags and the associated impacts and costs of their use, and creates the perception that they represent an unlimited resource.

Implementation and enforcement failures of the existing legislative framework governing packaging and packaging waste: The Packaging Directive requires national systems to be set up for the collection and recovery of packaging waste. The low level of separate collection for recycling and the prevalence of landfilling and littering problems indicate that infrastructure set up at national level is failing to provide for an effective collection and resource-efficient recovery of plastic carrier bags. Consumption trends such as eating out (away from home) and a greater use of public spaces[43], combined with the lightweight and convenience of plastic bags have added to the difficulties of managing the challenges of plastic bags. The collection infrastructure needs to be adapted to these societal changes. However, this is unlikely to happen quickly enough, especially taken into consideration the uneven development of the waste collection and treatment infrastructure across the EU.

The drivers of the problem are complex and the effective implementation of the existing EU acquis will not be enough to address the growing use and impacts of plastic carrier bags, in particular those of single-use. New measures are needed to increase consumer awareness on the costs and effects of unlimited consumption of single-use plastic carrier bags, and encourage more resource efficient practices.

[42] Hall, K., 2000. Impacts of Marine Debris and Oil Economic & Social Costs to Coastal Communities, Kommunenes Internasjonale Miljoorganisasjon (KIMO).

[43] Switzerland Federal Office for the Environment, 2011. Litter-dropping costs money: Component-specific cleaning costs produced by litter-dropping in Switzerland, FOEN, Bern. A summary of the publication "Littering Kostet" can be found at www.bafu.admin.ch/uw-1108-d.

2.3. Who is affected, in what ways, and to what extent?

EU citizens: all citizens are at least indirectly affected by threats related to inadequate management of plastic carrier bags, in terms of unsustainable resource consumption and pollution of air, water and soil that lead to animal deaths, loss of fish stocks, possible ingestion of contaminated fish and public health impacts. In addition, EU citizens are suffering from the impacts of littering while bearing the costs of collection, treatment and cleaning up of plastic bags waste.

Non-EU citizens: The unsustainable consumption of plastic carrier bags in Europe affects citizens in countries outside the EU due to the cross-border nature of pollution and littering, and especially marine littering. In addition, plastic waste, including plastic bags, is increasingly exported outside the EU for end of life treatment. This creates environmental impacts such as GHG emissions associated with transport and treatment, in certain cases, in sub-standard facilities.

Plastics recyclers: plastic bags in the EU are predominantly veered towards energy recovery and landfilling, and are increasingly exported for recycling outside the EU**.** Plastic recyclers are affected by the loss of a potential source of raw materials for recycling, and therefore by a loss of revenues**.**

Public authorities are affected by the increased costs and administrative burden associated with plastic carrier bag consumption, in terms of cleaning littering costs as well as enforcement of prevention measures aimed to reduce this consumption.

Tourism industry and local businesses: Littering incurs an aesthetic cost to society which can affect local businesses, especially the tourism industry.

Fishing industry: The pollution of the sea results in losses in fishing stocks, which translates into a loss of 'raw material' for the fishing industry as well as loss of fishing time and extra costs due to damaged equipment.

2.4. How would the problem evolve if no action is taken

A baseline scenario was constructed in order to assess how the plastic carrier bags consumption and end-of-life is likely to evolve without additional European initiative. The analysis has been limited to the "foreseeable future", i.e. until 2020.

2.4.1. Construction of the baseline scenario

The baseline scenario is based on the annual PRODCOM[44] data on EU production/sales of all plastic bags and sacks (PE[45] and other), which is projected to 2020 by assuming the same average annual change over 2011-2020 as for 2003-2010. The projections for the evolution of plastic carrier bags assumed a constant share of plastic carrier bags in the total EU production of plastic bags and sacks. The same reasoning was applied in projecting the evolution of the production of different types of plastic carrier bags.

These figures were then adjusted to trade to provide an overview of the amounts of plastic carrier bags placed on the market in 2020. EU-27 imports and exports (extra-EU trade) of all plastic sacks and bags for 2003-2009 were taken from PRODCOM and projected by assuming

[44] PRODCOM is a Eurostat database providing statistics on the production of manufactured goods.

[45] PE: Polyethylene.

the same average annual change over 2011-2020 as for 2003-2010. Both imports and exports of plastic carrier bags are projected to rise over the scenario period.

Based on the amount of plastic carrier bags placed on the market, the EU population and the average weights of different types plastic bags, the consumption per capita was then projected to 2020. When converting from weight to number of plastic carrier bags used per person, EU-27 population was assumed to grow in line with International Monetary Fund projections, i.e. from 499.2 million in 2010 to 510 million in 2020. Furthermore, average weights were estimated for single-use non-biodegradable (8.5 g), single-use biodegradable (8.9 g) and multiple-use plastic (78.9 g) carrier bags. These weights were assumed to remain constant over the projection period.

The resulting projections were adjusted where appropriate to take into account the effect of national policies already in place. The baseline scenario takes into consideration that certain measures taken between 2003 and 2010 might not deliver the same effects after 2010, as well as the fact that certain recent measures might not yet have fully produced their effects.

2.4.2. Analysis of the baseline scenario

At EU-27 level, the number of plastic carrier bags placed on the market is projected to rise from 99bn in 2010 to 111bn in 2020. Over the same period, EU-27 population is also projected to rise, from 499m to 510m. The number of bags used per capita thus increases by a small proportion, from 198 bags per capita in 2010 to 217 in 2020. The share of single-use plastic carrier bags is expected to remain stable at 89% of the amount of all plastic carrier bags over the projected period and thus slightly increasing in terms of use.

Current EU plastic bag production is shown in Table 5. Although EU overall production of plastic carrier bags is estimated to increase, single-use plastic carrier bags will be mostly imported from third countries. According to PRODCOM data, EU production of overall plastic bags and sacks remains relatively constant in terms of weight, from 3.43 Mt in 2003 to 3.37 Mt in 2010 projected to 3.39 Mt in 2020. Of these, it is assumed that plastic carrier bags only have a constant share of 33% of the total EU production of plastic bags and sacks. EU production of plastic carrier bags increases slightly, from 1.12 Mt in 2010 to 1.13 Mt in 2020. As to the types of plastic carrier bags produced in the EU, the market share of single-use bags and reusable bags will slightly decrease, while the share of biodegradable bags is projected to grow[46]. On the other hand, the share of single-use plastic carrier bags imported from outside EU is estimated to be of 70%. A detailed overview of plastic carrier bags flows in the EU in 2010 and 2020 can be found in Annex IV. In terms of plastic carrier bags treatment at the end of life, the rate of recycling is expected to increase at a rate of half a percentage point per year, from 6.6% in 2010 to 9.3% in 2020. Energy recovery is expected to remain constant at 39% while landfilling and incineration without energy recovery will decline from 49.7% to 46.9%.

Table 4: Number of plastic carrier bags used and littered in EU-27, 2010/2020 (billions)

	Total bags used	Bags used per	Bags littered

[46] The share of biodegradable plastics in single-use bags is assumed to grow by around 10% per year, i.e. from 3% in 2010 to 7% in 2020. This is a conservative estimate, given that European Bioplastics claims that bioplastics overall are growing by around 20% per year, see http://en.european-bioplastics.org/wp-content/uploads/2011/04/EuBP_image_brochure_2011.pdf

Eunomia's estimate further includes the total switch from non-biodegradable to biodegradable single-use carrier bags in Italy (as of 2011) and in Bulgaria (as of 2012). Eunomia's data is the one used in this report.

	(billions)		person		(billions)	
	2010	2020	2010	2020	2010	2020
Single-use plastic bags	**87,6**	**98,7**	**176**	**194**	**5,704**	**6,312**
Single-use non-biodegradable	85,3	92,2	171	181	5,7	6,3
Single-use biodegradable	2,3	6,5	5	13	0,004	0,012
Multiple-use	**11.0**	**11.8**	**22**	**23**	**2.3**	**2.3**
Total	**98.6**	**110.5**	**198**	**217**	**8.03**	**8.61**

The share of plastic carrier bags that end up as litter is expected to remain stable. However, the absolute numbers of plastic carrier bags littered will grow from just over 8 billion in 2010 to 8.6 billion in 2020. Due to the persistence of plastic, this means that the stock of plastic carrier bag litter in the marine and land environments will add up every year, and will accumulate in the environment. Particles will reduce in size as weathering and disintegration takes place, increasing the surface area and the possibility of chemical transport, and the potential for ingestion by a wider range of biota[47].

Although in the baseline scenario the problem is not expected to increase dramatically, if no action is taken the situation at EU-27 level will definitely not improve either, accumulating the negative effects year on year.

Several Member States have already taken actions to mitigate the environmental impacts of plastic carrier bags with variable results. The approaches vary from country to country as well as their effectiveness; certain measures are quite successful in addressing the problem while others have delivered only limited results.

The most successful policy initiative has been taken in Ireland where a direct levy of €0.15 per disposable bags, applied to consumers at the point of sale, has resulted in a 90% reduction of disposable bags. The success of the levy is partly owed to its progression in relation to the rate of consumption. Following an observed increase in consumption of disposable bags, in 2007 the levy was raised to €0.22 resulting in a further 20% reduction of use of such bags. In 2011, a maximum ceiling for the levy was set to €0.70 to allow flexibility for further increase overtime[48].

In Belgium a combination of tax on disposable plastic bags charged on producers (€3/kg of plastic bags) and a voluntary agreement of the retail sector (aiming to cut disposable plastic carrier bags by 90% by 2013, compared to 2003) has delivered a reduction of 85% in the use of such bags in 2010[49].

Similarly in Luxembourg, a voluntary agreement between the Ministry of Environment, Valorlux (producer responsibility organisation) and CLC (retailers' organisation) has resulted

[47] Bowmer, T. and P.J. Kershaw (Eds.), 2010. 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, GESAMP (IMO/FAO/UNESCO-IOC/UNIDO/WMO/IAEA/UN/UNEP Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection).

[48] S.I. No. 434/2011 — Waste Management (Landfill Levy) Regulations 2011.

[49] http://www.comeos.be/menu.asp?id=8258&lng=fr

in a national 'eco-bag' campaign promoting the use of an easily identifiable reusable bag. While the eco-bag was provided for free at the beginning, nowadays it can be bought for €0.80 and it is replaced without charge if damaged. As an accompanying measure, in 2007 the major supermarkets in Luxembourg suppressed the provision of free single-use plastic bags. The campaign was a success resulting in a reduction of 50 million single-use plastic carrier bags distributed between 2004 and 2007[50]. The voluntary agreement was prolonged for the period 2008-2012 with the aim to maintain the rate of consumption of at least 51% of reusable bags ('eco-bags')[51].

However, in other Member States similar attempts have had less success for reasons that may relate to the specific design of the instruments. For example, in 1988 Italy introduced a manufacturing tax of 100 ITL (€0.05) for each unit of plastic bags produced and released onto the domestic market[52]. However, the amount of the tax appears to have been too low to provide a real disincentive to the use of plastic bags. Moreover, the tax was abolished after 5 years. In 2010, Italy still appeared among the countries with the highest consumption of plastic bags in the EU. In 2011, Italy opted for a more radical approach introducing a ban on non-biodegradable plastic carrier bags.

Similarly, in 2009 Romania introduced an eco-tax of 0.2 RON (€0.05) per bag on shopping bags made of non-biodegradable materials. In 2010, the eco-tax was cut to 0.1 RON (€0.025) per bag and it was applied to bags made of non-renewable resources. Little data is available to quantify the effectiveness of their approach; however the Romanian Association of Solid Waste Management estimated a limited decrease in their use, of between 6 and 10%[53].

Most of the worst performing Member States have no specific legislation, nor wide-ranging voluntary commitments by retailers, aiming at reducing consumption of single-use plastic carrier bags (i.e. Estonia, Lithuania, Poland, Slovakia and Slovenia)[54]. More worryingly, in certain Member States with high consumption of plastic carrier bags and potentially high risks of marine littering (e.g. Greece, Cyprus), no measures have been taken to address this issue.

Given the experiences illustrated above, it is highly unlikely that individual actions will provide a consistent and overall response to the environmental impacts of plastic bag consumption, which are transboundary by nature and follow a continuous progression.

Annex I describes the various measures taken by Member States in more detail.

[50] http://www.valorlux.lu/fr/op%C3%A9ration-%C3%A9co-sac

[51] Accord environnemental entre le Ministère de l'Environnement et l'asbl Valorlux concernant la prévention des déchets d'emballages, http://www.environnement.public.lu/dechets/dossiers/emballages/accord_volontaire_2012.pdf

[52] Legge 475, 9 novembre 1988, Conversione in legge, con modificazioni del decreto legge n.397, 9 settembre 1988, recanti dispozioni urgenti di smaltimenti dei rifiuti industriali.

[53] Kit Strange, ACR+, 2011. Plastic bags: national policies & practices.

[54] Details of MS legislation, or lack thereof, can be found in more detail in Annex III.

2.5. Analysis of subsidiarity and EU added valued

EU competence to take action to reduce the use of single-use plastic carrier bags stems from the articles of the Lisbon Treaty related to the protection of the environment.

Under Article 191 of the Treaty, EU policy on the environment shall contribute, among other things, to protecting and improving the quality of the environment, protecting human health, ensuring prudent and rational utilisation of natural resources, and combating climate change. It shall be based on the precautionary principle and on the principles that preventive action should be taken, that environmental damage should as a priority be rectified at source and that the polluter should pay.

EU action to reduce the use of single-use plastic carrier bags is also fully in line with the objectives of the Packaging Directive 94/62/EC on Packaging and Packaging Waste. It aims, on the one hand, to prevent and reduce the environmental impacts of packaging and packaging waste; and, on the other hand, to ensure the functioning of the internal market.

With respect to the environmental dimension, the EU's right to act stems from the fact that the high consumption rates of plastic bags represent both a common *and* a transboundary challenge. An example of the former aspect is that efficient resource use is not only a challenge facing individual Member States – it is also an objective for the EU as a whole. Indeed, the discussions at the Environment Council of March and December 2011 reflected that the consumption of plastic carrier bags is a common concern for a large number of Member States – a concern that led to a call on the Commission to analyse possible regulatory measures.

The transboundary dimension of the plastic bags issue is in particular related to littering. Especially single-use plastic carrier bags can travel over large distances with currents and winds. Even in Member States with well performing waste management infrastructure, high concentrations of marine plastic litter can be detected, for instance 200 km west of Denmark, in the southern part of the Celtic Sea and along the south-east coast of France[55]. Nevertheless, littering of single-use plastic bags will exist as long as these items are consumed, and not managed at a similar level of ambition across the continent; as such, littering affects the EU as a whole.

Current experiences in EU Member States point to the fact that without an EU-wide initiative on plastic bags, effective action to tackle the problem is unlikely. As illustrated in the baseline scenario, the actions taken at Member State level have had variable effects. More worryingly, in certain Member States with high consumption of plastic carrier bags and potentially high risks of marine littering (e.g. Greece, Cyprus), no measures have been taken. Thus, the purpose of EU wide action is to ensure that all Member States, including those that have not taken any or sufficient action so far, take measures to address the problem of plastic bag consumption.

The added value of EU action would lie in providing a framework establishing a shared objective, concepts and definitions, as well as a timeframe and monitoring and reporting arrangements, while leaving Member States free to decide about precise implementation methods, in line with the subsidiarity principle. Common EU action would also facilitate the sharing of positive experiences and best practices from those Member States that have already successfully introduced measures reducing the use of single-use plastic bags.

[55] Galgani, F., *et al.*, 2000. Litter on the sea floor along European coasts.

2.6. Objectives

The general objective of an EU policy initiative on plastic carrier bags is to limit negative impacts on the environment, encourage waste prevention and a more efficient use of resources, while limiting negative socio-economic impacts.

More specifically, the objectives of the initiative are to:

- limit the environmental damage caused by an increasing consumption of plastic bags, in particular in terms of littering and unsustainable resource use, by significantly reducing the amount of single-use plastic carrier bags consumed per capita by 2015;
- tackle a common and transboundary problem in a coordinated and coherent way across the EU.

This Impact Assessment aims at assessing the main environmental, social and economic impacts of different policy options to achieve a reduction of the use of single-use plastic carrier bags. Various levels of ambition will be assessed and compared to a "baseline scenario" (without additional action at EU level) in order to identify the most appropriate instruments minimizing costs while maximizing benefits.

2.7. Consistency of these objectives with other EU policies

The initiative is fully consistent with the overall objectives of EU waste policy as reflected in article 1 of the EU's Waste Framework Directive 2008/98/EC, i.e. to protect the environment and human health by preventing or reducing the adverse impacts of the generation and management of waste and by reducing overall impacts of resource use and improving the efficiency of such use. It is also fully in line with the EU waste hierarchy according to which waste prevention should be given the highest priority – before any other waste management options such as recycling, incineration and disposal. More specifically, the initiative serves the objectives of EU's Packaging and Packaging Waste Directive – environmental protection and preservation of the internal market – upon which it will build.

Given its focus on more efficient resource use, the initiative should also be seen in the context of the "EU2020 Flagship" on resource-efficiency[56] and the Roadmap to a Resource Efficient Europe[57].

By reducing the use of plastic carrier bags the initiative will also contribute to reducing the pressure on biodiversity, especially on the marine environment, in line with the EU Biodiversity Strategy[58] which aims to halt the loss of biodiversity and ecosystem services in the EU by 2020. The initiative also complements the actions against littering and, more specifically, marine litter, undertaken under the Marine Strategy Framework Directive[59]. As such, it is referred to in the recent Commission Staff Working Paper on Marine Litter[60].

While the issue of plastic bag waste can be linked to the broader debate on the planned review of EU waste policy[61], specific solutions for plastic bags have already been identified and

[56] COM (2011) 21.

[57] COM (2011) 571 final.

[58] COM (2011) 244 final.

[59] OJ L 164, 25.6.2008, p. 19–40.

[60] SWD (2012) 365 final.

[61] Review of waste policy and legislation Roadmap
http://ec.europa.eu/governance/impact/planned_ia/docs/2014_env_005_waste_review_en.pdf

tested in practice, both at Member State level and internationally. Moreover, Member States have repeatedly requested the Commission to explore the scope for action at EU level, particularly in response to action taken by some Member States. Also, extensive public consultation on the issue has already been conducted by the Commission and the response has been analysed. For these various reasons, plastic bags will be addressed through a self-standing policy initiative.

3. DESCRIPTION OF POLICY OPTIONS

In light of the environmental impacts of single-use plastic carrier bags referred to in the problem definition and the LCA evidence reviewed, the options put forward will focus on prevention measures targeting single-use plastic carrier bags (both non-biodegradable and biodegradable).

3.1. Options discarded at an early stage

The options below were analysed but were not shortlisted for a detailed assessment:

Full implementation of the Packaging Directive. Full implementation of the Packaging Directive is not expected to bring a significant improvement. The Directive only includes targets for recycling and recovery. Already in 2009, most of the countries had achieved or surpassed those targets. Even in full implementation cases, packaging continues to be transferred to landfills, where single-use plastic carrier bags can escape and end up as litter. Experience shows that even in countries surpassing the obligations of the Packaging Directive littering has not been completely eradicated. As the Directive does not contain concrete provisions on prevention, it is unlikely that full implementation will reduce the growing consumption of single-use plastic carrier bags.

Remove plastic bags from the scope of the Packaging Directive. Plastic carrier bags are undeniably covered by the general definition of 'packaging' and the related criteria set out in article 3.1 of the Packaging Directive. Article 3.1 of the Directive defines packaging as "all products made of any materials of any nature to be used for the containment, protection, handling, delivery and presentation of goods, from raw materials to processed goods, from the producer to the user or the consumer." This definition is accompanied by a number of criteria, also contained in article 3.1, which, among other things, stipulate that "items designed and intended to be filled at the point of sale and 'disposable' items sold, filled or designed and intended to be filled at the point of sale shall be considered to be packaging provided they fulfil a packaging function". In line with this, plastic carrier bags are one of the illustrative examples listed in Annex I of the Directive. Although the list of examples in Annex I is not exhaustive, Member States have an obligation to consider items listed therein as packaging. It is worth recalling that this item was added in Annex I of the Directive after the Court ruled that plastic carrier bags handed to customers in shops constitute packaging within the meaning of the directive[62]. Moreover, this option also risks undermining the environmental objectives of common EU provisions, as this type of bags would not be regulated with regards to other

[62] Case C-341/01 of 29 April 2004, Plato Plastik Robert Frank GmbH v. Caropack Handelsgesellschaft mbH, p. 59.

provisions in the Packaging Directive. For instance, single-use plastic bags would no longer need to comply with the restrictions imposed on heavy metals, nor would they be covered by the Directive's recycling targets. Altogether, this option would miss the objective of tackling a common problem in a coordinated and coherent way across the EU.

Require Member States to organise awareness raising campaigns on the impacts of the use of single-use plastic carrier bags. Although this option provides flexibility, it is estimated that awareness-raising campaigns alone are not sufficient to drive a major change in consumer habits. Nevertheless, they can be an important and necessary instrument accompanying other measures such as voluntary agreements, pricing measures, etc.

Set a pricing measure on single-use plastic carrier bags at EU level. This option would require a unanimous endorsement of the Council of Ministers, which is highly unlikely in the current political climate. Further challenges relate to the level of the tax and the administrative arrangements related to its enforcement.

Voluntary agreement of the whole retail sector to phase out single-use plastic carrier bags to customers. Such an option is unlikely to meet with consensus in the short term, as retailers have taken different approaches on the issue of plastic carrier bags. While certain sub-sectors (e.g. food retail sector) have already achieved good progress, others are just starting; therefore different implementation dates might be required. It is expected that small retailers will have more difficulties in implementing the commitment, therefore entailing a high administrative burden in relation to the results.

3.2. Options shortlisted for scenario analysis

3.2.1. Option 1: "Business-as-usual" ("baseline scenario") where no specific EU actions are taken to reduce the use of plastic carrier bags

In this "do-nothing" option, the current situation would continue. There would be no additional policies and measures at EU or national level aiming to limit the consumption of single-use plastic carrier bags. This scenario is described in detail in section 2.4.2.

3.2.2. Option 2: Voluntary commitment of a significant share of the EU retail sector not to provide single-use plastic carrier bags

This option entails a voluntary agreement by a significant share of the EU retail sector to stop providing single-use plastic carrier bags. As is already the case in some Member States, multiple-use plastic bags would be charged, at least at cost recovery prices.

Such an agreement could take the form of a commitment by the retail sector encompassing the largest retailers in the EU. For the purpose of such an agreement it is assumed that 46.9 billion single-use plastic carrier bags are sold or given away by these retailers, which would translate into a 55% reduction of single use plastic carrier bags. Progress towards the achievement of the objective would be reported yearly. A review of the overall achievements would be conducted at the end of 2015 and depending on the results further voluntary or regulatory measures might be envisaged[63].

A targeted voluntary commitment encompassing the players that place the largest share of single-use plastic carrier bags on the market will ensure cost-effectiveness, with respect to public authorities' implementation of the measure. Of course, the resulting reduction would be less significant than in the case of a commitment covering the *whole* retail sector in the EU. On the other hand, a commitment by the largest retailers would entail less administrative and enforcement burden. The already established reporting and third-party independent monitoring structure would facilitate an effective monitoring towards the objective. It would also save time and costs in creating such a structure.

Hence in 2011 the Commission initiated discussions with retailers within the framework of the EU Retail Forum on a voluntary commitment for the reduction/phase out of single-use plastic bags. After almost one year of intensive and lengthy negotiations, these discussions concluded without a positive outcome. While the Retail Forum's members in principle acknowledged the existence of the problem, and despite the support for a drastic reduction of single-use plastic bags by a substantive number of retailers in the Forum, another significant group of large retailers did oppose such measures. The main arguments put forward by some against the proposed EU voluntary agreement were based on subsidiarity grounds (i.e. it should be left to Member States to take measures), on proportionality (the measure in their view was too cumbersome in terms of monitoring, and controlling "compliance" would not be proportionate to the size of the problem) and on effectiveness. Some retailers argued, for example, that after some time of implementing a charge between €0.10 and €0.20 per bag, they had still observed an increase in the consumption of single-use plastic bags.

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[63] In the UK, a voluntary agreement between public authorities and 7 large supermarket chains narrowly missed the target of a 50% reduction of single-use carrier bags usage by May 2009 compared to 2006. In 2010, participants in the UK continued to monitor bag usage, but without setting formal targets. In 2011, in Belgium, a voluntary commitment of the retail sector, albeit coupled with a tax of €3 per kg on producers of disposable plastic carrier bags, resulted in an 86% reduction in the use of such bags, compared to 2003.

Given this situation, both European organisations representing retailers, Eurocommerce and ERRT did not further pursue the idea of a voluntary commitment. Similarly, a proposal for a voluntary commitment initiated by the plastic converter industry to reduce of the use of single-use plastic bags was not taken up by retailers.

The feasibility and success of this option depends on the willingness of the players involved to work on a commonly agreed framework and on any accompanying instruments set up to support a change in consumption patterns[64].

3.2.3. Option 3: Setting an EU level prevention target for single-use plastic carrier bags combined with economic instruments and accompanied by the possibility for Member States to introduce market restrictions by way of derogation of article 18 of the Packaging Directive

Under this option, a minimum prevention (reduction) target for single-use plastic carrier bags would be set at EU level, expressed in number of bags consumed per capita per year. Member States would be free to choose the measures to reach the target although it would be worth making an explicit recommendation to ensure that plastic carrier bags are not provided to consumers for free. This option has three mutually supportive elements: a prevention target; the recommended use of economic instruments (pricing measures); and a possibility for Member States to introduce market restrictions by way of derogation of article 18 of the Packaging Directive. These elements are explained in more detail below.

- *A prevention target*

A prevention target provides for a clear objective, while leaving flexibility to Member States on the means to be applied to attain it. This is in line with the Treaty provisions on internal market and takes into consideration progress already achieved in some of the Member States. Article 4 (on prevention) of the Packaging Directive could be used to introduce such target in EU legislation.

In terms of the measures to achieve such target, Annex IV of the Waste Framework Directive[65] provides a list of examples of waste prevention measures available to Member States, including prevention programmes, awareness raising campaigns, voluntary agreements, etc. Such measures could also be applied to single-use plastic carrier bags[66].

Stakeholders responding to the public consultation expressed large support for waste prevention targets set at EU level (74,1%), although they did not generally make suggestions on how the targets should be set.

A prevention target should be ambitious enough to address the unsustainable rate of plastic bag consumption in the EU, while taking account of what has proved achievable in those Member States that have already taken action.

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[64] As the outcome to these negotiations is the result of very recent developments, we have decided to keep this as one of the policy options analysed for impacts.

[65] OJ L 312, 22.11.2008, p. 3–30.

[66] It is worth noting, however, that in most Member States producers and importers are already obliged to pay a fee for the collection and recovery of plastic bags in line with the obligations of producer responsibility schemes for packaging waste. No evidence is available to support an assumption that such recovery fees have contributed to the reduction in use of plastic carrier bags. As such, a fee payable by producers and importers only, does not seem to be sufficient to curb plastic bag consumption either.

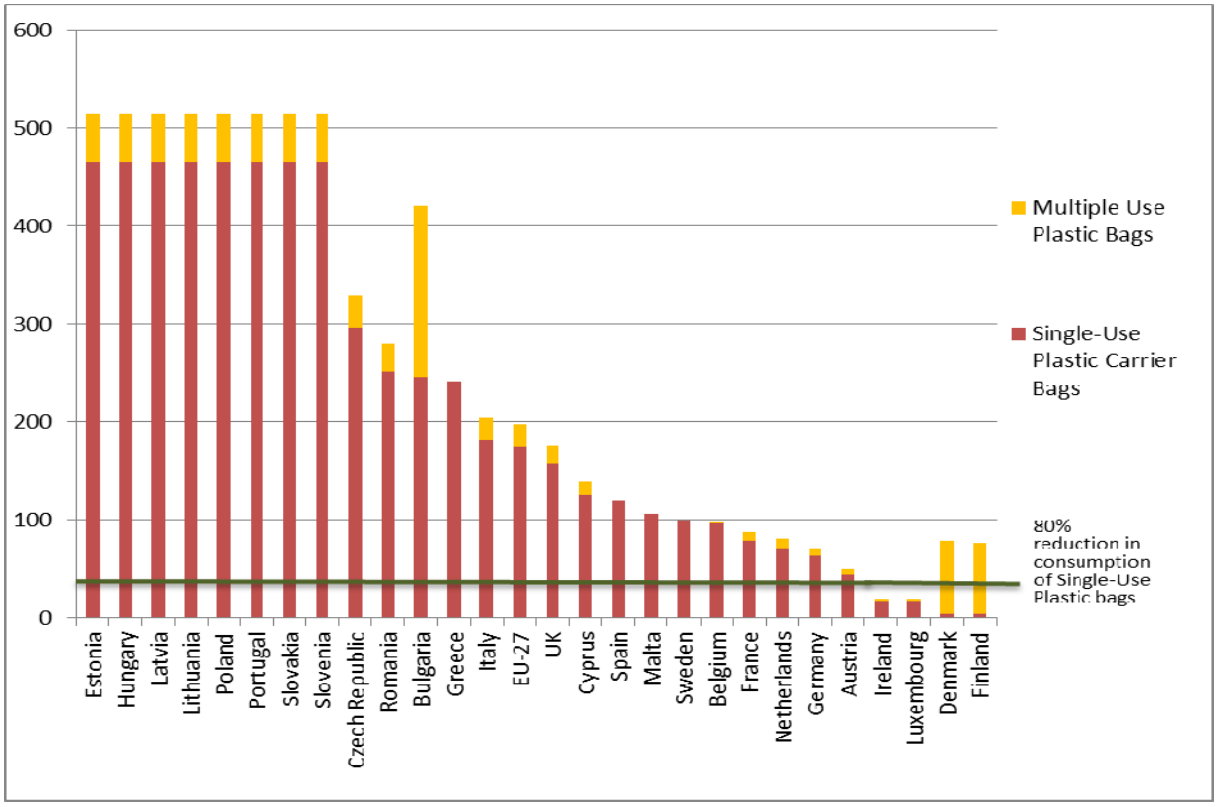

Figure 2: Bag consumption per Member State, EU-27 average, and 80% reduction target of per capita single-use plastic bag consumption[67]

A per capita target is deemed the most effective way to reduce the consumption of plastic bags. The target would be set at 35 bags per person per year, based on the average current (2010) consumption of the best 25% performing Member States (i.e. Finland, Denmark, Luxemburg, Ireland, Austria, Germany, the Netherlands, and France), which together have an average of 32 single-use plastic bags consumed per capita. 35 bags used per capita per year in the EU would result in a reduction of approximately 80% of single-use plastic bag consumption, which for the purpose of this impact assessment will be as the preferred reduction target (as reflected in figure 2 above). All Member States are deemed able to reach this target as it only relates to a category of plastic carrier bags (single-use ones) for which consumption can be reduced without significant impacts on consumers, as re-usable alternatives are already available.

The methodological considerations related to setting the level of a prevention target are described in more detail in Annex V of this report.

- *The use of economic instruments (pricing measures)*

As outlined in section 2.4.2 above, experiences of Member States show that the common denominator of policies that have successfully reduced plastic bag consumption is the introduction of economic instruments. Member States that have introduced effective pricing measures have achieved reductions in the consumption of single-use plastic bags of or greater than 80%.

[67] Eunomia, 2012. p. 39. Annex 2.0, EU consumption of Single-use plastic carrier bags.

The prevention target described above should therefore be accompanied by an explicit recommendation to introduce a pricing instrument, building on article 15 of the Packaging Directive, which encourages the use of economic instruments. Such pricing instruments – the exact design of which would again be left to Member States – could take the form of a consumer or a manufacturers/importers levy[68] (revenues would be re-directed to the public budget), or could be implemented through an agreement with the retail sector not to provide plastic carrier bags for free (revenues would go to retailers).

The effectiveness of pricing instruments depends on a number of factors that should be considered in their design phase:

- the instrument should ideally be part of an overall framework of measures aiming to increase resource efficiency (alternatives to plastic carrier bags should not be provided for free either)
- secure early acceptance of the public and ensure visibility of the measure and adequate alternatives (e.g. awareness campaigns)
- secure agreement of stakeholders on implementation
- design systems with minimal administrative burdens for producers and retailers (e.g. by integrating the measure into existing structures)
- effective enforcement (e.g. strong penalties, regular inspections, etc.).

• *A possibility for Member States to introduce market restrictions by way of derogation of article 18 of the Packaging Directive*

Marketing bans by individual Member States are likely to conflict with article 18 of the Packaging Directive in its current form and may not be justifiable under the exception of TFEU art 114 (5). These legal problems can be addressed by introducing a specific derogation to article 18 of the Directive allowing Member States to introduce marketing bans on single-use plastic bags.

3.2.4. Option 4: Introducing an EU wide ban of single-use plastic carrier bags

Under this option, the provision of single-use plastic carrier bags in retail service would be prohibited. Member States would have to design and implement the appropriate tools to enforce the ban, e.g. by setting dissuasive penalties for non-compliance, organising spot checks and following up on complaints, ensuring appropriate action in case of breach, etc. Multiple-use plastic bags would be charged, at least at cost-recovery prices.

Industry stakeholders responding to the Commission's questionnaire were particularly wary towards the option of a ban, and stressed the need to consider the "unintended consequences", such as a market switch to other materials which may not deliver the desired environmental outcomes.

[68] In case of a levy, Member States could choose whether to use the funds to reduce other taxes, e.g. on labour or profits, or to enhance the environmental benefit by ring fencing funds for litter clean-up activities, recycling and other environmental projects.

4. ANALYSIS OF IMPACTS

This section analyses the impacts of the different policy options proposed in section 3.2, taking account of the experiences of regions and Member States that have already introduced single-use carrier plastic bags' reduction measures.

The analysis is based on a qualitative and – to the extent possible – quantitative assessment (including modelling) of the environmental and socio-economic impacts of the proposed policy options. The data presented here is based on the two studies commissioned by the Commission services: the first one by Bio Intelligence Service in 2011, the second one by Eunomia in 2012.

4.1. Underlying assumptions

The impacts of the prevention targets and measures presented here depend on their exact design, as to be decided by each Member State, and the evolution of consumer behaviour following their introduction. The models used are based on a number of key assumptions:

a) An *entry into force of the measures in 2015*. This was done for ease of comparison between the cases.

b) For the *resource use and CO_2 impacts*, it was assumed that:

- The production 1 kg of PE[69] plastic requires about 2 kg of oil (including raw material and energy)[70].
- One single-use non-biodegradable plastic carrier bag weighing 7.5-12.6 g entails the emission of 1.58 kg of CO_2, assuming a rate of 40% of reuse[71].

c) *Production of plastic bags within the EU vs. external production (imports).* This is a key assumption in analysing the socio-economic impacts of the four policy options; 68% of all single-use plastic carrier bags consumed in the EU are imported, as shown in Table 5 below. Rounding up this figure, it is assumed that 70% of all non-biodegradable single use plastic bags are made outside the EU.

Table 5: Tonnage and corresponding percentual values of single-use plastic bags and multiple-use plastic bags, made in the EU and abroad[72]

	EU Bag Production (Tonnes)	Imported bags (Tonnes)	EU Bag Production (%)	Imported bags (%)
Single-use plastic bags[73]	250081	522500	32	68
Multiple-use plastic bags	873993	238081	79	21

[69] Polyethylene is used in the production of plastic bags. These can be HDPE (High Density Polyethylene) usually used to make Single-use plastic bags, or LDPE (Low Density Polyethylene) usually used to make Multiple-use plastic bags.

[70] www.designinsite.dk/htmsider/m0002.htm

[71] UK Environment Agency (2011) Life cycle assessment of supermarket carrier bags: a review of the bags available in 2006.

[72] Eunomia, 2012. p. 43. Annex 3.0 (EU Production of Plastic Carrier Bags).

[73] "Single-use plastic bags", here, takes into account production and imports of both biodegradable and non-biodegradable single-use plastic.

d) *Switches from single-use plastic bags to other types of bags.* Table 6 below shows the 'switching behaviour', based on experiences made in EU Members States where single-use plastic bag consumption has already been curbed: for every 1000 single-use plastic bags avoided, people use on average 29 multiple-use plastic bags; 4 other multiple-use bags; 127 paper bags; and 273 plastic bin-liners. This means that a switch to alternative bags results in an overall reduction of bags used.

Table 6: Switches from single-use plastic bags to other types of bags[74]

Other bags used	for every 1000 Single-Use Plastic Bags avoided
Multiple-use plastic bags	29
Other multiple use bags	4
Paper bags	127
Plastic bin liners	273
Total	**433**

Although situations may vary from country to country, depending on regional production and consumption trends, we assume this table to represent the general patterns for the whole of the EU. For each policy option, the above switching rates are assumed[75].

e) Retailers would *charge for multiple-use plastic bags,* at least at cost-recovery prices; and would *provide paper bags free of charge*.

[74] Eunomia, 2012. p.11. Section 3.1. Possible switches to other types of bags. See also Annex VI for further information.

[75] Eunomia (2012) does not consider likely that supermarkets will switch to paper bags due to their expense and relative lack of strength. It is expected, however, that other sectors will switch to greater use of paper bags if these are not made the subject of the policy. They assume that half (50%) of the plastic bag consumption in non-supermarket sectors will be displaced by paper bag consumption, and half by multiple-use bags. This has, indeed, been the experience in Ireland. Relative prices per bag and per type can be found in Annex VII.

4.2. Types of impacts

All options to reduce the use of single-use plastic carrier bags share the same types of impacts; the *magnitude* of these impacts will differ from one option to another depending on the degree of ambition and effectiveness of each measure.

The analysis that follows is focused on nine main issues. It looks at three environmental impacts (benefits): resource use, littering rates, and impacts on public spending on waste management and litter collection.

The analysis of economic and social costs and benefits will cover six main issues: administrative burden; impacts on EU producers; impacts on EU retailers; impacts on consumers; impact on employment levels; and public awareness.

Environmental impacts

The main environmental benefits of the proposed measures are linked to the **reduced use of resources** embedded in the production of single-use plastic carrier bags, and corresponding greenhouse gas emissions; as well as a **decline in the amount of waste arising and the number of bags littered**. This, in turn, will **lower litter clean-up expenses**, and expenses incurred in **formal waste management** (collection, recycling and disposal)[76], which are expected to be reduced considerably, as consumption of single-use plastic bags diminishes. In Member States with high consumption rates, it is expected that there will be higher cost reductions in public spending.

Economic and social impacts

Measures to reduce the consumption of single-use plastic carrier bags, especially regulatory measures, are likely to entail some **administrative burden**, falling both on the public and the private sector, to ensure implementation and enforcement. The extent of the administrative burden will depend on the choice and the exact design of the measures to be implemented[77].

The **impacts on producers** are expected to be mixed. The reduction or elimination of single-use plastic carrier bags will entail a decrease in the activity of their manufacturers. On the other hand, producers of *multiple-use* plastic bags will benefit from the changes. In the EU context, given that 70% of single-use carrier bags are imported from outside EU, we expect limited negative impacts on European producers. Reduced availability of single-use plastic carrier bags would in part be offset by a switch to reusable (LDPE) plastic carrier bags, that are mainly produced in the EU.[78]

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[76] Eunomia (2012) was able to assess litter clean-up and formal waste management costs for each MS. Their detailed analysis can be found on pp. 58-70 of the Final Report.

[77] In countries where measures to reduce single-use plastic bags have been particularly successful, such as Ireland, charges are paid into an environment fund, which is used for financing recycling centres and other environmental activities such as cleaning up illegal landfill sites. Annual revenues have risen from around €12-14m to €23.4m in 2009. Collection and associated administration costs are low, at about 3% of revenues. The remainder of the revenues are used to support a wide range of environmental programmes

[78] EU producers focus on LDPE production. Low Density Polyethylene (LDPE) Plastic carrier bags are designed for multiple-use and are commonly referred to as 'Bags for Life'. Nevertheless, as retailers and consumers are the ones ultimately responsible for choosing their alternative to single-use plastic bags, the prospected impacts on producers should be considered with care. For instance in France, the progressive switch to reusable bags initiated by major retailers turned mainly to PP (Polypropylene) bags, which are mainly produced in China (communication with the French association of flexible packaging).

Retailers may initially face costs to implement any of the proposed measures (e.g. awareness raising, administrative costs, possible longer transaction times in supermarkets, and an increase in costs of providing free alternatives such as paper bags) but it is likely that these costs can be offset by the increased sale of reusable alternatives and the overall reduction of consumption of single-use carrier bags which retailers currently often provide free of charge[79]. As is the case in Denmark, some retailers may even profit economically from measures to reduce single-use plastic bag consumption (in such cases care should be taken to avoid the public perception that a specific sector is profiting significantly from such practices[80]).

Impacts on **employment levels** are likely to be slightly negative; although proportionally the impacts are not major, employment in the plastic bags producing sectors is expected to be negatively affected in all the proposed policy options[81].

Consumers may face an initial increase of costs under all options, as the recommended use of economic instruments would imply that they are asked to pay for plastic carrier bags. However, these costs will decrease as consumers switch to reusable alternatives, which save costs in the longer run.

All options will increase **awareness** of the environmental impacts of single-use plastic bags and resource efficiency aspects at large, and could help promote more sustainable consumption patterns. If designed and implemented in an optimal way, measures have the potential to influence consumer behaviour more broadly (e.g. limit use of disposable items, promote re-use), as well as guide manufacturers' and retailers' business models (e.g. promoting reusable, resource efficient alternatives, provide sizes that better suit consumer needs).

[79] Convery, Frank, *et al.*, 2007. The most popular tax in Europe? Lessons from the Irish plastic bags levy.

[80] In Denmark, supermarkets have made plastic bags a significant source of income. Denmark has a tax on weight of plastic bags that is applied to producers, transferred to the retailers who choose whether and how to further pass it to consumers. The Danish consumer is said to pay the highest price in the world for plastic bags, e.g. between 2- 3.50 DKK (€0.27-0.47). The share of the levy is around 0.44 DKK (0.06 EUR) per bag and the marginal revenue for retailers is in certain cases around 1 DKK (0.13 EUR) per bag. In May 2011, Danish discount market Fakta charged 2.50 DKK (0.34 EUR) for a conventional plastic bag (0.04 mm, max load 15kg). In a survey made by the Danish newspaper Politiken, thick re-usable plastic bags cost between 1.50 – 1.80 DKK (0.20-0.24 EUR) in purchase cost for the supermarket (including tax) and thin plastic bags approximately 0.80 DKK (including tax). Assuming that Fakta purchase their bag from the producer for 1.50 DKK, the marginal revenue is 1 DKK (0.13 EUR) per bag. (Source: Ecorys (2011) The role of market based instruments in achieving a resource economy).

[81] Employment impacts in the plastic bag sector are expected to be slightly negative even though profits for producers of bags increase. This is due to the differences in profits made by producers from single-use and multiple-use plastic bags. Annexes VIII and IV of this report, from Eunomia, 2012. p.13 (Section 3.2 on Impacts on Plastic Bag Producing Companies, Employment and Profits).

4.3. Specific impacts per type of measure

4.3.1. Option 1: "Business-as-usual" ("baseline scenario") where no specific EU actions are taken to reduce the use of plastic carrier bags

The business-as-usual scenario shows a trend with a slight increase in the amount of plastic bags consumed over the 2010-2020 period, as shown in Table 7. All other policy options are compared to this baseline scenario.

Table 7: Amount of plastic carrier bags used in the EU, as projected in the Baseline Scenario (Option 1)

Impact category	2010	2020
Plastic carrier bags (Mt)	1.613	1.772
Single-use plastic carrier bags (Mt)	*0.73*	*0.842*
Plastic carrier bags (billions)	98.6	110.5
Single-use plastic carrier bags (billions)	*85.3*	*98.8*

Environmental impacts

In the projected period, the amount of plastic bags consumed rises, with single-use plastic bags experiencing a similar trend. If no action is taken, consumption would keep rising beyond 2020. At EU level, the rate of recycling of plastic bags might experience a slight increase, coupled with a corresponding decrease in disposal rates. However, an increased recycling rate is unlikely to offset the use of natural resources due to increased consumption, and the effects of plastic persisting in the environment. The amount of bags used will increase **littering rates**. Assessing related impacts in quantitative terms – e.g. in terms of numbers of marine species affected – is however difficult.

Public expenses to deal with plastic bag waste (formal collection and end-of-life treatment) and litter (clean-up costs) are also expected to increase.

Economic and social impacts

In a business-as-usual scenario, no major change is expected in terms of impacts on **administrative burden**, EU **producers**, **retailers**, **employment**, **consumers**, and **public awareness**: these remain almost constant. It is worth mentioning that the projected increase in single-use plastic bag consumption will further increase the costs faced by EU retailers to provide such bags free of charge.

Moreover, the increase and persistence of plastic bags litter will increasingly affect communities dependent on fishing and tourism, in Europe and elsewhere.

4.3.2. *Option 2: Voluntary commitment of a significant share of the EU retail sector not to provide single-use plastic carrier bags*

Under this option, as of 2015, the members of the EU Retail Forum would stop distributing single-use plastic carrier bags. On the basis of the share of the market of the Forum, such a commitment would result in a 55% reduction of the total amount of single-use plastic carrier bags used in the EU by 2015 compared to the base year 2010 (see Table 8 below). Based on existing experiences, switches to alternative bags are assumed to be as reflected in Table 6 in section 4.1 above.

Table 8: Effects of a 55% reduction in single-use plastic carrier bags used in the EU, 2015

Impact category	Baseline	Retailers' voluntary agreement	**Reduction**
Plastic carrier bags (Mt)	1.772	1.540	**0.232**
Single-use plastic carrier bags (Mt)	*0.842*	*0.379*	***0.463***
Plastic carrier bags (billions)	110.5	59.1	**51.4**
Single-use plastic carrier bags (billions)	*98.8*	*44.4*	***54.3***

Environmental impacts

In terms of **resource use** a 55% reduction in the number of single-use plastic carrier bags translates into a 13% reduction (0.2 Mt) of plastic used to make plastic bags in 2020[82]. The overall number of plastic carrier bags used decreases by 46% (taking into account the partial switch to multiple-use plastic carrier bags), leading to oil savings of 434 kt and avoidance of 81,2 Mt of life-cycle greenhouse-gas emissions. Environmental impacts are summarised in Table 9:

Table 9: Environmental impacts of a 55% reduction in single-use plastic carrier bags used in the EU, 2015

Impact category	**Reduction**
Oil (kt)	**463**
Emissions ($MtCO_2eq$)	**81.2**
Bags littered (billions/2015)	**4.1**

Compared to the baseline, in 2015 there would be a net decrease in the numbers of **bags littered,** of 4.1 billion[83]. In addition, the yearly reduction in littered bags would translate into savings to public authorities in terms of budget spent on littered bags collection and disposal (€ 39 million in 2015); and in the formal collection, recycling and disposal of all types of bags (€ 28.9 million in 2015).

[82] Bio Intelligence Services, 2011. p. 17.

[83] Eunomia, 2012. This figure includes single-use, multiple use plastic bags and paper bags littered as forecast for 2015.

Economic and social impacts[84]

The **administrative burden** on public authorities and their expenditure to implement and enforce this option would be minimal. Retailers would be able to define implementation modalities adapted to their market circumstances.

As expected, **EU producers** of *multiple-use* plastic bags, paper bags and bin liners would see their annual profits go up (€ 86 million in 2015). Single-use plastic bag manufacturers, however, would see reduced profits (- € 77 million in 2015).

Retailers would experience a reduction in the costs incurred in providing carrier bags to their costumers, translated into net savings nearing € 500 million per year between 2015 and 2020. Costs for providing plastic carrier bags would be drastically reduced, as retailers would forego the costs of providing single-use plastic bags free of charge, while charging for multiple-use plastic bags. The fraction of the retail sector switching to free paper bags would incur higher costs, but these costs do not exceed the cost reduction from providing 55% fewer plastic bags.

Overall, the combined savings and profits by public authorities, manufacturers and retailers amount to € 478 million per year, on average, between 2015 and 2020.

EU plastic bag producers would experience a reduction in **employment** of 860 Full Time Equivalents.

As mentioned in the general section on impacts, **consumers** may face an initial increase of costs, although these would decrease as consumers switch to reusable alternatives.

A voluntary initiative of retailers could contribute to raising public **awareness** of the environmental impacts of the use of carrier bags, especially if accompanied by awareness-raising campaigns. However, the fact that the commitment does not cover the entire retail sector might result in creating uncertainty for consumers, limit their awareness and stand in the way of a potentially more profound change in consumption patterns.

4.3.3. Option 3: Setting an EU level prevention target for single-use plastic carrier bags combined with economic instruments and accompanied by the possibility for Member States to introduce market restrictions by way of derogation of article 18 of the Packaging Directive

Under this option, each Member State would be required to set a limit of 35 single-use plastic carrier bags per person, with implementation of the measure starting in 2015. This target is estimated to deliver a reduction of 80% in the number of single-use plastic carrier bags used in the EU; corresponding absolute reductions are shown in Table 10:

[84] All economic and social impact forecasts are derived from Eunomia, 2012.

Table 10: Effects of an EU prevention target of 35 single-use plastic carrier bags used per person, 2020

Impact category	Baseline	Prevention target	Reduction
Plastic carrier bags (Mt)	1.772	1.425	**0.346**
Single-use plastic carrier bags (Mt)	*0.842*	*0.149*	***0.693***
Plastic carrier bags (billions)	110.5	33.7	**76.8**
Single-use plastic carrier bags (billions)	*98.8*	*17.5*	***81.2***

Member States would be free to determine the instruments to meet this target; differences in the choice of instruments to reach the target will also lead to differences in economic and social impacts. This also applies to impacts arising from market restrictions, where it is impossible to forecast which Member States would set them so as to derogate article 18 of the packaging directive. Consequently, it is difficult to determine the exact quantitative impacts for individual Member States and the other stakeholder groups. Impacts will thus be assessed in terms of EU averages.

Environmental impacts

An 80% reduction in the number of single-use plastic carrier bags in 2015 translates into a 70% reduction in the total number of plastic carrier bags (the difference being due to switching from single-use to multiple-use plastic bags). This amounts to a 20% decrease in tonnes of plastic used in making plastic bags[85], translating into **resource use** savings in terms of oil used equal to 693 kt and a reduction of 121.4 million tonnes of CO_2 equivalents. The overall environmental impacts of this option can thus be summarised as follows:

Table 11: Environmental impacts of an EU waste prevention target of 35 single-use plastic carrier bags used per person, 2020

Impact category	Reduction
Oil (kt)	**693**
Emissions ($MtCO_2eq$)	**121.4**
Bags littered (billions/2015)	**5.3**

Moreover, this option will result in a reduction of 5.3 billion **littered bags**[86]. The reduction in bags littered would translate into considerable annual savings to **public administrations** in terms of budget spent on collecting and disposing of littered bags (savings of € 54.4 million in 2015); and in the formal collection, recycling and disposal of all types of bags (savings of € 45.6 million in 2015).

[85] Bio Intelligence Service, 2011. p. 18.

[86] Eunomia, 2012. This figure includes single-use, multiple use plastic bags and paper bags littered forecasted for 2015.

Economic and social impacts

The **administrative burden** and economic costs would depend on the choice and design of the measures to be adopted at the national level, which could include voluntary agreements, regulatory measures, pricing instruments, awareness-raising campaigns, etc. They would entail administrative costs linked to monitoring (collection and reporting of data) and enforcement. If a pricing instrument is indeed taken up by Member States, costs may, for instance, depend on how well a levy is integrated in existing tax instruments such as VAT. Moreover, and depending on its design, such instrument could bring additional revenues to national budgets or to retailers. The administrative burden facing Member States need to be put in perspective, as they already have an obligation to report on packaging and packaging waste.

At EU level, additional administrative burden would result from ensuring that targets are achieved and from dealing with Member States that do not comply. However, this additional burden is expected to be limited compared to the already existing flow of products and waste statistics reported by the Member States to EUROSTAT.

Finally, it is worth bearing in mind that pricing measures on plastic carrier bags could generate significant revenues for government (e.g. Ireland).

EU producers of multiple use plastic bags, paper bags and bin liners would experience a considerable rise in profits (€ 127 million in 2015). On the other hand, single-use plastic bag manufacturers would again see their profits reduced (- € 120 million in 2015). However, as the 80% target would still allow for some production of single-use plastic bags, in the meantime EU companies could increase their investments in the production of multiple-use plastic or other carrier bags.

Retailers would experience a reduction in the costs incurred in providing bags to their costumers, translated into net savings nearing € 800 million per year between 2015 and 2020. As in the previous scenario, the savings made by all retailers by foregoing the free provision of single-use plastic bags exceed the costs that some would incur if they chose to provide free paper bags. Moreover, these net savings would offset the predicted small costs of adjustment and additional administrative burden[87]. However, small shops might be more affected than larger ones because placing a price on plastic carrier bags might discourage impulse buying by "walk-up" customers. For larger retailers, which represent the main channel for plastic bags distribution to consumers, 'impulse shopping' is likely to account for a smaller share of sales.

Overall, the combined savings and profits by public authorities, manufacturers and retailers amount to € 650 million per year, on average, between 2015 and 2020.

EU plastic bag producers would experience a reduction in **employment** of 1340 Full Time Equivalents, throughout the initial stages of the implementation of the policy. After this one-off effect employment levels would stabilise.

Consumers may face an initial increase of costs, as the recommended use of economic instruments would imply that they are asked to pay for plastic carrier bags. However, these costs will decrease as consumers switch to reusable alternatives, which save costs in the longer run.

An ambitious and clear reduction target – underpinned by a pricing mechanisms and other measures – would contribute to raising **awareness** about the problem of high levels of single-

[87] Ecorys, 2011. The role of market based instruments in achieving a resource economy.

use plastic bags consumption and sustainability and resource use issues in general. Nevertheless, specific awareness campaigns would appear necessary to ensure that the objectives of such measures are well understood by consumers.

4.3.4. Option 4: EU ban on single-use plastic carrier bags

As is shown in table 12, a total ban entails a 100% reduction in the number of single-use plastic carrier bags and an 85% reduction in the total number of plastic carrier bags (taking into account a partial switch to multiple-use plastic carrier bags).

Table 12: Effects of a ban on single-use plastic carrier bags, 2020

Impact category	Baseline	Ban	Reduction
Plastic carrier bags (Mt)	1.772	1.351	**0.421**
Single-use plastic carrier bags (Mt)	0.842	0	**0.842**
Plastic carrier bags (billions)	110.5	17.1	**93.4**
Single-use plastic carrier bags (billions)	98.8	0	**88.9**

Environmental impacts

Table 13 below shows the environmental impacts of a complete prohibition of the distribution of single-use plastic carrier bags in the EU in terms of **resources use** – it would result in a reduction in oil use of 842 kt and save the release of 148 million tonnes of CO_2 equivalents. A complete ban would also entail a reduction of 6.4 billion **littered bags** compared to the baseline scenario. The total lack of bags littered would translate into annual savings to **public authorities** in littered bags collection and disposal (€ 64 million in 2015); and in the formal collection, recycling and disposal of all types of bags (€ 57.3 million in 2015).

Table 13: Environmental impacts of a ban on single-use plastic carrier bags, 2020

Impact category	Reduction
Oil (kt)	**842**
Emissions ($MtCO_2eq$)	**147.6**
Bags littered (billions/2015)	**6.4**

Economic and social impacts

The ban would incur a significant **administrative burden** in terms of enforcement and compliance checks. On the other hand, there would be no reporting burden for retailers.

As expected, **EU producers** of multiple use plastic bags, paper bags and bin liners would experience a considerable rise in their profits (€ 156 million in 2015). Single-use plastic bag manufacturers, however, would see their profits decline considerably (-€ 146 million in

2015)[88]. A ban will affect all single-use carrier bags producers simultaneously, with possibly drastic consequences on production and employment, especially for SMEs. Such concerns have been expressed by a large number of the industry stakeholders who responded to the Commission's public consultation in June 2011. Nevertheless, as EU producers have a competitive advantage in producing higher-value, thicker LDPE bags, there is scope for a shift in production; this would however require timely investments in equipment and the training of staff. EU manufacturers producing alternative carrier bags will benefit from the ban, but they are also likely to face immediate demand pressure for production of alternatives, which will require additional investments. In the medium term, EU producers of multiple-use carrier bags could nevertheless obtain net benefits and quickly offset initial investments.

Retailers would no longer incur any costs in providing bags to their costumers, while charging for multiple use plastic bags, at least at cost-recovery prices. This would translate into net savings nearing € 890 million per year between 2015 and 2020. The fraction of the retail sector switching to free paper bags would incur higher costs, but these costs do not exceed the cost reduction from providing no plastic bags.

Overall, the combined savings and profits by public authorities, manufacturers and retailers amount to € 792 million per year, on average, between 2015 and 2020.

EU plastic bag producers would experience a reduction in **employment** with a (one-off) loss of 1640 Full Time Equivalents in 2015. On the other hand, employment in the tourism and fishing industries may benefit from a near total reduction of littered bags.

As with the other options, **consumers** may face an initial increase of costs to replace single-use plastic bags with reusable alternatives. However, these costs will decrease as consumers adapt their behaviour. Nevertheless, if not accompanied by important information campaigns, **consumer** perceptions of a ban may be negative in terms of a curtailing freedom of choice. In practice, however, the availability of alternatives to single-use plastic carrier bags would not lead to important changes in consumption patterns.

Even though the ban could have positive impacts on consumer habits, a simple disappearance of single-use plastic carrier bags may not *per se* **increase awareness** and incentivise consumers to reduce the use of carrier bags or switch to more sustainable alternatives.

[88] Eunomia, 2012. Note that some EU producers could still produce single-use plastic bags for exports. Profits from their activities would be in the range of €1 million per year.

5. COMPARING THE POLICY OPTIONS

5.1. Quantitative impacts

This Section compares the different policy options based on a quantitative analysis. Tables 14, 15 and 16 below summarise the quantitative impacts modelled for several environmental, economic and social impact indicators, for each of the four policy scenarios described in the previous sections 3 and 4.

In terms of quantitative impacts the following tables show that a ban on single-use plastic bags would score best against environmental and economic indicators, followed by a prevention target (80% reduction) and a voluntary agreement of the Retail sector (55% reduction), with the business-as-usual scenario having the poorest score. The ban would lead to the largest negative effects on employment (followed by a prevention target and a voluntary agreement, with the business-as-usual scenario not leading to net changes in employment levels); nevertheless, under options 2 to 4 profits made by bag producers are expected to increase. This is due to the differences in profits made from producing single-use and multiple-use plastic bags (for further details on modelling results, data used, assumptions and calculations on the modelling of employment and manufacturer's profits see Annex VIII and Annex IX) .

Table 14: Quantitative comparison of the main environmental impacts of the options proposed in 2020

Environmental Impact Indicators	Baseline (Business as Usual)	Retailers' voluntary agreement	Prevention target	Ban
Tonnes of total plastic carrier bags (% reduction)	0	13	20	24
Tonnes of single-use plastic carrier bags (% reduction)	0	55	82	100
Number of total plastic carrier bags (% reduction)	0	47	70	85
Number of single-use plastic carrier bags (% reduction)	0	55	80	100
Oil (kt saved)	0	463	693	842
Emissions ($MtCO_2eq$ avoided)	0	81,2	121,4	147,6
Littered bags' (billions/2015) reduction	0	4,1	5,3	6,4

Table 15: Quantitative comparison of the main economic impacts of the options proposed, averaged over years 2015-2020, relative to the baseline (business as usual).

Economic Impact Indicators	Baseline (Business as Usual)	Retailers' voluntary agreement	Prevention target	Ban
Costs Reduction to Retailers (€m/year)	0	412,5	649,8	791,7
Profits to EU Bag Manufacturers (€m/year)	0	5,7	3,8	4,2
Cost reduction for Litter Collection (€ m/year)	0	34,0	46,3	54,2
Cost reduction for waste management (€m/year)	0	25,8	39,8	49,5
Total savings and benefits (€m/year)[89]	**0**	**478,0**	**739,8**	**899,5**

Table 16: Quantitative comparison of the main social impacts of the options proposed, averaged over years 2015-2020, relative to the baseline (business as usual).

Social Impact Indicators	Baseline (Business as Usual)	Retailers' voluntary agreement	Prevention target	Ban
Net Change in Employment in EU Bag Manufacture in 2015 (Full Time Equivalents)	**0**	**-860**	**-1340**	**-1641**

[89] Total savings here also include the benefits incurred by the public authorities in waste management and litter collection, presented in Table 12.

5.2. Other impacts and considerations

Bearing in mind the objective of a policy initiative on single-use plastic carrier bags – to limit negative impacts on the environment and human health, and to reduce resource and energy use – it is important to complement the above quantitative assessment with a – more qualitative – analysis of impacts that are much more difficult to quantify.

5.2.1. Flexibility of Member States to decide

Even though a prevention target would prescribe an objective, it takes account of the progress already achieved in certain Member States. Moreover, it would grant all Member States the flexibility to decide which measures work best in their national contexts. These conditions would neither be met in the case of an EU-wide voluntary agreement with the retail sector, nor in the case of a ban. Furthermore, the introduction of a minimum target would grant Member States the freedom to reach higher levels of ambition.

5.2.2. Implementation

Changes in institutional arrangements needed to implement a new measure may entail administrative and human resources' costs.

A voluntary agreement with part of the EU retail sector would entail lower implementation costs for public authorities than a prevention target or a ban. Moreover, retailers would be able to define conditions for implementation that are adapted to their market circumstances. On the other hand, a voluntary agreement also comes with risks related to possible free-riding and the difficulty of imposing sanctions in case of non-compliance[90].

The administrative costs related to a prevention target will depend on the exact measures to be adopted by individual Member States. Public authorities are likely to face additional costs related to monitoring (in particular to ensure compliance by retailers with reporting obligations), but this would be a small part of the costs already borne by Member States in the context of reporting on existing targets for packaging and packaging waste. In the case of a prevention target monitoring and enforcement costs are likely to be lower than in the case of a ban.

Member States that have already implemented measures to reduce the use of plastic bags and have already reached the average *per capita* target will not face further impacts.

5.2.3. Possibility to generate revenues

The recommended pricing instrument for plastic bags accompanying a prevention target for single-use plastic bags would generate revenues, which depending on the precise design of the instrument, could be directed towards public authorities or retailers. If revenues flow to public authorities, they could be used to offset (part of) the necessary administrative costs related to implementation and enforcement. Revenues could also be used to finance environmental projects. In a business-as-usual scenario public authorities (and/or retailers) would not be able to generate additional revenues; a voluntary agreement and a ban would only allow for potential additional revenues from the sale of multiple-use plastic bags, if these were sold at higher than cost-recovery prices.

[90] As explained in the description of option 2 in section 4.3.2, discussions with the EU Retail Forum have already been attempted. This option is therefore now assumed to be very difficult to implement.

5.2.4. Acceptance of the measure

As the retailers in the EU Retail Forum only cover 55% of the total EU consumption of single-use plastic bags, if such a voluntary agreement were to happen, many smaller retail shops would not take part. This not only risks confusing consumers as single-use plastic bags would be available in some shops but not others, but also raises questions in terms of a level playing field between all retailers in the EU. Moreover, as mentioned above, there is a risk that individual retailers covered by the Retail Forum do not accept the agreement.

On the other hand, both retailers and consumers could perceive a ban as excessive and disproportional, especially in light of the positive experiences in Member States having taken less stringent measures.

5.2.5. Raising awareness on sustainable consumption

Making single-use plastic bags more scarce and introducing a mandatory pricing measure – as would happen in the case of a prevention target – may help raise consumer awareness of (un)sustainable consumption patterns more broadly, i.e. beyond the consumption of plastic bags only. This effect is likely to be much smaller in the case of a voluntary agreement with only part of the EU retail sector, as this would confront consumers with contradictory messages about the sustainability of plastic carrier bags (which would be available in some places but not in others).

5.2.6. Other issues

A ban and a prevention target may affect small shops more than larger ones because it might discourage impulse buying by “walk-up” customers. For larger retailers, which represent the main channel for plastic bags distribution to consumers, 'impulse shopping' is likely to account for a smaller share of sales.

5.3. Comparison of the policy options

Table 17 below gives an overall assessment of the four policy options analysed in this report by presenting a comparative, qualitative assessment of their respective impacts. The methodology and assumptions used to arrive at these conclusions are described in Sections 5.1 and 5.2 of this report, and explained in detail in the studies of BIO IS (2011) and Eunomia (2012)[91].

Table 17: Qualitative comparison of environmental, economic and social impacts of policy options to reduce use of single-use plastic carrier bags

Impact indicator	Baseline	Retailers' voluntary agreement	Prevention target	Ban
Environmental	– –	+	++	++
Economic	– –	+	++	++
Social (employment)	+	–	–	–
Flexibility to MS	– –	– –	++	– –
Implementation	0	≈	–	– –
Funds generation				
For public authorities	0	0	++	+
For retailers	0	+	++	+
Acceptance of the measure	– –	–	++	–
Awareness raising on sustainable consumption	– –	+	++	+

Legend

Legend	Likely effect
++	Positive impact
+	Slightly positive
≈	Marginal/Neutral
0	No change
–	Slightly negative impact
– –	Negative impact

[91] Bio Intelligence Service, 2011. Assessment of impacts of options to reduce the use of single-use plastic carrier bags. Final Report.

Eunomia, 2012. Assistance to the Commission to complement an assessment of the socio-economic costs and benefits of options to reduce use of single-use plastic carrier bags in the EU. Final Report

6. PREFERRED OPTION

The option that combines an EU-wide prevention target with an explicit recommendation to use a pricing measure and the possibility for Member States to apply market restrictions by way of derogation of Article 18 (option as described in Section 3.2.3) has the highest potential to deliver ambitious environmental results, while achieving positive economic impacts, limiting negative effects on employment, ensuring public acceptance, and contributing to wider awareness on sustainable consumption (see Table 17, above, comparing the different policy options). Setting an EU-wide target would 'guide' measures to be adopted by Member States, ensuring that they are ambitious enough to achieve the desired effect. The main risks of this option relates to its practical implementation, i.e. the measures taken by Member States to achieve the proposed 80% reduction target.

Further consideration of the policy options analysed in this impact assessment during the Commission's inter-service consultations have however led to the conclusion that given the current very large differences between Member States' consumption levels of single-use plastic bags, it would be difficult at present to design and implement an EU-wide reduction target. Instead of establishing a common EU target, it is therefore preferable to introduce in Article 4 of Directive 94/62/EC the obligation for all Member States to reduce the consumption of single-use plastic carrier bags, while allowing them to set their own national reduction targets and to choose the measures to reach those targets. At a later stage the establishment of an EU-wide reduction target could however be considered.

To assist Member States in setting effective measures to reduce plastic bag consumption, the Commission will promote the sharing of best practices, including for the monitoring and evaluation of the measures implemented. Monitoring of transposition and implementation will occur in accordance with the Commission's role as a guardian of EU law. The costs to implement this option will largely depend on the choice and design of the measures adopted at national level.

7. MONITORING AND EVALUATION

Member States would be expected to transpose the Directive 12 months after its entry into force and to implement measures that reduce single-use plastic bag consumption within 2 years after entry into force. They would notify the Commission of their national legislation to reach the objective, which the Commission would then check for conformity.

7.1. Core indicators of progress towards meeting the objectives

The core indicator for progress towards meeting the objectives set for this policy initiative is:

- Single-use plastic carrier bags placed on the market

Progress towards meeting the objectives can be monitored by adding a sub-category to the already existing EU production and trade databases (PRODCOM[92] and COMEXT[93]) managed by Eurostat and regularly updated with information provided by Member States.

[92] Survey for the collection and dissemination of statistics on the production of industrial (mainly manufactured) goods, both in value and quantity terms, with at least an annual frequency, in the EU.

[93] Eurostat reference database for EU external trade, including imports and exports.

7.2. Broad outline for possible monitoring and evaluation arrangements

Member States are ultimately responsible for the implementation, monitoring and enforcement of their national measures to achieve the requirements of the policy initiative advocated in this report. Therefore, the exact data collection methods will depend on the internal organisation of each Member State and the nature of the implementing instruments chosen. For instance, Member States that have set a price on individual single-use bags, and collect it as a tax, are in a position to report the number of bags sold in great detail[94]. Member States that implement voluntary agreements with retailers rely on retailers for the provision of data on plastic bags sold[95].

As regards monitoring of plastic bag litter, some Member States carry out systematic litter surveys on beaches and in the countryside[96].

The Commission will encourage the sharing of best practices concerning data collection from countries that have successfully implemented such initiatives. If appropriate, specific guidelines on monitoring and reporting can be issued by the Commission, as it has been done in the context of other EU waste stream directives.

However, monitoring a reduction in the consumption of single-use plastic carrier bags combined with a pricing measure and accompanied by the possibility for Member States to introduce market restrictions by way of derogation of article 18 of the Packaging Directive should be relatively straightforward, given the monitoring instruments that already exist for the implementation of the Packaging Directive and the Waste Framework Directive.

It is also worth recalling that Article 29 of the Waste Framework Directive sets an obligation for the establishment of national waste prevention programmes by 2013. In the context of these programmes, Member States would report on the planned steps towards implementing their consumption of single-use plastic carrier bags and on how the measures implemented contribute to achieving the target. The European Environment Agency is expected to include in its annual report a review of the progress made in completing and implementing national waste prevention programmes.

Furthermore, article 17 of the Packaging Directive provides for 3-years implementation reports. In this framework, Member States would report on the amounts of single-use plastic carrier bags placed on the market and on how the measures they have taken contribute to achieving a reduction of single-use plastic bag consumption. On the basis of national implementation reports, the Commission then publishes its own report on the implementation of the Packaging Directive and its impact on the environment and the functioning of the internal market.

Therefore, new measures aiming to reduce the use of single-use plastic carrier bags will not imply major changes to existing monitoring obligations.

[94] This is the case in Ireland and Bulgaria. In Denmark, where there is a tax to retailers on weight of plastic bags sold, tax revenues are used as a proxy to number of plastic bags sold, with average weight of plastic bags as a reference.

[95] For instance in Luxemburg,

[96] In Ireland, for instance, these types of surveys are paid for by the Environment Fund, resourced by the single-use plastic bag levy.

ANNEXES

Annex I: Overview national measures to reduce the use of plastic carrier bags

	MS	Existing or planned legislation to avoid the use of plastic carrier bags	Voluntary initiatives	Achieved or planned outcomes
1	AT	Austria has no legislation in place to address the issue of plastic bags, nor a national recycling scheme. In January 2011, the environment minister published a five-point plan to reduce the use of plastic bags.	Based on this initiative there are voluntary agreements with supermarket chains in place, to use plastic bags containing more than 80% recycling material. Other supermarkets do not offer plastic carrier bags any more. In many cases plastic-bags for fruits and vegetables are changed into bags made from cellulose.	
2	BE	Belgian authorities have had a voluntary agreement with retailers for 15 years where customers are charged a fee that goes to Fost Plus, a plastic collection and recycling firm. However there is no national scheme for recycling plastic bags separately. There is also a federal environmental tax on single-use plastic carrier bags. The packaging tax, introduced in May 2007, sets a charge of €3/kg for the distribution of plastic carrier bags used for carrying goods purchased from retailers. Article 6(3) of a Regulation of 27 June 1996 contains the legal provisions on avoiding the use of plastic carrier bags. The regulation is not yet in force in the Walloon region. Any reduction in the use of plastic carrier bags in the Walloon region is therefore on a voluntary basis or as a result of other legislation.	The retailers' association Comeos produced a plan to reduce the use of plastic carrier bags in retail, which has been in place since 2003. Members committed to reducing "single-use" plastic bags by 20-25% by 2006 and by 60% by 2009.	In Flanders, the voluntary agreement led to an 80% reduction in disposable plastic carrier bags between 2003 and 2009. In Wallonia, the plan has led to a 60% reduction in disposable plastic bags for the period 2007-2010 compared to 2003. The 2010-2013 plan targets a 90% reduction compared to 2003 in terms of tonnage/revenue. By 2011 an 86% reduction had been achieved.

	MS	Existing or planned legislation to avoid the use of plastic carrier bags	Voluntary initiatives	Achieved or planned outcomes
3	BG	In March 2011, Bulgaria's Ministry of Environment proposed the use of economic measures to limit the use of plastic bags. A tax on PE bags with a thickness of less than 15 microns will come into effect on 10 October 2011.[97] The tax will be paid per item by those who place plastic carrier bags on the Bulgarian market and retailers will pass the fee on to customers. The proceeds of the tax will be ring-fenced for waste management projects. The tax is set to increase each year, from €0.077 initially to €0.28 in 2014. At the beginning of 2012 the Ministry of Environment and Water plans to extend the tax to bags thinner than 23 microns.[98]		The tax on thin plastic carrier bags is expected to result in a reduction of 30% of carrier plastic bags consumed.
4	CY	No measures in place. Proposals to make all bags biodegradable and to prohibit supermarkets from giving away free plastic carrier bags were rejected in 2008.		

[97] Sustainable development academy (2011*) Bulgaria to introduce eco-tax on plastic bags*, available at: www.courseforsustainability.org/blacksea/news.php?id_news=470. ENDS Europe (2011) Sorting out the plastic bag policy chaos, 5 July 2011.

[98] National authority communication.

	MS	Existing or planned legislation to avoid the use of plastic carrier bags	Voluntary initiatives	Achieved or planned outcomes
5	CZ	Under Czech law: a) if no charge is applied at the supermarket till for plastic carrier bags (as is the case at Tesco for example), then they are treated as packaging. For the disposal of this packaging, a charge of around €230 per tonne of plastic carrier bags must be paid by the supermarket. This measure does not discourage use of plastic carrier bags directly but it does encourage supermarkets to impose a charge. b) if a charge is applied to plastic carrier bags (e.g. at BILLA supermarkets) it is not considered packaging and there is therefore no disposal fee. From 2011, free distribution of plastic carrier bags will be banned but it will be up to retailers how much they charge. The Czech Environment Ministry considers conventional plastic carrier bags containing additives to be problematic because a relatively large amount of plastic waste recycling is carried out in the Czech Republic. Labelling is therefore now being considered.		
6	DE	No specific legislation.	Supermarkets voluntarily charge for plastic bags. Most German supermarkets charge between €0.05 and €0.10 per "single-use" bag, depending on the type of bag.	The problem is regarded as having been solved by packaging legislation.

	MS	Existing or planned legislation to avoid the use of plastic carrier bags	Voluntary initiatives	Achieved or planned outcomes
7	DK	There has been a charge for plastic and paper carrier bags (with a volume of at least 5 litres) since 1993. The charge depends on the weight and material. On average it is 0.5 DKK per plastic bag (this charge is equal to 10 DKK/kg for paper bags and 22 DKK/kg (around €3) for plastic bags). It is up to individual businesses to decide whether or not they charge their customers for the bags (generally between 1.5 DKK and 3 DKK). As the cost can be absorbed in the cost of products, consumer behaviour change is not the direct target as in Ireland.		The environmental authorities do not have precise data on the number of carrier bags used. However, after the introduction of charges, the total use of plastic to make carrier bags fell from just under 18 750 tonnes in 1993 to around 7 750 tonnes in 1999. By 2009, use had crept back up to around 8 950 tonnes. According to environment authority data, carrier bags have become thinner since the introduction of charges,[99] and are made out of reusable (thick) material, so that their energy value can be used when burnt in incinerators. Many municipalities, organisations and businesses encourage the use of reusable bags. Use of paper and plastic bags is estimated to have fallen by two-thirds.[100]

[99] BIO calculations are that average weight may have reduced by up to one third since 2003.

[100] The Scottish Government (2005) Proposed Plastic Bag Levy - Extended Impact Assessment: Volume 2: Appendices Appendix 1. International Context – Experience Elsewhere- Republic of Ireland, available at: www.scotland.gov.uk/Publications/2005/08/1993259/33019.

	MS	Existing or planned legislation to avoid the use of plastic carrier bags	Voluntary initiatives	Achieved or planned outcomes
8	EE	Under the current legislation, plastic carrier bags are considered to be part of packaging, so it is the duty of the producer (person who places the packaging on the market) to organise collection and arrange for recovery or recycling. If recovery or recycling targets are not met, the producer must pay a packaging tax for the amount it is below the target. The Estonian Green Party initiated draft legislation in 2010 to implement a new tax on plastic carrier bags. On 3 February 2011 it was still undergoing its first reading in Parliament. The draft being considered by the Estonian parliament suggested a tax of €0.20 per plastic bag over 20 cm x 30 cm in size (with handles) bought in retail. It is currently unclear what is happening with the plastic bag tax under the new government.	In retail, bags are sold for around €0.10, so are not free. In this way, the bulk use of these bags can be monitored to a certain extent. Reusable bags are promoted by media campaigns, as well as in other ways.	A tax of €0.20 on top of the average price of €0.10 would mean that the number of plastic bags sold would decrease quickly, like in Ireland. However, an evaluation of the policy has not yet been carried out.
9	EL	There is no legislation to reduce the use of plastic carrier bags.	Plastic bags are free everywhere in Greece, apart from Lidl. Since 2008, some supermarkets have made reusable shopping bags available but with limited success because thin plastic carrier bags are still distributed without charge. Some municipalities (e.g. Athens), districts (e.g. Samos) and large supermarkets have introduced biodegradable shopping bags.	

	MS	Existing or planned legislation to avoid the use of plastic carrier bags	Voluntary initiatives	Achieved or planned outcomes
10	ES	In transposing the Waste Framework Directive in 2012, Spain envisaged the following reduction in plastic bag use compared to 2007: - 60% fewer plastic carrier bags by 2013; - 70% by 2015; - 80% fewer plastic carrier bags by 2016. From 2018, the use of plastic carrier bags would be stopped completely, except for plastic bags for meat, fish and freezer products (with a high water content), as no equivalent alternative to plastic bags has yet been found. In addition, from 1 January 2015, a message about the harmful environmental impacts of plastic carrier bags must be printed on all bags. However, this change was announced without notifying the EC, for which an EU pilot was launched. AS a result, the reduction calendar and ban has been suspended. A Royal Decree will be issued in the future with a revised timeline of single-use plastic bag reductions, prior notification to the EC. The Spanish body for standardisation and certification (AENOR) has made a standard on reusable PE carrier bags (UNE 53942 - 2009), guaranteeing their use at least 15 times. The region of Andalucía agreed a charge for the use of plastic carrier bags in June 2010, which came into force on 1 May 2011. It provides for a charge of €0.05 per plastic carrier bag in 2011, which should rise to €0.10 per plastic carrier bag in 2012.	There have also been voluntary agreements in Spain since at least 2008. The main retail associations signed up to voluntary agreements with the regional public authorities to promote the prevention and more sustainable use of carrier bags among consumers. Some large supermarket chains now charge either for plastic carrier bags (Día) or pay a small amount back (around €0.10) if the customer does not take any plastic carrier bags (Eroski Group).	One of the best examples is *Pacto por la Bolsa* in Catalonia, signed in 2009. Its target was a reduction of consumption of "single-use" bags by 50% by 2012. By 2010, a reduction of 40% had been achieved.
11	FI	No legislation specifically targeting plastic carrier bags.	Almost all supermarkets sell durable bags, paper bags and plastic bags. Some public institutions and private companies provide free multiple-use cloth bags.	

	MS	Existing or planned legislation to avoid the use of plastic carrier bags	Voluntary initiatives	Achieved or planned outcomes
12	FR	In 2005, France adopted a law banning the sale of non-biodegradable plastic bags by 2010 but the text was never applied since it was deemed to be in breach of certain provisions of the Packaging Directive. The 2010 budget (*Loi de finances rectificative pour 2010, article 47*) instead set up a tax on non-biodegradable "single-use" plastic carrier bags of €10/kg (around €0.06 per bag), which will be applied from 1 January 2014. This is set out in Article 266, as amended, of the general tax code book *'Code des Douanes'*. Biodegradable bags made from a minimum of 40% renewable resources would be exempt.	Until now, supermarket chains have had sole responsibility for reducing the number of plastic carrier bags. Since 1996, E.Leclerc has progressively replaced free thin plastic bags with biodegradable, reusable and cotton carrier bags. The supermarket chain has reduced the number of plastic carrier bags distributed to consumers from 1bn in 1995 to 50m in 2005. By 2005, 94% of its costumers owned one or more reusable bags. Other chains have followed its example and some have voluntarily started charging for plastic bags. The FCD retail federation made a commitment to reduce plastic carrier bag use in 2003 and aims to completely phase out thin plastic carrier bags by the end of 2011. Carrefour aims to completely end free provision by 2012. The island of Corsica banned plastic carrier bags in 2003. A referendum was organised that proposed three options for the replacement of conventional plastic carrier bags: large reusable plastic bags costing €1, paper bags sold for €0.08, or bio-based bags sold between €0.05 and €0.14 depending on their size. Of the 30 448 persons who voted, the majority (61%) opted for the reusable plastic bag sold for €1.	The tax is intended to reduce the use of free thin plastic carrier bags to as close to zero as possible. In past years, increased provision of reusable carrier bags has succeeded in considerably reducing the excessive provision of free thin plastic bags in France's supermarkets. The number of thin plastic carrier bags used in France decreased from 10.5bn to 1.5bn from 2002 to 2009.
13	HU	It is reported that there is a tax and national recycling scheme in place.	Some supermarkets have started voluntarily charging for plastic bags.	

	MS	Existing or planned legislation to avoid the use of plastic carrier bags	Voluntary initiatives	Achieved or planned outcomes
14	IE	A levy was introduced in March 2002 on the purchase of plastic carrier bags in supermarkets, petrol stations and shops. It began at a rate of €0.15 and was raised to €0.22 on 1 July 2007.[101] The regulations do not distinguish between biodegradable plastic bags and other plastic bags,[102] but exemptions are made for plastic bags for use with fresh fish, fresh meat and fresh poultry, if not exceeding 225 mm width, 345 mm depth, 450 mm length (including handle), as well as for fruits, nuts, sweets, ice cream, cooked items, milk products on board an aeroplane or ship, or when marked as reusable. Charges are paid into an environment fund, which is used for financing recycling centres and other environmental activities such as cleaning up illegal landfill sites. Annual revenues have risen from around €12-14m to €23.4m in 2009. Collection and associated administration costs are low, at about 3% of revenues.[103] In 2011, provision has been made in national legislation which sets a ceiling for the levy at €0.70 and enables the levy to be amended once in any financial year.		The effects of the tax on the use of plastic bags in retail outlets and in the landscape were dramatic. Within five months of introduction, a 90% reduction was achieved. At the same time, €3.5m was collected. At that time, 328 bags per person per year were used. This number was reduced to 21. However there was subsequently a gradual increase in plastic bag usage, to 30 bags per person/year in 2006. In response, the plastic bag levy was increased. This resulted in a decrease to 26 bags per person in 2008 and 18 bags per person in 2010. The aim of the increased rate was to keep the number of plastic bags per person to 21 or fewer. The share of plastic bags in litter pollution in Ireland has fallen from 5% in 2001 to 0.25% in 2010.

[101] For more information see www.citizensinformation.ie/en/environment/waste_management_and_recycling/plastic_bag_environmental_levy.html.

[102] Source: www.environ.ie/en/Environment/Waste/PlasticBags.

[103] Convery, F. et al. (2006) The most popular tax in Europe? Lessons from the Irish plastic bags levy, Science+Business Media, plasticbaglaws.org/.../study_the-most-popular-tax-in-Europe-2007.pdf.

	MS	Existing or planned legislation to avoid the use of plastic carrier bags	Voluntary initiatives	Achieved or planned outcomes
15	IT	Italy has taken the most drastic action of any EU Member State so far, in its Law of 27 December 2006, No 296, Article 1, paragraphs 1129, 1130 and 1131. Paragraph 1129: In order to reduce the amount of CO_2 emissions to the atmosphere, improve environmental protection and support the agro-industry on biomaterials, in 2007 a national pilot programme was launched for the gradual reduction of carrier bags placed on the market that are not biodegradable under the EU criteria defined in law, and the technical conditions adopted at EU level. Paragraph 1130: In accordance with paragraph 1129 (…) the programme is aimed at establishing measures to be gradually implemented at national level to achieve the ban on placing carrier bags on the market that are non-biodegradable and that do not fulfil the technical and legal biodegradability criteria adopted at EU level. The ban came into force on 1 January 2011 and does not provide for any specific penalties for infringements. It applies to all product sectors and all types of non-biodegradable carrier bags. Reusable plastic bags are exempt. Shops and supermarkets will only be able to provide customers with the plastic bags remaining in their stockrooms, giving them to customers free of charge; and only until 31 August 2011 in supermarkets and 31 December in smaller shops.[104] The Italian ban was announced without notifying the EC. On April 5, Italy gave notification of a draft law defining the scope of the ban on the marketing of non-biodegradable shopping bags. It also contains provisions related to penalties. The Commission has sent a detailed opinion to the Italian authorities. Italy has also notified the Commission of a decree in which technical details of the ban are specified.		The goals are to reduce CO2 emissions, protect the environment and support the agricultural sector with the commercialisation of bio-based materials. A drastic reduction in the number of non-biodegradable plastic bags in favour of the use of reusable bags and shopping bags is expected, along with a corresponding increase in number of bags made of biomaterials from biodegradable and compostable material.

[104] Legge finanziaria 20071.

	MS	Existing or planned legislation to avoid the use of plastic carrier bags	Voluntary initiatives	Achieved or planned outcomes
16	LT	In Lithuania, there is no legislation or planned legislation to ban plastic carrier bags.	Most distributors voluntarily do not use plastic carrier bags.	
17	LU	No legislation specifically targeting plastic carrier bags.	A voluntary agreement is in place between the Environment Ministry and Valorlux (association of producers and importers of packaging material) regarding the sale of the multiple-use "Eco-sac" carrier bag. The voluntary agreement has a target of a market share for multi-use carrier bags of at least 51%. This agreement was first made with food and DIY shops. The first agreement was made in 2004, the second in 2006, and the third in 2008. It was renewed again in 2012 for a further period of five years. It is applicable throughout the country. There is no provision for penalties. An annual inspection is carried out by a commission made up of the CLC trade association, Valorlux and the Environment Ministry). During the next five years two more sectors should be analysed in order to extend the project. The target of market share is put up to at least 57%. There will be no advertising printed on the "Eco-Sac". Participants were invited to withdraw their "own" multiple layer bags from the markets.	The system is self-supporting, and in addition, each year two studies are undertaken, financed by the sale of multiple-use carrier bags. 2002: 71m "single-use" plastic carrier bags 2004: 55m plastic carrier bags (Introduction of eco-bags) 2007: 11m plastic carrier bags (significant fall following introduction of a voluntary charge of €0.03 per bag) 2009: 6.5m plastic carrier bags In material terms, the quantity of single-use shopping bags was reduced from 454,4 tons (2006) to 53,4 tons (2009), which is a decrease of 89 % in waste material. The consumer survey of 2009 showed that most small purchases are no longer packed in a single-use shopping bag (24.4 %). Most customers now use reusable shopping bags (46 %).

	MS	Existing or planned legislation to avoid the use of plastic carrier bags	Voluntary initiatives	Achieved or planned outcomes
18	LV	The Latvian Environment Ministry states that each year around 20 tonnes of plastic bags must be disposed of. Taxes were therefore introduced on the use of plastic carrier bags which the retailer must pay. A tax rate of 0.80 LVL/kg is applied to plastic bags weighing more than 0.003 kg (the weight of 1 000 bags exceeds 3 kg). Since 2009, there are three categories of environmental levy: €0.02, €0.14 or €0.15 per plastic carrier bag, labelling (printed) on plastic carrier bags, and penalties for breaches of the conditions. In 2010 the law was amended again to prevent the use of carrier bags without handles to avoid the environmental levy.	Supermarkets now only offer plastic carrier bags for a charge.	No information on results has been found.
19	MT	Charges for plastic bags were introduced in 2005: Biodegradable: 0; Degradable: €0.14; Plastic: €0.16.		A decrease of 5m plastic bags was recorded in the first five months of 2005. Better traceability and monitoring of the production of plastic carrier bags has resulted.
20	NL	In the Netherlands there is no specific legislation regarding plastic carrier bags. Since 1 January 2008, packaging importers, producers and purchasers pay a packaging tax, with different tariffs for each type of material. For plastic packaging such as plastic carrier bags, the tariff is currently €0.47/kg. To encourage the use of biodegradable carrier bags, these have a tariff of €0.08/kg. Finally, plastic waste has been collected separately in all around 430 Dutch municipalities and towns since 1 January 2010.	Voluntary agreements in retail mean that supermarket customers have not received most types of plastic carrier bag for free since the mid-1990s and today pay around €0.20 per bag. In many shops there are "bag bins" where used bags can be deposited and used again by other customers. The retail sector recently announced that the smaller, translucent bags will not be offered free either.	The Dutch Environment Ministry could not give details of the overall amount of plastic carrier bags placed on the market, or in relation to possible trends since the introduction of the legislation. They simply emphasise that currently 50-70% of plastic waste in Dutch households is recovered, and the measures put in place in the Netherlands in the last 20 years have led to a reduction in the use of plastic carrier bags approaching the situation of Ireland.

	MS	Existing or planned legislation to avoid the use of plastic carrier bags	Voluntary initiatives	Achieved or planned outcomes
21	PL	Polish law does not have a specific regulation concerning plastic carrier bags. It is not planned to establish such regulations in future although a tax was considered during 2010.		
22	PT	Portuguese MPs have approved a legislative proposal to promote the following replacement measures: • Provision of biodegradable bags • Provision of reusable bags at affordable price • Environmental awareness of employees and consumers to promote the use of alternatives to plastic bags that are environmentally responsible; • Promotion of environmental awareness campaigns among consumers, aimed at the separation of waste at source and the appropriate referral within the existing legal systems management; • Adoption of one of the following economic mechanisms to encourage a reduction in the use of plastic bags: Levying a charge for the supply of plastic bags; Applying a discount on the price of goods sold to consumers desisting entirely from taking free plastic bags		The proposal sets a 90% reduction target for the supply and consumption of thin-walled plastic bags at wholesalers and supermarkets by 2017 against a 2007 baseline. There are intermediate targets of a 30%and 60% reduction by 2013 and 2015.
23	RO	Government Regulation No 25/2008 (published in Gazette No 628 of 29 August 2008) entered into force on 1 January 2009. Introduction of a tax of €0.5 for each non-biodegradable plastic carrier bag placed on the market. In 2010, the tax was cut to €0.25 and applies to bags from non-renewable sources.		There is no official data available to quantify the decline in use, though the Romanian association of Solid Waste Management reports that according to unofficial sources the decrease was 6-10%.

	MS	Existing or planned legislation to avoid the use of plastic carrier bags	Voluntary initiatives	Achieved or planned outcomes
24	SE	No measures planned. Responsibility currently rests with producers, who are responsible for collection and disposal. The producer pays a disposal charge which is recovered through the price of the bag. Plastic bags could (theoretically) be collected at plastic bottle collection points.	Supermarkets pass the cost of disposal on to the consumer: a plastic bag costs €0.17-0.30. Swedes like to buy €0.50 plastic bags (almost twice as expensive) which are printed with the logo of an NGO or a local sports team. That organisation then receives 50% of the proceeds. The Swedish retailer Hemköp has introduced bags made of renewable materials (sugar cane). The material can be recycled like conventional PE.	Pricing under the current regulation is intended to reduce the use of plastic bags and to support the use of multi-use fabric bags. However, no data on the results achieved has been found.
25	SK	In Slovakia there is no legislation on the avoidance of plastic carrier bags and none is currently planned.	Some food stores (Billa, Hypernova and Kaufland) no longer give out plastic bags for free, but sell them.	
26	SI	In Slovenia there are proposals to introduce a tax on plastic bags that would be passed on to customers: €0.50 for bags made from at least 5% plastic; €0.40 for bags made from more than 95% biodegradable material; €0.20 for bags made from more than 95% textiles.		

	MS	Existing or planned legislation to avoid the use of plastic carrier bags	Voluntary initiatives	Achieved or planned outcomes
27	UK	In the UK there are currently no legal requirements on avoiding the use of plastic carrier bags, only voluntary agreements between the ministry responsible (Defra) and leading supermarket and department store chains. However, the 2008 Climate Change Act provides conditions to allow the introduction of a general charge for plastic carrier bags. The Welsh Assembly Government plans to introduce a compulsory charge of 0.05 GBP (around €0.06) for "single-use" plastic bags in October 2011. Originally, the plan was to introduce a charge of 0.07 GBP from April 2011. However, these plans were changed after heavy lobbying from the British Retail Consortium (BRC) and others. It will finally enter into force in June 2013. The Scottish Government and Northern Ireland Assembly Government have been running an awareness-raising campaign for several years in order to reach the target of a significant reduction in plastic bag use, and are considering options to phase out free plastic bags in supermarkets. The Northern Ireland Assembly Government is currently consulting on proposals for a charge on carrier bags; the consultation closes on 12 October 2011.[105] Several towns and cities in the UK have also started to ban plastic shopping bags. The town of Modbury banned plastic bags in 2007.[106] Chesham launched the Plastic Bags Free Chesham Campaign in 2007.[107]	A voluntary agreement between Defra and 21 large retailers had a target of a 25% reduction in the harmful environmental impact of carrier bags between May 2006 and December 2008. The amount of virgin polymer was used as an indicator and reusable bags were included. The agreement included support for reuse of carrier bags, increased recycling and a reduction in the weight of carrier bags. A second agreement followed with the target of a 50% reduction by May 2009 compared to 2006. Seven supermarket chains participated. The following agreement for 2010 (between the Scottish Government, Defra, the Welsh Assembly Government, and the Northern Ireland Department of the Environment with the British Retail Consortium (BRC) and its supermarket members) continued with the idea of further reductions, but did not set out concrete targets. The agreements were mainly aimed at simple plastic carrier bags that customers can get for free in supermarkets. There are no penalties involved. A variety of methods were used to cut use: some such as Marks and Spencer charge for bags, while others put signs in car parks reminding customers to reuse their bags. Others began giving out bags only when requested by customers.	Defra statistics show that in May 2006, 870m thin bags were used in the participating supermarkets. In May 2009, this number was 452m and in May 2010 it was 475m. This is a reduction of around 45% compared to 2006, i.e. short of the target. Defra would like to achieve a 70% reduction in the long term. Further plans, such as the introduction of a charge for thin bags, are still an option according to Defra but are not currently being pursued. The devolved administrations in Scotland, Wales and Northern Ireland could however implement their own measures on this issue, such as those planned by Wales for October 2011. According to the WRAP, the following progress was made (figures include the overall number of carrier bags, not just thin bags: 2008: -26% 2009: -48% 2010: decreasing trend stops; use of thin plastic bags increases 5% compared to May 2009.

[105] See www.doeni.gov.uk/consultation_document_on_proposals_for_a_charge_on_single_use_carrier_bags.pdf.
[106] Vidal, J. (2007) "Welcome to Modbury. Just don't ask for a plastic bag" in The Guardian, available at: www.guardian.co.uk/environment/2007/apr/28/plasticbags.frontpagenews.
[107] Plastic Bags Free Chesham Campaign, see: www.cheshamintransition.org.uk/waste-recycling/plastic-bag-free-chesham.html.

Annex II: Description of types of plastic carrier bags

Plastic carrier bags can be made from by-products of oil and gas or they can be bio-based[108]. As they can come in different shapes and formats, there is no widely accepted definition to distinguish the different types of plastic carrier bags. However, for the purpose of this assessment, we consider:

- **"single-use" plastic carrier bags** as the thin-walled, lightweight plastic carrier bags distributed at the check and used to carry goods from supermarkets and other shops[109]. They are generally made of high density polyethylene (HDPE). They are single-use in the sense that they are usually only used for one shopping trip although they may be used again for some other purpose such as to contain or carry domestic waste. The most relevant parameter to distinguish between single-use and reusable plastic bags is related to their thickness; usually a single-use carrier bag has a thickness lower than 49 microns[110]. A precise definition would have to be determined in the context of a given policy proposal.
- **"multiple-use" or reusable plastic carrier bags** are made either from low density polyethylene (LDPE/LLDPE), which has a glossy appearance, or polypropylene (PP), a thermoplastic polymer that resembles canvas in appearance and is even more durable. They are usually sold at supermarket cash registers for a higher price than single-use ones (if ever charged) and some supermarkets will exchange them for a new bag without charge if they become damaged.
- **biodegradable plastic carrier bags** are generally made of bio-based materials and are capable of undergoing physical, chemical, thermal or biological decomposition under certain defined conditions. Compostable polymers are biodegradable and also meet certain conditions relating to the rate of biodegradation and impact on the environment.

A series of LCA studies have been performed on the sustainability of different carrier bags. The results however vary widely due to the variety of ways in which the methodology can be applied, the assumptions on the numbers of times bags can be reused, and the end of life options in specific regions. Littering is often not included as a parameter in LCAs. Therefore, it is extremely difficult to draw overall conclusions on the most environmentally friendly option as there is not an ideal type of bag for all impact categories.

Nevertheless, some aspects are commonly recognised in most LCAs. In terms of littering, single-use plastic carrier bags have the poorest score due to their lightweight and their little value. Although not as persistent in the environment, biodegradable carrier bags will only degrade within a reasonable time if disposed of and treated in appropriate conditions, such as

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[108] Bio-based plastics come in three main categories: natural polymers from renewable sources such as cellulose, starch and plant-based proteins; polymers synthesised from renewable sources, e.g. polylactic acid (PLA); and polymers produced by bacterial fermentation, e.g. polyhydroxyalkanoates (PHAs). Bio-based plastics can be either biodegradable or non-biodegradable (e.g. PLA).

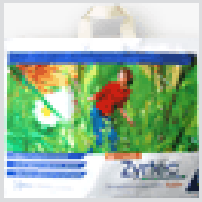
[109] Sacks and bags used for fresh food such as fruit and vegetables or in butcher shops are not included in this definition of single-use plastic carrier bags. They usually do not have handles and are placed inside other bags. They are generally excluded from plastic carrier bag policies for reasons of practicality (lack of suitable alternatives) or food safety (especially when used for raw meat).

[110] Figure based on existing experience at Member States and international level and endorsed by relevant stakeholders such as European Plastic Converters, European Plastic Films, Eurocommerce, European Association of Plastic Recycling and Recovery, Plastics Europe, European Bioplastics, European Plastic Recyclers.

biological waste treatment facilities. Therefore, they do not constitute a solution to the problem of littering.

Furthermore, there appears to be a general consensus on the fact that reuse is the key to reducing the environmental impacts of any kind of bag. Thick polymer-based reusable bags are considered to have a positive environmental balance, as long as they are used four times or more.

For a more detailed review of a number of LCA studies, please consult Annex VI.

Type	Materials	Weight (g)[111]	Image
Single-use non-biodegradable	Mostly HDPE, can also be LDPE	8.6	 Source: http://printed-bags.net/products/index.php?lg=en
Single-use biodegradable	Can be fully bio-based, usually a starch-polymer blend	8.9	 Source: myzerowaste.com  Source: www.alibaba.com
Multiple-use	Non-woven PP, woven PP	88.3	 Source: apaperblog.com/what-are-non-woven-bags  Source: www.momgoesgreen.com
	LDPE		 Source: http://printed-bags.net/products/index.php?lg=en

[111] Typical weights, estimated by BIO based on feedback from stakeholders.

Annex III: Stakeholder consultation on options to reduce the use of plastic carrier bags and options reinforce of the biodegradability requirements in the Packaging Directive – summary of comments

A public consultation was launched on 17 June 2011 via the EUROPA website in order to gather as comments and suggestions as from the stakeholders concerned.The consultation ran until 9 August 2011.

Stakeholders were consulted on the necessity and options to reduce the use of plastic carrier bags and on options to reinforce the biodegradability requirements in Directive 94/62/EC on packaging and packaging waste.

Respondents' profile

The stakeholder consultation attracted a vivid interest from citizens and stakeholders with 15538 contributions received. The respondents to the consultation can be grouped in several categories: citizens (15 056), public authorities (52), industry associations (151), NGOs (60), universities (35), others (184).

Contributions on options to reduce plastic carrier bags

A majority of respondents (78,4%) generally supported the need for EU measures to reduce the use of plastic carrier bags. All options put forward achieved high support with a preference for waste prevention targets (74.1%), followed by a ban of plastic carrier bags (70.6%) and pricing measures (61.8). Options for measures at EU level gained more support than options for measures at national level, especially among citizens and NGOs. A series of contributions, especially from the industry and retail sector, also pointed out the potential of voluntary schemes involving industry and retailers to deliver effective results. NGOs stressed the need for all players, all Member States to contribute equally to addressing the problem. However, it was generally agreed and emphasized by Member States public administrations' contributions that whatever measures will be adopted need not punish the countries that have already taken prevention actions and managed to achieve positive results.

In terms of exemptions from the measures to reduce plastic carrier bags, most respondents favoured exemptions for biodegradable plastic bags, followed by exemptions reusable plastic bags and equally opinions that no such exemptions should be granted at all. In view of possible exemption, the distinction between single-use carrier bags and reusable ones should be further clarified. NGOs and industry players tend to agree that the key to reducing environmental impacts of any carrier bags is re-use. It was pointed out that many single-use plastic carrier bags are in fact re-used for other purposes, e.g. bin liners. Industry players and retailers also highlighted to necessity to explore the need for further exemptions, such as for food safety reasons for example.

Generally, it was widely agreed that associating a value to the plastic bags, will encourage reuse and even appropriate disposal. A majority of stakeholders also agree that the rate of pricing needs to be high enough to ensure effective results, however certain reason that such measure should be best adopted at the level closest to the citizens to take into account the diversity of circumstances across the EU.

A significant number of respondents, mostly industry representatives, stressed the need to consider the "unintended consequences" of a reduction in use of plastic carrier bags, such as a market switch to other materials which may not deliver the desired environmental outcomes.

It was also pointed out that the addressing litter will require a combination of instruments starting from awareness raising, use of economic instruments that give of value to plastic

bags, promotion of more resource efficient alternatives, appropriate collection and waste management infrastructure.

Contribution to the IA

Following the consultation, the option of a voluntary commitment of the retail sector was added for further assessment as indicated by a significant number of contributions. Also in defining the policy options, specific attention was given to finding solutions so as not to punish Member States that have already taken prevention measures by means of setting a prevention target per capita on the basis of an average of best performing Member States. A number of contributions pointed out to the need to define single-use plastic carrier bags versus reusable one. On the basis of some data on certain national and international experiences and of discussions with producers and retailers, an attempt was made to provide some parameters for distinction. A precise definition would have to be further determined in the context of a given policy proposal. The environmental performance of different carrier bags was analysed by means of a review of exiting literature. Generally, the contributions from stakeholders fed into the analysis of impacts, especially with concrete data on competitiveness and employment.

Annex IV: Plastic carrier bag flows

Table 18: Summary of plastic carrier bag flows in EU, 2010 and 2020 (Mt)[112]

	Production		Exports		Imports		Consumption		End-of-life						Litter	
									Recycling		Energy recovery		Landfill			
	2010	2020	2010	2020	2010	2020	2010	2020	2010	2020	2010	2020	2010	2020	2010	2020
Single-use plastic bag	**0.39**	**0.42**	**0.02**	**0.03**	**0.53**	**0.65**	**0.75**	**0.84**	**0.05**	**0.08**	**0.29**	**0.33**	**0.37**	**0.42**	**0.04**	**0.05**
Single-use non-biodegradable	0.38	0.39	0.02	0.03	0.51	0.59	0.73	0.78	0.05	0.07	0.28	0.31	0.36	0.39	0.04	0.05
Single-use biodegradable	0.01	0.03	0.00	0.00	0.02	0.06	0.02	0.06	0.00	0.01	0.01	0.02	0.01	0.03	0.00	0.00
Multiple-use	**0.73**	**0.72**	**0.03**	**0.03**	**0.24**	**0.35**	**0.87**	**0.93**	**0.06**	**0.09**	**0.34**	**0.36**	**0.43**	**0.46**	**0.02**	**0.02**
Total	**1.12**	**1.13**	**0.05**	**0.06**	**0.76**	**0.99**	**1.61**	**1.77**	**0.11**	**0.17**	**0.63**	**0.69**	**0.80**	**0.83**	**0.06**	**0.0.7**

[112] BIO analysis based on available data and stakeholder estimates. Some figures were updated with Eunomia data, as their estimates were deemed more accurate: Imports (Bio IS trends are maintained to 2020; Litter rates (Bio IS trends are maintained)

Annex V: Methodological considerations on setting the level of a prevention target

A prevention target should be ambitious enough to address the unsustainable rate of plastic bag consumption in the EU, while taking account of what has proved achievable in those Member States that have already taken action. Section 3.2.3 describes the most effective way to reduce the consumption of plastic bags. In this annex we describe the rationale used to reach that conclusion. In what follows below, these general considerations are used to assess and compare three basic methodologies considered to set a prevention target:

1. Set an (identical) target in relation to the annual consumption rate per capita in each individual Member State (e.g. 80% reduction of the current use of single-use plastic bags in each Member State). This option would punish Member States that have already significantly reduced the use of single-use plastic carrier bags (such as Finland and Ireland: 4 bags per c/a), while Member States with high current consumption rates (over 450 bags c/a) would still continue witnessing high absolute numbers of single-use plastic bags consumed.
2. Set a weight-based reduction target (e.g. set a maximum of kg of single-use plastic carrier bags per capita). This option would run the risk of unintended market developments in the form of thinner bags, which would result in an increase of the absolute number of such bags placed on the market[113]. As thinner plastic bags are less likely to be re-used and are more prone to being littered, an increase in their absolute numbers is contrary to the objective pursued by this initiative.
3. Set a common reduction target in relation to the *EU average* consumption of single-use plastic carrier bags annually consumed per capita. An effective reduction target needs to be balanced: a target set too high, in line with the achievements of the EU's top performers (Finland and Denmark, which both have a national per capita consumption of 4 single-use plastic bags), would seem unrealistic for poorer performers. On the other hand, a target set too low (i.e. aligning it to the average EU consumption, 176 single-use plastic bags; see Table 4 in section 2.4.2 above) would not be ambitious enough to drive effective prevention measures across the EU, thus undermining the core objective of this initiative.

   A middle ground option would be to base the reduction target on the average current (2010) consumption of the best 25% performing Member States (i.e. Finland, Denmark, Luxemburg, Ireland, Austria, Germany, the Netherlands, and France), which together have an average of 32 single-use plastic bags consumed per capita, accounting for 18.3% of the baseline average EU consumption rate. It would thus result in a reduction of approximately 80% of single-use plastic bag consumption, which for the purpose of this impact assessment will be as the preferred reduction target (as reflected in figure 2 below). An 80% reduction rate amounts to an absolute number of 35 single-use plastic bags consumed per capita, per annum, in all Member States. All Member States are deemed able to reach this target as it only relates to a category of plastic carrier bags (single-use ones) for which consumption can be reduced without significant impacts on consumers, as more sustainable, re-usable alternatives are already available.

[113] Ecorys, 2011. The role of market based instruments in achieving a resource economy. This assumption is supported by the trend observed in Denmark after the introduction of a plastic bags tax of 22 DKK per kg.

Annex VI: Overview LCA studies on the environmental impacts of different carrier bags

A number of LCAs of plastic carrier bags are available. The results vary widely due to the variety of ways in which the method can be applied: functional unit, system boundaries, the country concerned, etc. Assumptions as to how many times carrier bags are reused and the end-of-life options in a particular country particularly affect the results. Several existing LCAs are presented in the table below. In the rest of this section, references to these studies are indicated using the numbers displayed in the first column.

Table 19: Main LCAs cited

ref	Organisation	Year	Title
1	UK Environment Agency	2011	Life cycle assessment of supermarket carrier bags: a review of the bags available in 2006
2	Boustead Consulting & Associates	2007	Life Cycle Assessment for Three Types of Grocery Bags – Recyclable plastic; Compostable, Biodegradable Plastic; and Recycled, Recyclable Paper
3	James, K. and T. Grant, Centre for Design at RMIT University	2005	LCA of Degradable Plastic Bags
4	PWC/Ecobilan	2004	Impact assessment of Carrefour plastic carrier bags, Carrefour, France

The environmental impact (excluding litter) of all types of carrier bag[114] is dominated by resource use and production (1) (Figure 1). The electricity consumed to produce 1 000 conventional HDPE bags is 6.151 kWh (22.144 MJ) and 418.4 g of waste are generated. The production of plastic carrier bags can also be a significant source of photochemical oxidants when the inks used contain solvents. The fact that the production of materials is the most impacting life-cycle phase for all bags means that for the same technical properties, any reduction of the mass per bag and any reuse will reduce the environmental impact.

[114] The bags studied were: single-use HDPE, single-use HDPE with a pro-degradant additive, starch-polyester blend biodegradable, paper, "bag-for-life" LDPE, durable polypropylene (PP) and cotton. It was assumed that all HDPE bags are imported to the UK from China.

Annex VII: Relative contribution of different environmental impacts of a HDPE bag

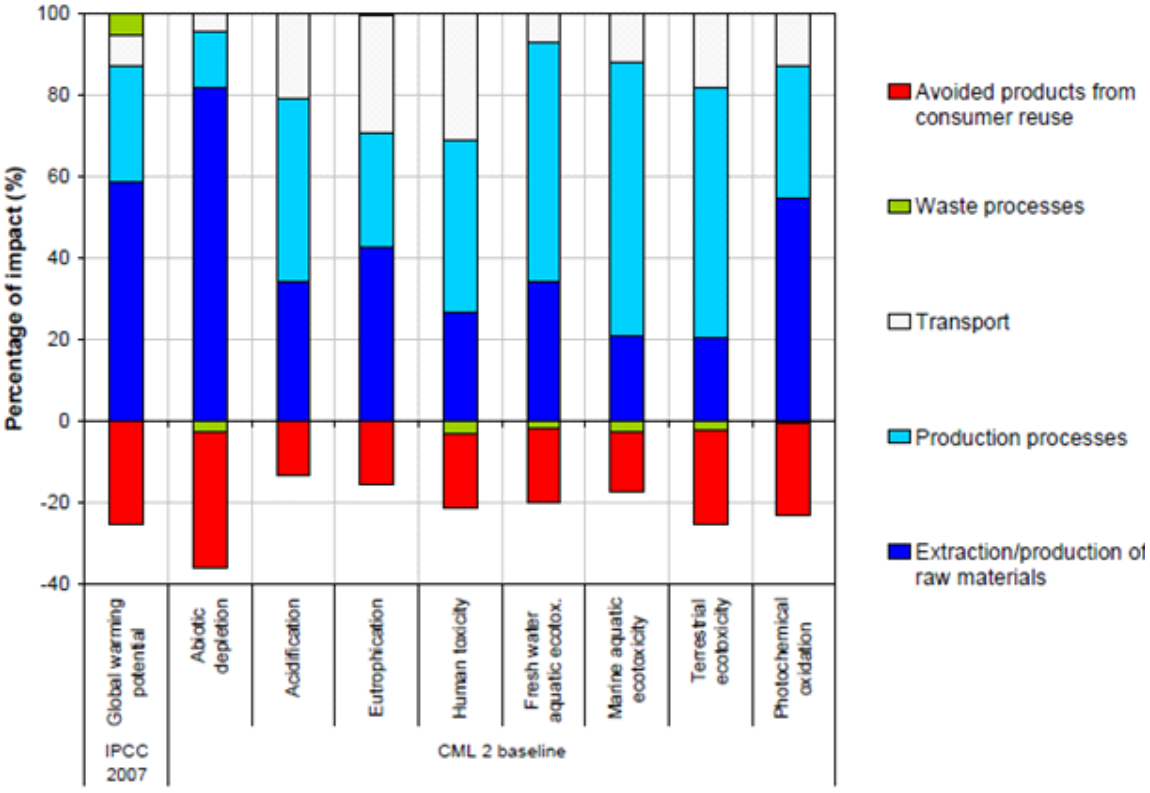


Figure 3: Relative contribution of different environmental impacts of a HDPE bag

Annex VIII: Employment modeling [115]

A. Employment intensity assumptions

Taking the figures on production levels and employment above, we outline below the likely changes in levels of employment related to changes in levels of EU production. Annual EU production is taken to be 1 124 074 tonnes of plastic carrier bags.[116] It is further estimated that there are 15,000-20,000 workers[117] or as many as 50,000 workers if the entire supply chain is included.[118] We make the assumption that they are FTEs (Full Time Equivalents).[119] Assuming a mid-point estimate of 17,500 employees working on plastic carrier bag production in the EU, and dividing this figure by annual production, **the number of people employed per tonne produced is 0.015**.[120] This equates to one person employed for every 64.23 tonnes of plastic carrier bags produced. **We do not distinguish between the employment intensity of LDPE and HDPE production as there is insufficient data available to make such a distinction.** In the absence of further information **we assume the same employment intensity for bin liners, of 0.015 people employed (FTE) per tonne produced**.

It has not been possible to obtain figures for EU-wide paper bag production or employment.[121] However, a rough estimate was obtained from using publicly available data relating to a Scottish manufacturer of paper bags, which employs 210 staff and produces 50 million bags per week.[122] Given an average paper bag weight of 55.2g, this equates to 143520 tonnes of production a year. This equates to one person for every 683 tonnes of paper bags produced. **The number of people employed per tonne of paper bags produced therefore is assumed to be 0.0015,** though it is recognised that the dependence on a single source is less than ideal. The assumptions on employment intensity are summarised in Table 20.

Table 20: Employment Intensity of EU Production by Bag Type (FTE per tonne)

Bag Type	Employment Intensity (FTE per tonne)
HDPE	0.0150
LDPE	0.0150
Paper	0.0015

[115] Eunomia, 2012. (p.13 Section 3.2 on Impacts on Plastic Bag Producing Companies, Employment and Profits, and p.41, Annex 3.0).

[116] Bio Intelligence Service (2011) Assessment of Impacts of Options to Reduce the Use of Single-use Plastic Carrier Bags, Final Report to European Commission – DG Environment, 12 September 2011

[117] Personal communication between BIO IS and Alber & Geiger

[118] EuPC (2006) *EU duties on plastic bag imports applauded by EuPC,* press release available at http://www.europeanplasticfilms.eu/docs/antidumping.pdf

[119] This will have the effect of delivering a higher estimate of job losses than if we assumed a mix of FTE and part-time.

[120] It is not clear whether some of these are part time workers. In the absence of further information we simply assume 17,250 full time equivalents (FTEs).

[121] We have contacted CEPI and EuroSac but no information was available.

[122] See http://www.smithandersonpackaging.co.uk/. Again, in the absence of further information we assume that the 210 staff work full time.

B. Results

The effect on employment of the different options is shown in the table 4 below . The assumptions relating to employment are outlined in the next sub-section, below.

Table 21: Total number of people employed in the manufacture of single-use plastic carrier bags in the EU (thousands).

	2012	2013	2014	2015	2016	2017	2018	2019	2020
Baseline	4.9	5.1	5.2	5.4	5.5	5.6	5.7	5.8	6.0
Ban	4.9	5.1	5.2	0.3	0.4	0.4	0.4	0.4	0.4
Voluntary Commitment	4.9	5.1	5.2	2.6	2.7	2.7	2.7	2.8	2.8
Prevention Target	4.9	5.1	5.2	1.3	1.3	1.3	1.3	1.3	1.3

All options result in a decrease of employment in the manufacture of **single-use plastic bags**. There is, however, an increase in the number of people employed in the manufacture of **multiple-use plastic carrier bags, paper bags, and bin liners**. This increase relative to the baseline is shown in Table 225.

Table 22: Increase in the number of people employed in the manufacture of multiple-use bags, paper bags and bin liners in the EU (thousands)

	2012	2013	2014	2015	2016	2017	2018	2019	2020
Baseline	-	-	-	-	-	-	-	-	-
Ban	-	-	-	3.7	3.7	3.8	3.8	3.9	4.0
Voluntary Commitment	-	-	-	2.0	2.1	2.1	2.2	2.2	2.3
Prevention Target	-	-	-	3.0	3.1	3.1	3.2	3.2	3.3

Table 23: Net change in the number of people employed in the manufacture of all bags in the EU (thousands)

	2012	2013	2014	2015	2016	2017	2018	2019	2020
Baseline	-	-	-	-	-	-	-	-	-
Ban	-	-	-	-1.3	-1.4	-1.5	-1.5	-1.6	-1.6
Voluntary Commitment	-	-	-	-0.7	-0.7	-0.8	-0.8	-0.8	-0.9
Prevention Target	-	-	-	-1.1	-1.1	-1.2	-1.2	-1.3	-1.3

Annex IX: Profits to Manufacturers[123]

A. Nature of switches from single use plastic bags to other types of bags

Evidence was sought regarding the nature of switches that consumers could be expected to make when policies are introduced which restrict the use of Single-use plastic bags.

Table 24: Single-use plastic bags replacement ratio

For every 1000 single-use plastic bags avoided	Other types of bags used
LDPE (multiple-use plastic bags)	29
Bin liners	273
Other multiple use-plastic bags	4
Paper bags	127
For every 1000 single-use plastic bags avoided	**433 other types of bags used (of which 302 made of plastic)**

The only source of data which provided relevant bag consumption numbers was from WRAP, for the UK Carrier Bags Voluntary Agreement. Although based on only UK supermarkets, this still provides some basis for understanding how many bags of other types are used to substitute for Single-use plastic bags when analysed alongside Household Expenditure Data. Using this evidence suggests **that for every 1000 single-use plastic carrier bags avoided, 29 LDPE bags are used, and 4 other multiple-use bags such as those made from cotton are used**. This assumption is used in analysing the impacts of the different policy scenarios proposed.

It is not considered likely that supermarkets will switch to paper bags due to their expense and relative lack of strength, although it is expected that other sectors will switch to greater use of paper bags if these are not made the subject of the policy, and this has, indeed, been the experience in Ireland. However, the extent to which other sectors will switch to paper bags rather than multiple-use bags is not clear. It was therefore assumed that half (50%) of the plastic bag consumption in non-supermarket sectors will be displaced by paper bag consumption, and half by multiple-use bags. As per the BIO IS assumption[124], 32% of single-use plastic carrier bag consumption occurs in non-supermarket sectors. Therefore, at a capacity substitution rate of 79.6%[125], **127 paper bags are assumed to be consumed for every 1000 Single-use plastic bags avoided** (32% x 50% x 79.6% x 1000 = 127).

In light of the fact that no data could be gained to help give a sensible estimate of switches to Single-use plastic bags-replacement bin liners used in the home, an approach based on interpretation of figures from an LCA study was adopted. The study included data from a 2005 WRAP study which surveyed the various forms of 'second use' for single-use plastic

[123] Eunomia, 2012. (p.13 Section 3.2 on Impacts on Plastic Bag Producing Companies, Employment and Profits, and p.41, Annex 3.0).

[124] Bio Intelligence Service Report 2011.

[125] Environment Agency (2011), *Evidence: Life Cycle Assessment of Supermarket Carrier Bags: A Review of the Bags Available in 2006*, Environment Agency February 2011.

bags. It stated that of all single-use plastic carrier bags consumed, 76% were used again, of which 53% were put to use as bin liners.[126] Based on this we assume that per 1000 Single-use plastic bags reduction, 403 (76% x 53% = 40.3%) equivalent capacity bin liners will be required. The equivalent capacity will be that stated in the EA LCA study of 29 litres,[127] so **we assume a consumption increase of approximately 273 bin liners will occur for every 1000 Single-use plastic bags avoided**.

It is evident from the examples available that reliable data on the nature of such switches (i.e. which bags are used as replacements for single-use plastic bags) are difficult to obtain. Typically figures are provided by retailers, and relate only to reductions in percentage terms.

B. Price of different types of bags

Table 25: Unit Costs to Retailers (per 1000 bags)

Bag Type	Unit Cost (per 1000 bags)[128]
Single-use non-biodegradable plastic (HDPE) bag	*€ 8.31
Multiple-use non-biodegradable plastic (LDPE) bag (Bag for Life)	*€ 17.87
Single-use Biodegradable Plastic Bag	*€ 82.87
Single-use Paper Bag with Handles	*€ 97.58
Woven Polypropylene (PP) bags	**€ 452.73
Cotton	*€ 1 111.25
Jute	***€ 1 161.62
Notes * Costs taken from http://www.polybags.co.uk/ ** Data taken from AEA Study for the Welsh Government[129] *** Costs taken from http://www.midpac.co.uk/jute-bags/natural-jute-bags	

[126] Environment Agency (2011), *Evidence: Life Cycle Assessment of Supermarket Carrier Bags: A Review of the Bags Available in 2006*, Environment Agency February 2011.

[127] Environment Agency (2011), *Evidence: Life Cycle Assessment of Supermarket Carrier Bags: A Review of the Bags Available in 2006*, Environment Agency February 2011.

[128] All figures converted to Euros from GBP. Inflation has been accounted for with historical 2009 figures using latest HM Treasury GDP Deflator data. Converted at a £:€ exchange rate of 1:1.27650, ft.com currency converter, 26th July 2012.

[129] AEA Technology plc (2009), *Welsh Assembly Government, Single Use Bag Study: Final,* Report for the Welsh Assembly Government August 2009.

C. Profits to manufacturers modelling results

Eunomia 2012 was not been able to establish any evidence relating to the profitability of the bag manufacturing sector in the EU. Therefore, **in the absence of any other information, we make the assumption in the modelling that the profit to manufacturers is approximately 10% of the price paid by retailers (or 9.09% of the price paid by consumers in the case of bin liners, on the assumption that retailers mark up prices by 10%).** We report this profit for EU-based manufacturers for all bag types.

Table 26: Profits to EU Manufacturer from Single-use Plastic Carrier Bags (€ millions)

	2012	2013	2014	2015	2016	2017	2018	2019	2020
Baseline	€ 124	€ 138	€ 142	€ 147	€ 152	€ 156	€ 161	€ 165	€ 170
Ban	€ 124	€ 138	€ 142	€ 1	€ 1	€ 1	€ 1	€ 1	€ -
Voluntary Commitment	€ 124	€ 138	€ 142	€ 70	€ 72	€ 73	€ 74	€ 75	€ 77
Prevention Target	€ 124	€ 138	€ 142	€ 27	€ 28	€ 28	€ 29	€ 29	€ 30

There is, however, an increase in the profits associated with the manufacture of alternative bags including paper bags, and also from the increase in sales of bin liners. These increases are shown in Table 27.

Table 27: Increase in Profits to EU Manufacturers from Multiple-use Bags, Paper Bags and Bin Liners (€ millions)

	2012	2013	2014	2015	2016	2017	2018	2019	2020
Baseline	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -
Ban	€ -	€ -	€ -	€ 214	€ 219	€ 222	€ 226	€ 230	€ 234
Voluntary Commitment	€ -	€ -	€ -	€ 118	€ 122	€ 125	€ 128	€ 131	€ 135
Prevention Target	€ -	€ -	€ -	€ 175	€ 180	€ 183	€ 187	€ 190	€ 194

There is therefore an increase in profits to EU bag manufacturers relative to the baseline under all scenarios, as shown in Table 28.

Table 28: Net Change in Profits to EU Bag Manufacturers (€ millions)

	2012	2013	2014	2015	2016	2017	2018	2019	2020
Baseline	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -
Ban	€ -	€ -	€ -	€ 68	€ 67	€ 67	€ 66	€ 65	€ 64
Voluntary Commitment	€ -	€ -	€ -	€ 41	€ 41	€ 42	€ 42	€ 41	€ 41
Prevention Target	€ -	€ -	€ -	€ 55	€ 56	€ 55	€ 55	€ 54	€ 54