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Second Regional Meeting on Marine Litter Best Practices
(jointly organized with the MARLICE 2019 International Forum on Marine Litter and Circular Economy)

Seville, Spain, 8-10 April 2019

Agenda item 3: Regional Guidelines for Selected Marine Litter Prevention and Reduction measures

Background elements for the guidelines on phasing out single-use plastic bags: review of international experiences and alternative options

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List of Abbreviations / Acronyms and definitions

Bag-use profile	Proportion of bag types used at retail venues
EPR	Extended Producer responsibility
GES	Good Ecological Status
GHG	Green-house emissions
HDPE	High-density polyethylene
LCA	Life-cycle assessment
LDPE	Low-density polyethylene
MENA region	Middle-East North-Africa region
PP	Polypropylene
SCP/RAC	Regional Activity Centre for Sustainable Consumption and Production
SUPB	Single-use plastic bags: high-density polyethylene (HDPE) bags designed to be used once. This is usually determined by the width or grammage. For the purpose of this report, the focus is on those that have handles, generally used as shopping bags.

Note by the Secretariat

The Eighteenth Ordinary Meeting of the Contracting Parties to the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean ("the Barcelona Convention"), held in Istanbul, Turkey, from 3 to 6 December 2013, adopted Decision IG.21/7 related to the Regional Plan on Marine Litter Management in the Mediterranean in the Framework of Article 15 of the Protocol for the Protection of the Mediterranean Sea against Pollution from Land-based Sources and Activities (LBS Protocol) to the Barcelona Convention, hereinafter referred to as the Marine Litter Regional Plan (UNEP(DEPI)/MED IG.21/9).

Furthermore, according to Article 14 of the Marine Litter Regional Plan, the Secretariat in cooperation with relevant international and regional organisations, shall prepare specific guidelines taking into account where appropriate existing guidelines, to support and facilitate the implementation of measures provided for in articles 9 and 10 thereof. Subject to availability of external funds such guidelines shall be published in different Mediterranean region languages.

The MAP Programme of Work (PoW) 2018-2019 adopted by the Twentieth Ordinary Meeting of the Contracting Parties to the Barcelona Convention and its Protocols, held in Tirana, Albania, from 17 to 20 December 2017, contains several activities addressing marine litter including the implementation of the EU funded Marine Litter MED Project which has specific outputs on the development of a set of technical guidelines in the framework of Article 14 of the Regional Plan.

The present document has been developed within the EU-funded Marine Litter Med project. A first draft version was submitted to national experts for revision at the occasion of the Regional Meeting on Marine Litter Best Practices, 9-10 October 2018, Izmir, Turkey. After the comments received, this version serves as a background information document for the document UNEP/MED WG.466/5 Guidelines to Phase out Single-Use Plastic Bags in the Mediterranean.

Executive Summary

1. Single-use plastic bags (SUPB) rank among the most commonly found marine litter items in the Mediterranean Sea. The Regional Plan on Marine Litter Management in the Mediterranean, adopted by all the Contracting Parties to the Barcelona Convention, urges national authorities, among others, to take action to reduce SUPB.

2. The proposed guidelines intend to provide a common understanding of the alternative measures that can be considered in developing the most appropriate legal and regulatory framework to introduce the non-single use of plastic bags in the signatory countries of the Barcelona Convention. While these guidelines focus on the full process of decision making, from absence of actions to reduce SUPB to a comprehensive programme to tackle them, they can also be used to complement and strengthen actions in countries where the process is on-going. In fact, experiences show loopholes and obstacles in different countries and these guidelines intend to contribute in overcoming them.

3. The guidelines build on the review and lessons learnt of international cases which make use of specific policy measures, as well as the context in the Mediterranean region. It particularly focuses on the effect in terms of change in the use of SUPB, as well as socioeconomic side effects. Different policy options may attain similar drastic reductions as proven through the experiences review. This provides flexibility to adapt to national contexts. It is important to note that economic impact of reducing/banning SUPB does not seem to be crucial for any of the cases reviewed. On the contrary, some of them consider this as an opportunity to develop internal economic activity.

4. The report contains a specific chapter on alternatives, often overlooked, but considered a key element to succeed in phasing out SUPB without negative impact on communities. It includes a discussion on biodegradable plastic bags, emphasizing their limitations as solution to plastic pollution, especially in developing countries.

5. Based on these elements, a 10-step-by-step guide is provided to phase out SUPB in the Mediterranean region. Countries that already implemented measures in this regard may find complementary and supportive actions.

1. Introduction

1.1. The scope of this report

6. Single-use plastic bags (SUPB) rank among the most commonly found marine litter items in the Mediterranean Sea and coast (International Coastal Clean-up, ICC 2014[1]). Littered bags pose threats not only to biodiversity but also to the society, by hampering economic development and affecting public health. The Regional Plan on Marine Litter Management in the Mediterranean[2], adopted by all the Contracting Parties to the Barcelona Convention, urges national authorities, among others, to take action to reduce SUPB including through voluntary agreements and fiscal and economic instruments. Action has already been taken in a number of countries in the Mediterranean, including the total ban of certain types of plastics or certain applications of single-use plastics.

7. With the ultimate objective of achieving the Good Ecological Status[3] (GES) of the Mediterranean Sea, the EU-funded Marine Litter Med project[4] (in short, ML Med project) addresses the reduction of single-use plastic bags in MENA countries as one of the key common measures provided for in the Regional Plan on Marine Litter Management in the Mediterranean. Within this project, technical assistance will be provided to five countries to develop where appropriate the required legal and regulatory framework to introduce the non-single use of plastic bags and EPR for plastic bags.

8. The proposed guidelines intend to provide a common understanding of the alternative measures that can be considered in developing the most appropriate legal and regulatory framework to introduce the non-single use of plastic bags in the signatory countries of the Barcelona Convention. Notwithstanding, it is important to acknowledge the different baseline in each of the countries. The EU Member States have already taken action driven by the Directive 2015/720 on the reduction of the consumption of lightweight plastic carrier bags. Non-EU countries such as Morocco, Tunisia and Israel have taken important regulatory, fiscal or voluntary measures, or are in the process of drafting. Other countries have not started the process yet but have expressed their intention and commitment to do so.

9. While these guidelines focus on the full process of decision making, from absence of actions to reduce SUPB to a comprehensive programme to tackle them, they can also be used to complement and strengthen actions in countries where the process is on-going. In fact, experiences show loopholes and obstacles in different countries and these guidelines intend to contribute in overcoming them.

1.2. The issue: single-use plastic bags, an overview

10. Plastics are one of the main materials of the modern economy due to their multiple properties, applications and low cost. Their use has been growing exponentially since the 50s and it is expected to double in the next 20 years[5].

11. Plastic packaging, which includes plastic carrier bags, is the plastic's largest application, representing 26% of the total volume at global level[6]. It is estimated that roughly 5 trillion plastic

[1] Ocean conservancy /International Coastal Cleanup (ICC, 2014), (http://www.oceanconservancy.org/).
[2] UNEP/MAP (2013). Regional Plan for the Marine Litter Management in the Mediterranean https://www.cbd.int/doc/meetings/mar/mcbem-2014-03/other/mcbem-2014-03-120-en.pdf
[3] UN Environment – Mediterranan Action Plan (2018). Ecosystem Approach. http://web.unep.org/unepmap/who-we-are/ecosystem-approach
[4] http://web.unep.org/unepmap/what-we-do/projects
[5] World Economic Forum, Ellen MacArthur Foundation and McKinsey & Company (2016). The New Plastics Economy — Rethinking the future of plastics. http://www.ellenmacarthurfoundation.org/publications
[6] World Economic Forum, Ellen MacArthur Foundation and McKinsey & Company (2016). The New Plastics Economy — Rethinking the future of plastics. http://www.ellenmacarthurfoundation.org/publications

carrier bags are consumed worldwide each year. That is almost 10 million plastic carrier bags per minute[7]. The main issue is that 95% of worldwide plastic packaging (including plastic bags) value is lost to the economy after a short first use, which poses disastrous negative effects for people and nature[6].

12. SUPBs are defined in the literature as recyclable high-density polyethylene (HDPE) bags designed to be used once. SUPBs rose to popularity for use in retail venues in the 1970s and remain the most popular grocery bag choice around the world in the absence of regulatory measures[8].

13. Their product-to-waste flow, represented in the figure below, begins with the conversion of fossil fuels (but also a very low fraction from organic sources) into polymers used to manufacture all plastic. The window of consumer use for SUPBs averages only 20 minutes[9] after which it can follow several paths. When disposed in the environment, they can take between 400 and 1000 years to break down. A proportion of SUPB are indeed recycled, but this fraction is very low due to low profitability (from 1 to 5%, according to various sources[10] [11]). Often these bags are later reused as bag linen and they generally end up in landfills or incineration plants. When it comes to the cycle in MENA and Balkans countries, there are some further considerations to be made about the waste management. It is important to note that sorted household waste, especially for plastic bags, is negligible. Recycling industry is not well developed and hence recycling might be inexistent (with exceptions often provided by green entrepreneurs). Finally, unsorted domestic waste often leaks into the environment due to insufficient collection.

[7] UN Environment (2018). The state of plastics. World Environment Day Outlook 2018. http://wedocs.unep.org/bitstream/handle/20.500.11822/25513/state_plastics_WED.pdf
[8] Green Cities California (2010). Master Environmental Assessment on Single-Use and Reusable Bags. ICF International. https://www.smgov.net/uploadedFiles/Departments/OSE/Task_Force_on_the_Environment/TFE_2010/03%2015%2010_Attachment%205_MEA.Single%20Use%20Bags.Ex.Summary.pdf
[9] Equinox Center (2013). Plastic Bag Bans: Analysis of Economic and Environmental Impacts. https://energycenter.org/sites/default/files/Plastic-Bag-Ban-Web-Version-10-22-13-CK.pdf
[10] Wate Management (n.d.). Bags by the Numbers http://www.wmnorthwest.com/guidelines/plasticvspaper.htm
[11] USEPA (2006). Municipal solid waste in the United States: facts and figures. http://www.epa.gov/epaoswer/non-hw/muncpl/pubs/mswchar05.pdf

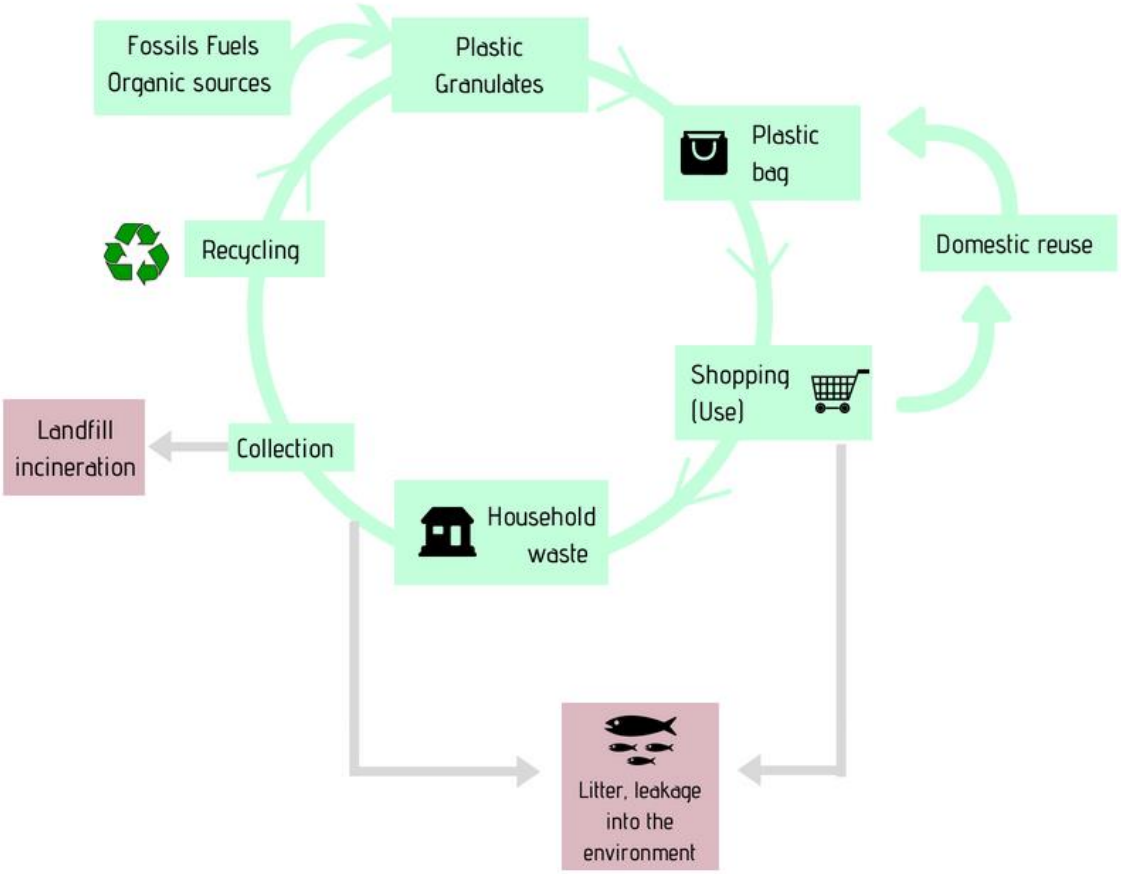

Figure 1. SUPB product-to-waste flow in MENA countries. Source: Own elaboration

14. From the figure above one can deduce several impacts of plastic bags end of life. Waste disposed in landfill or incinerated involves economic costs which fall under tax payers. When plastic leaks into the environment, the main problem might be regarded as its main feature: durability. The long process to mineralize involves impact not only in the environment, but also socioeconomic effects such as the loss of aesthetic values which may be linked to economic activities. When it comes to the marine environment, the process is even longer degrade is even longer. Plastics have been reported to negatively impact between 180 and 660 species of animals, including birds, fish, turtles, and marine mammals, with a portion of these plastics presumably comprised of plastic bags[12]. Marine animals may confuse bags for food leading to ingestion, blocked digestive tracts and eventual death. Plastic breaks down in smaller pieces in the oceans, down to micro- and nano-plastics. There is evidence that these particles are being uptaken by marine organisms, which effects in terms of toxicology still remain poorly known, especially with regards to impact on human health[13].

1.3. Responses to single-use plastic bags

15. Single-use plastic bags have become an icon of plastic pollution and the fight against it, and thus around 60 countries have introduced policies to tackle them14. At the regional level, the

[12] UNEP (2014). Plastic Debris in the World's Oceans.
http://www.unep.org/regionalseas/marinelitter/publications/docs/plastic_ocean_report.pdf
[13] Gallo F. et al (2018). Marine litter plastics and microplastics and their toxic chemicals components: the need for urgent preventive measures. Environ Sci Eur. 2018; 30(1): 13.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5918521/
[14] UN Environment (2018). The state of plastics. World Environment Day Outlook 2018.
https://www.unenvironment.org/es/node/21843

Barcelona Convention, through the Regional Plan on Marine Litter Management in the Mediterranean, specifically considers this marine litter item.

16. The guidelines will be focusing in four broad categories of policies that have been already put in place in different parts of the world, and include:

a. Economic instruments (levies on consumers, subsidies)
b. Voluntary agreements with retailers
c. Legal bans

17. Some examples are discussed in detail in the following chapter in order to draw lessons learnt that could be of use for the Mediterranean countries in the last chapter.

2. Options for phasing out the use and production of single-use plastic bags – Lessons learnt from international experience

18. According to international experience, the main potential strategies are illustrated through concrete experience in different countries and regions. In cases where data exists, a more detailed analysis of the effects is depicted, considering parameters such as bag-use profile, economic and social effects[15].

2.1. Strategic assessment of policy options

19. Before exploring the different options, it is interesting to review the work that was undertaken at the EU level to assess which policy option would be adopted, what can be considered as a strategic assessment. This process was completed with the adoption of the Directive (EU) 2015/720 of the European Parliament and of the Council of 29 April 2015 amending Directive 94/62/EC as regards reducing the consumption of lightweight plastic carrier bags[16].

20. Consultancy BIO Intelligence Service conducted a study for the EC in order to decide on action to reduce the consumption of lightweight plastic carrier bags[17].

21. The study explored several policy options, namely:

a. Baseline scenario, which means no additional policy measure but taken into account those decided by Member States before that date.
b. Option 2: Voluntary commitment of a significant share of the retail sector not to provide single-use plastic carrier bags. For the purpose of the study, it is assumed that 46,5 billion SUPB are distributed by largest retailers grouped under the Retail Forum, representing 55% share of the European retail market.
c. Option 3: Setting an EU level prevention target for single-use plastic carrier bags. The target refers to SUPB per person and it would be set at EU level. Then, Member States would select and implement appropriate measures (similar to a ban) to induce the necessary behaviour change by industry, retailers and consumers. The level of ambition is set in 80% reduction of SUPB in the EU by 2020 compared to 2010. This means 35 SUPB/person/year in 2020.
d. Option 4: Introduction of a legal requirement for Member States to take measures to ensure that plastic carrier bags are not provided for free to end users. Member States would be free to set the price level and to use the funds to enhance the environmental benefit by ring-fencing funds for litter clean-up activities, recycling and other

[15] For further information and examples, it is recommended to read the document *Plastic bags: inventory of political instruments. A review by ACR+ and ACR+ MED (2013)*. Some of the examples below are also reported in that document.

[16] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32015L0720

[17] BIO Intelligence Service (2011). Assessment of impacts of options to reduce the use of single-use plastic carrier bags. Final report prepared for the European Commission – DG Environment http://ec.europa.eu/environment/waste/packaging/pdf/report_options.pdf

environmental projects. However, this option was later discarded by the EC because it would require a unanimous endorsement of the Council of Ministers, which was highly unlikely. Further challenges related to the level of the tax and the administrative arrangements related to its enforcement[18].

e. Option 5: EU ban on single-use carrier bags. This option requires a change in the legal basis of the Packaging Directive.

22. The report includes a discussion on pros and cons of the different options as it follows:

Policy option	Pros	Cons
Option 1: Baseline Scenario	• No legal or administrative changes or costs associated with revising current legislation.	• Environmental, economic and social impacts associated with plastic carrier bag use in the EU would persist and/or worsen (e.g. accumulation of litter in the environment).
Option 2: Voluntary commitment of a significant share of the retail sector not to provide single-use plastic carrier bags	• Some reduction in plastic carrier bag use at participating shops. • Minimal disruption for consumers, manufacturers and retailers. • More 'buy-in' from retailers. • Less administrative burden for governments as they would be less involved than for mandatory measures.	• Not all shops would participate. Under a voluntary agreement, it is unlikely that there would be a dedicated monitoring and enforcement body, nor sanctions to ensure participating retailers stick to the targets and commitments set out.
Option 3: Setting an EU-level prevention target for single-use plastic carrier bags	• Flexibility for Member States as to the policy instruments to be used. • A waste prevention target would set clear guidelines on how much plastic bag reduction Member States should achieve.	• Risk that the target is not achieved, or that Member States implement costly or ineffective polices • Administrative burden would be on Member States
Option 4: Introduction of a legal requirement for Member States to take measures to ensure that single-use plastic carrier bags are not provided for free to customers	• Raises awareness about resource efficiency and waste among the general public. • Funds from the levy can be ring-fenced for environmental projects such as litter clean-up, landfill remediation etc. • Provides incentive for consumers to reduce excessive bag use while preserving consumer	• In terms of consumer behaviour, mandatory consumer charges are a more direct lever than a voluntary agreement. • Depending how Option 4 is implemented, there can be administrative burden for national administrations and/or retailers. • There is a cost for those consumers who pay the levy or purchase multiple-use bags.

[18] EC (2013). Impact Assessment for a 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. SWD/2013/0444 final

	choice.	
Option 5: Introducing an EU-level ban on single-use plastic carrier bags	• Provides high level of certainty in the mitigation of environmental impacts, especially litter. • Possible increase in revenue and jobs for EU producers of alternative carrier bags.	• Loss of revenue and jobs connected with single use plastic carrier bags. • Loss of consumer choice. • Damage to EU Internal Market.

23. In order to know about the environmental, economic and social impact, each option was assessed against different parameters. The following tables summarize the main findings averaged over years 2015-2020, relative to the baseline (business as usual)[17]:

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
Economic Impact Indicators				
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)	**0**	**478,0**	**739,8**	**899,5**
Social Impact Indicators				
Net Change in Employment in EU Bag Manufacture in 2015 (Full Time Equivalents)	**0**	**-860**	**-1340**	**-1641**

24. The Commission staff working document (2013) also includes an interesting comparative analysis between the policy options, as it follows.

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

25. Finally, the EU adopted the quantitative reduction option. 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.

2.2. Public awareness

26. There are many experiences on information and awareness campaigns, aiming at changing consumers' behaviour to phase out plastic bags. For this, they raise awareness on the negative impacts of plastic bags and some propose alternatives. However, their efficacy in producing long-lasting changes is limited. Rather than an option in itself, public awareness should be regarded as a component for any other policy option.

27. Indeed it is important not only to raise awareness on the negative impacts of SUPBs but also to inform and promote available alternatives. The latter is especially important in the case of bans.

Scotland

28. With the slogan "Remember to re-use your carrier bags", the Scottish government and Scottish retailers ran the biggest street campaign ever. Based on the premise that an elephant never forgets, the campaign ran on TV and radio as well as in supermarkets and shops across the country. Twelve major retailers and almost 500 independent shops were on board, potentially reaching millions of consumers. The £466,000 campaign formed part of voluntary measures to reduce carrier bag use. More info: https://bit.ly/2LlQesA.

Germany

29. With 30,000 collected disposable bags, the longest plastic-bag chain in the world was formed as a sign against resource waste. It was a campaign to raise public awareness that wanted to make a statement about the use of plastic bags—and to set a world record.

30. Within the framework of the initiative *Berlin tüt was*, 30,000 plastic bags were collected over the course of several months. Thousands of Berliners handed over their disposable bags, which were no longer needed, to dozens of collection points all over the city in exchange for reusable multipacks.

31. The 30,000 plastic bags were knotted in the form of a chain and shaped into an exclamation mark by more than 3,000 world record holders. This not only set a clear signal about the influx of plastic bags, but also significantly exceeded the previous world record of 10,615 plastic bags.

32. Together with various project partners, the Foundation Naturschutz Berlin organized this campaign in Tempelhofer Park, in Berlin. More info: https://bit.ly/2LL97Bb.

2.3. Economic instruments

2.3.1. Ecotaxes

33. Ecotaxes, taxes or charges are used as an economic incentive to influence producers and consumers choices. However, charges and taxes do not mean exactly the same. While "taxes" generate revenues to the general public budget, "charges" (also called levies) are applied for a particular use (e.g. environmental fund to restore damaged sites).

Ireland

34. Government introduced a 0,15€ levy per bag in March 2002, increased to 0,22€ in 2007. Plastic bags designed for re-use were sold to customers for a sum of not less than 70 cents each. In 2008, 26,6€ million was raised with this charge and dedicated to the Environment Fund. This fund is specifically used to deal with the negative effects of plastic bags. More info: http://bit.ly/2mEP6Rv.

35. In-depth analysis:
   a. Impact on SUPB use: 90% reduction. From 328 bags/person/year (pre-levy, 2002) to 12 bags/person/year (2015)[19]
   b. Impact on bag-use profile:

[19] Department of Communications, Climate Action & Environment (2016). http://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupDetailDoc&id=27612&no=6

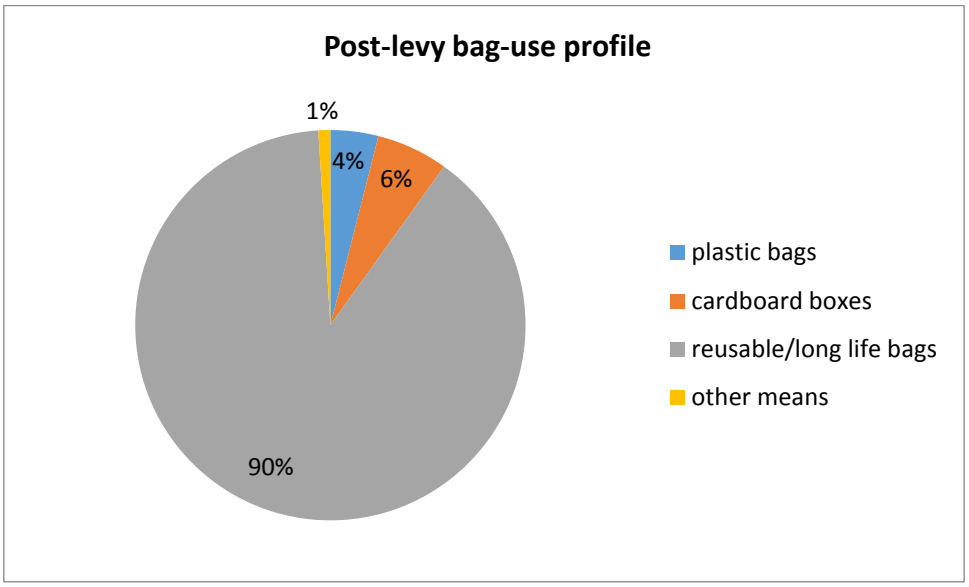

Figure 2. Bag-use profile after the enforcement of Irish levy on plastic bags. Source: own elaboration based on Department of Communications, Climate Action & Environment (2016)

c. Impact on litter:

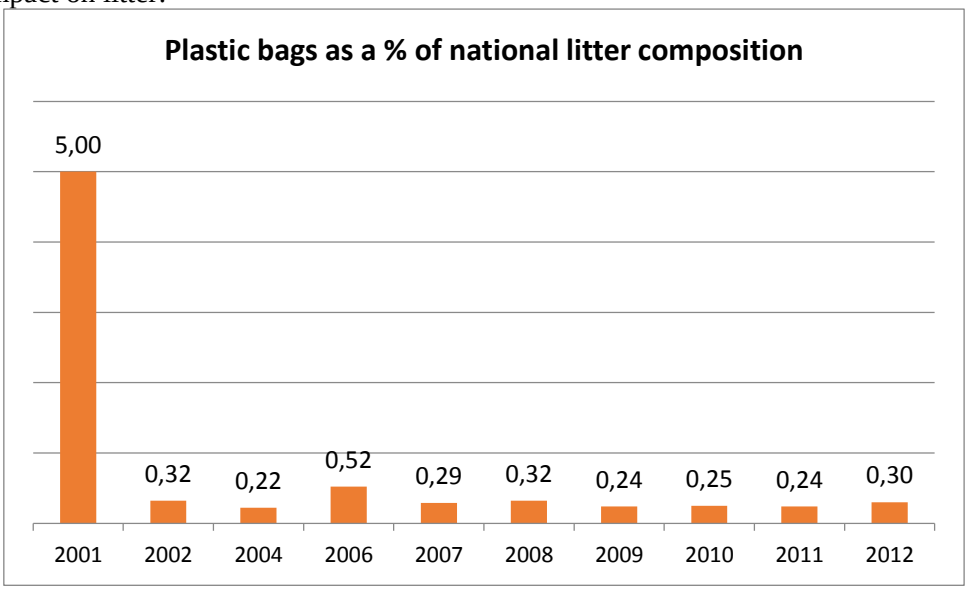

Figure 3. Evolution of the percentage of plastic bags found as litter in Ireland. Source: own elaboration based on Department of Communications, Climate Action & Environment (2016)

d. Social Impact: After the implementation of the levy, the National Environment Survey "Attitudes and Actions" (2003) revealed the following social perception:

- 91% in favour. Reasons included:
  - Better for the environment
  - There are no plastic bag visible in the streets
  - Re-usable bags are more suitable for holding and carrying shopping
- 6% against. Arguments included:
  - Missed use of plastic bags within the house
  - Were frustrated when they forgot to bring re-usable bags into the shop
- 3% no opinion

e. Economic impact: The revenues raised by the levy are dedicated to the Environment Fund[20]. In the following figures, the evolution of the income and some expenditure items are shown. To note the magnitude of the plastic bag revenue: 10 to 25 million euro per year. Moreover, the accountability through yearly detailed financial reports is key for transparency.

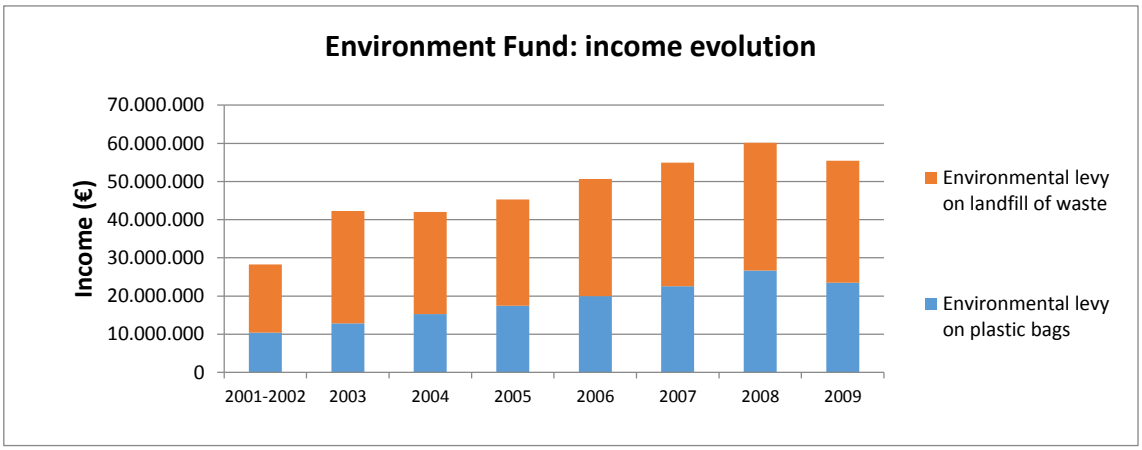

Figure 4. Evolution of the Irish Environment Fund income. Source: Own elaboration from Department of Communications, Climate Action & Environment (2018)

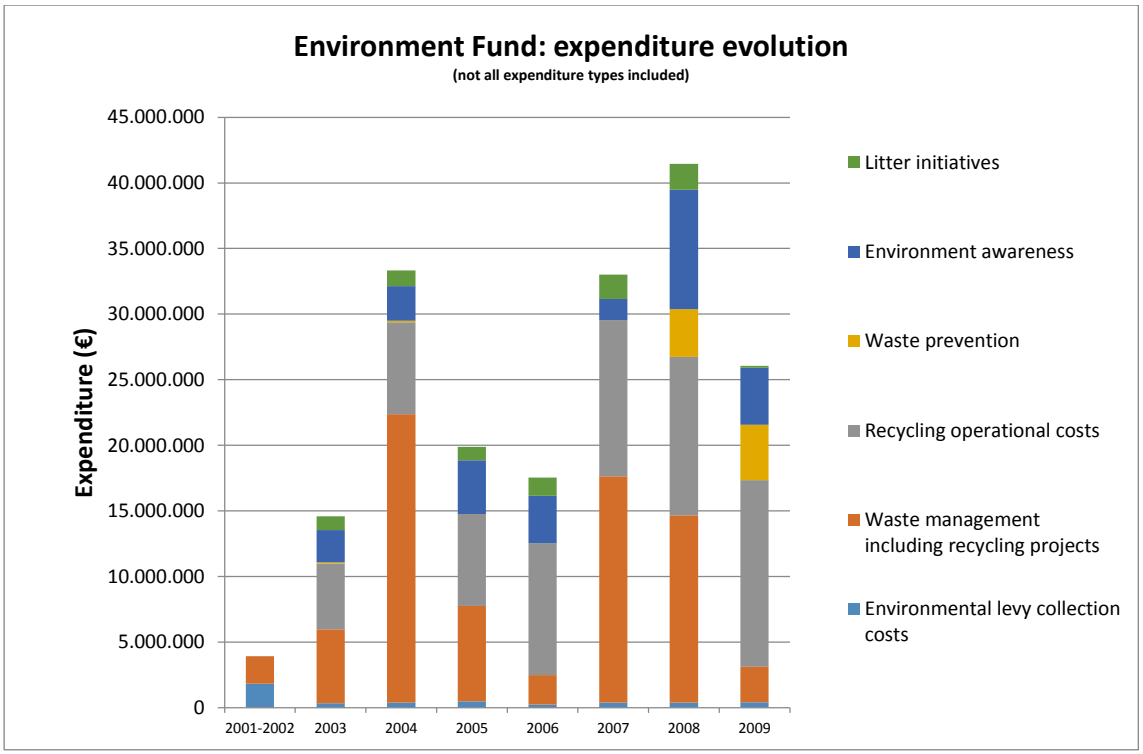

Figure 5. Evolution of the Irish Environment Fund expenditure. Source: Own elaboration from Department of Communications, Climate Action & Environment (2018)

36. The presented data makes the Irish case an international benchmark with a dramatic decrease of the SUPBs, high social acceptance and fund raising for specific environmental fund.

[20] Department of Communications, Climate Action & Environment (2018). Environmental Fund. https://www.dccae.gov.ie/en-ie/environment/topics/environmental-protection-and-awareness/environmental-fund/pages/default.aspx

Israel

37. Established by the Plastic Bag Law, supermarkets must submit quarterly reports to the Ministry of Environmental Protection (MoEP) detailing the number of bags sold, and the money received for those bags. While this reporting obligation began in January 2017, as of July 2016, the supermarkets had to report quarterly to the MoEP the number of bags they purchased, based on available stock.

38. The money paid for plastic bags at supermarkets is transferred to the Ministry of Environmental Protection's Maintenance of Cleanliness Fund. It is used to fund projects aimed at reducing air pollution throughout Israel, to raise public awareness about the new law, and to lend support to manufacturers so that they can adjust their operations to the provisions of the new law. More info: http://bit.ly/2De0hYA.

39. In the first quarter of 2017, about 78 million bags were sold, down 80% from the fourth quarter of 2016, before the law took effect. In the fourth quarter of 2016, about 380 million bags were reported by the major retailers[21.]

2.3.2. Subsidies

40. Subsidies are aimed at promoting alternatives through a public economic incentive.

Israel

41. A subsidy has been introduced for the sale of reusable bags. The Ministry of Environmental Protection tested a subsidy to several supermarkets for the distribution of reusable bags from Jan 1st to Jan 17th, 2017. During this period, participating supermarkets gave out a certain number of free reusable bags to consumers, depending on how much money consumers spent: customers could receive one reusable tote bag at no additional cost, with grocery purchases of €23,40 - 58,70. They could receive two bags for purchases of €58,70 - 93,96, three bags for €93,96 - 129,00, four bags for €129,00 - 176,18 and five bags for purchases of €176,18 or more. More info: http://bit.ly/2De0hYA.

2.4. Voluntary agreements

42. Voluntary initiatives, often at the initiative of the government and retail sector, exist in many countries.

UK

43. Some retailers, such as Marks&Spencer, started charging plastic bags to discourage consumption, and then dedicated this gain to charity. In 8 years, the retailer has donated the over £10 million raised by the charge. Later on, the government made this charge compulsory, and retailers must declare how they dedicate that money to charity. More info: http://bit.ly/2ETVRGN

Region of Catalonia

44. An agreement was signed in 2007 between the regional government and the large retail sector through which the large retail sector committed implement actions to reduce SUPB, including to charge for their distribution. In turn, the regional government has supported around 200 projects

[21] Israel Ministry of Environmental Protection (2017). Plastic Is Out! Significant Drop in Plastic Bag Use Reported Since Plastic Bag Law Passed . http://www.sviva.gov.il/English/ResourcesandServices/NewsAndEvents/NewsAndMessageDover/Pages/2017/09-Sept/Significant-Drop-in-Plastic-Bag-Use-Reported-Since-Plastic-Bag-Law-Passed.aspx

aiming at reducing SUPBs. As a result, the consumption of plastic bags has been reduced by 50%. More info: http://bit.ly/2FM7WyU.

45. In-depth analysis:

a. Impact on SUPB use: 47,8% reduction (2007-2015). From 327 bags/person/year (2007) to 164 bags/person/year (2015)[22]. However, SUPB increased in small retail sector by 15,6% in the same period, and in 2015 was responsible for the distribution of 93,1% of SUPB. This means that 152 out of 164 bags/person were delivered by small retailers, mostly from the grocery sector.

b. Impact on bag-use profile:

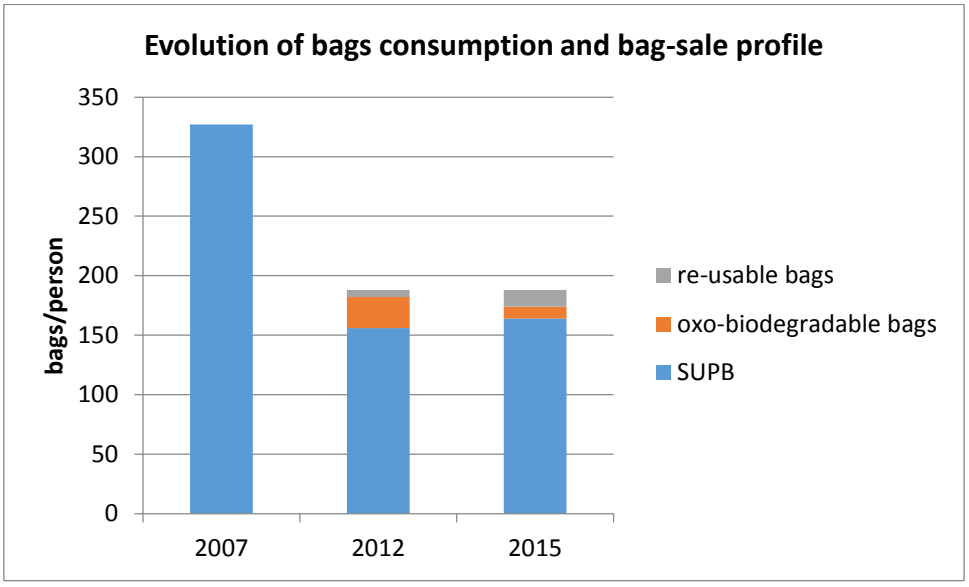

Figure 6. Bag-use profile evolution in Catalonia for the period 2001-2015. Source: own elaboration based on Daleph (2016)

c. Text of the agreement: http://residus.gencat.cat/web/.content/home/ambits_dactuacio/prevencio/prevencio_de_residus_municipals/pacte_per_la_bossa/CNV16008_conveni_pacte_bossa.pdf

d. Additional measures: Despite the important reduction achieved, it was proven that SUPB consumption in small shops kept growing. For this reason, as part of Law 5/2017, from 2016 all commercial establishments have to charge clients for single-use plastic bags (with the exception of compostable bags according to norm UNE-EN 13432 or equivalent), so extending a practice to small shops that was now the norm with hypermarkets and large supermarkets. The bag must be sold as a separate item and the price indicated in the bill. The regulations for this practice do not set out any minimum price for the bags sold at commercial establishments. More information: http://bit.ly/2EPtQ2Y.

2.5. Command and control instruments

46. More and more countries, regions and cities have introduced a ban on plastic bags or have considered its introduction and this number is still rising. Such bans can be differentiated into several categories, including:

[22] Daleph (2016). Estudi sobre el consum de bosses de plàstic a Catalunya l'any 2015. Resum executiu http://residus.gencat.cat/web/.content/home/ambits_dactuacio/prevencio/prevencio_de_residus_municipals/pacte_per_la_bossa/Estudi_ARC_2015_Resum_Executiu_def.pdf

2.5.1. Bans that forbid certain types of single-use plastic bags, certain applications or the use of single-use plastic bags in certain conditions

47. Several countries have passed laws banning SUPB under certain conditions and under different criteria (e.g. source of material, width, purpose, etc.).

State of California

48. The main features of the Bill SB 270, approved in 2014, include: ban on single-use plastic bags, compulsory charges for paper and reusable bags, compostable bags allowed only in certain jurisdictions, establishment of a Reusable Grocery Bag Fund, and opportunity to return plastic bags to stores.

49. The bill incorporates language designed to accommodate companies that are in the business of making plastic products. The idea is to give existing manufacturers time to convert facilities and processes into compostable plastic, recycled paper, or reusable bag production, if they so choose. With that reality in mind, stores are permitted to sell compostable plastic bags and/or paper bags made of recycled material at a cost of ten cents apiece. SB 270, in fact, requires third party certification for the material content of reusable bags, presumably to protect consumers from recycled toxins. More info: http://bit.ly/2Dlt80v.

50. A year later, preliminary data from thousands of volunteers who collected trash during California's Coastal Cleanup Day in September appears to show a remarkable drop in plastic bag refuse. Compared to 2010, plastic bag litter has dropped by around 72%. Plastic bags now account for less than 1.5 percent of all litter, rather than nearly 10%. In Monterey County south of San Francisco, volunteers found only 43 plastic bags during the clean-up, compared to just under 2.500 in 2010[23].

Los Angeles County

51. Los Angeles County, California passed legislation banning single-use plastic bags on Nov. 16, 2010. The first phase of the L.A. County ban became effective on July 1st, 2011 which affected only large retailers and supermarkets. The second phase went into force on July 1st, 2012 for the remainder of smaller food stores. The ban only affects unincorporated areas of the county. This means no cities or towns within the county are affected. Municipalities must pass their own bans. More info: https://bit.ly/2K4Ls1c.

52. In-depth analysis:

a. Economic impact: The National Center for Policy Analysis (NCPA) (conservative think tank[24]) conducted a survey of store managers in both areas of L.A. County, incorporated and unincorporated, regarding the plastic bag ban. The survey sought to identify the following[25]:
   - Would retail sales be affected
   - Would employment be affected
   - Would shoppers change their shopping habits

   The survey results showed that of the retailers responding in the ban-affected areas:
   - 80% realized a -5.7% decrease in sales
   - Employment was reduced by over 10%

   Merchants in the incorporated areas of the county (not affected by the ban) reported:

[23] Californians against Waste (2017). One Year Later: Voter Approval of Bag Ban Results in Substantially Reduced Plastic Bag Litter and Waste. https://www.cawrecycles.org/recycling-news/xtj9dcga9bmh5daxn4sw4kry4zpndg
[24] Walker (2012). Plastic Bag Bans 'Present Hidden Environmental, Economic Costs' https://www.environmentalleader.com/2012/02/national-center-for-policy-analysis-describes-hidden-costs-of-bag-bans/
[25] PBBR (2012). Plastic Bag Bans Hurt Economy? http://plasticbagbanreport.com/plastic-bag-bans-hurt-economy/

- 60% of retailers saw a 9% increase in sales
- Employment increased by 2.4%

Municipalities in California

53. Equinox (2013) reports that in California there were 64 plastic bag bans ordinances by 2013, covering 85 municipalities, with many including a fee on single-use paper bags to discourage a mere substitution of material. Together, these ordinances covered around 44% of the state's population.

54. In-depth analysis:

a. Bag-use profile: The figure below shows the change in bag-use profile for the cases of the municipalities of San Jose and Santa Monica, as well as Los Angeles County. In these jurisdictions, plastic bag bans increased reusable bag usage by 40%. However, the fee on paper bags does not avoid its increase in use, passing from 3 to 16%.

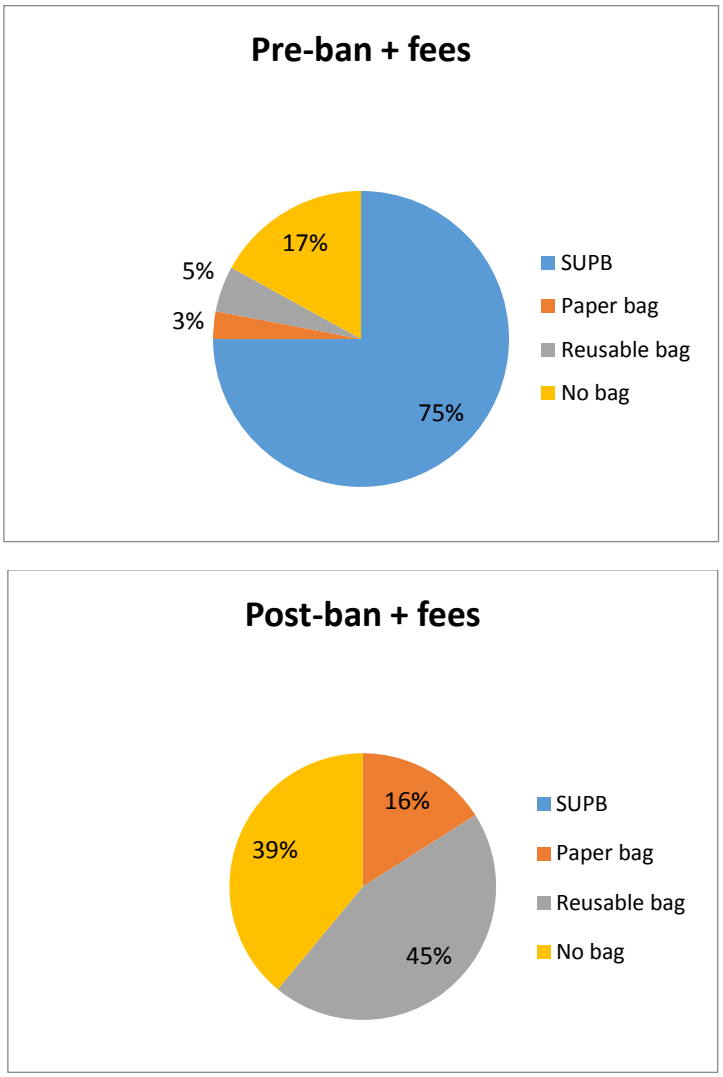

Figure 7. Bag-use profile evolution in selected cases of California as a consequence of combination of plastic bag bans and fees. Source: Own elaboration based on Equinox (2013)

b. Environmental impact: The change in the bag-use profile is better overall for the environment than the old profile, particularly considering that:

- A ban + fee successfully reduce the volume of SUPB use. A ban + 10 USD cent fee in San Diego achieved 86% reduction of SUPB, which means a decrease of 348 million SUPB/year, which would mean a decrease of around 250 bags/person/year.
- Less energy is required, more water is require, less solid waste is generated and fewer GHG's are emitted from the life cycles of bag-use profiles achieved with bans + fees. In the case of San Diego, this means:
    - Energy: 74 million MJ reduction
    - CO_2 eq. emissions: 6.418 tons reduction
    - Solid waste: 270.000 kg reduction
    - Water consumption: 113 million liters increase
    -
- Reduction in litter and solid waste. In San Jose, surveys show an 89% reduction of SUPBs in storm drains, 60% reduction in creeks, and 59% reduction on city streets.

c. Economic impacts: Generally, local economies where the bans have been approved are not negatively affected. It is interesting to distinguish impacts per stakeholder groups:

- *Retailers*. They faced short-term increase in bags costs due to increased paper bag usage, but these costs should be mitigated over time as consumers transition to reusable bags. San Jose and San Francisco have reported "no sustained negative impact to retailers". In particular, San Francisco's Office of Economic Analysis analyzed the projected economic impacts on the local economy of SF ban with proposed increases in restrictions (inclusion of restaurants)[26]. The prime financial beneficiary of the legislation would be retailers. They will retain the bag charge as higher profits. In addition, the reduction in plastic and paper bag use will reduce retailers' overhead costs, also directly increasing their profits. However, the Office's modeling suggests that competition will force down retail prices, and roughly half of this higher profit will be returned to consumers in the form of lower prices. When this reduction in prices is taken into effect, the net cost to consumers is projected to lie in the $10-12 million range annually by 2014.
- *Consumers*. Costs are estimated in $7,70 per household in the first year after the ban to purchase reusable bags and to account for any fees related to paper bags. Recurring costs should decrease due to long lifespan of reusable bags.
- *Governments*. San Francisco estimated an annual savings of $100.000 for avoided plastic bag cleanup costs, and $600.000 in savings from avoided SUPB waste treatment costs. Besides, some cities and counties have some associated costs, for example due to bag give-aways. In L.A. County announced the delivery of 1 million reusable bags to low income residents in areas affected by the ban. San Diego decided to take up costs related to food assistance programs, which are not required to pay by the ordinance.
- *Plastics manufacturers*. It has not been possible to find studies that quantify job loss in the plastics industry due to bans. Although one may consider that job losses may occur in this sector, it has opportunities, to expand production to reusable bags or other products.

[26] City and County of San Francisco (2011). Checkout Bag Charge: Economic Impact Report. http://nebula.wsimg.com/e47b185f36cc1d9d4c2e18fc61d9c405?AccessKeyId=1C31A3B4B1A73412F089&disposition=0&alloworigin=1

France

55. Decree nº 2016-379 (2016) bans the making available of disposable plastic bags, with the exception of bags other than carrier bags, of compostable bags that can be disposed of with household composting waste and which entirely or partially consist of bio sourced materials.

56. To this end, the decree included the definition and characteristics of disposable plastic bags, carrier bags and compostable bags that can be disposed of with household composting waste as well as the expected bio source content of plastic bags. Finally, it specifies what indications must be given on plastic bags to inform the consumer of their composition and use. It entered into force the 1st July 2016.

57. Key information and definitions:

a. Disposable plastic bags (SUPB): plastic bags with a volume of less than 25 litres, or a thickness of less than 50 microns.
b. Compostable bags that can be disposed of with household composting waste: bags compliant with standard NF T 51-800 or, whilst waiting for the standard to be published, compliant with the requirements laid down by a Decree by the Minister of the Environment.
c. Bio-sourced content: percentage, expressed as a fraction of total carbon, of plant materials contained in the bag, determined in accordance with standard ISO 16620-2:2015, version of April 2015.

58. *Marking* Compulsory for SUPB that can be used for compost in household composting waste, specifying the reference to the standard or corresponding decree, or that it can be sorted as part of separate waste collection and that it must not be simply thrown away; and that it consists partly of bio-sourced materials, specifying the quantity of its bio-sourced content and referring to the standard that allows this to be determined. In the other cases, it must be specified that the bag can be reused and must not be simply thrown away. More info: http://bit.ly/2ER5E02.

59. In-depth analysis:

a. Economic impact: Following the regular procedure of this type of legislative initiative in France, an assessment of the economic impacts of the initiatives must be performed. The following table summarizes such impacts per stakeholders groups[27].

[27] Ministère de la Transition Ecologique et Solidaire (2016). Fiche d'impact projet de texte reglementaire

Global economic impacts Annual mean calculated over 3 years						
	Citizens	**Companies**	**Territorial communities and local public enterprises**	**State**	**Other administration entities**	**Total**
New charges	Weak ***	Weak **	None	Negligible	None	
Earnings and savings	Not quantifiable ***	Not quantifiable **	Not quantifiable *			
Net impact						0

* The communities will decrease collection and treatment costs of plastics bags, including those which are littered (according to *Vacances Propres*: 57.000 tons of litter in France / year - figures 2013). In the context of the EU Plastic Bags Directive, the Commission has estimated that 8 billion plastic bags are being improperly in Europe and that setting a target for reducing plastic bags consumption would lead to savings € 46,3 million (avoided collection of litter) and € 39,8 million (avoided treatment of single-use bags).

** Retailers currently spend € 50 million/year to buy checkout bags and € 91 million/year to buy fruit and vegetable bags. The decree would drastically reduce the consumption of checkout bags (it should be considered that voluntary agreements by supermarkets led to a 93% reduction). For fruits and vegetables, thin plastic bags will be replaced by paper or compostable bags whose cost is currently the double. However, high demand should lead to higher competitiveness and thus costs should decrease. Therefore, it can be assumed that retailers' expenses would remain stable. Concerning companies producing plastic bags, they will have to change work processes (minor changes). However, it can be an opportunity to relocate industrial units in France dedicated to the compostable sector (by then the production of plastic bags was made 80% abroad).

*** Citizens may see the shopping costs increased due to extra cost for more expensive bags. However since it should evolve to a predominant reusable bags profile, the decree would be beneficial in the mid-term (one reusable bag can replace around 10 SUPB).

Italy

60. A ban on plastic bags (L. n. 296/2006) went into force in January 1, 2011 by. After since, Italy generally opted for compostable bags according to the standard UNI EN 13432:2002 (suitable for industrial composting). From January 2018, the ban was extended to light and ultralight plastic bags which had several effects and reactions:

- Social opposition to pay for vegetable and fruit biodegradable bags
- Charge of 1 euro cent to 3 euro cents per compostable bag
- Italian news outlets reported that the annual cost per family averaged between €4 and €12.50 per year

61. In-depth analysis:

a. SUPB consumption and bag-use profile: In the case of COOP supermarkets, consumption of bags was reduced in the period 2008-2011from 460 to 240 million bags/year, that is, by 50%. In terms of bag-use profile, the pre-ban scenario was almost fully SUPB, while the post-ban scenario is dominated by compostable bags (98%). Indeed in 2011, COOP supermarkets distributed 225 million bags less than in 2008, but the durable bags increase was only of 5 million[28].

[28] COOP Italia (2012). COOP e le buste per la spesa.

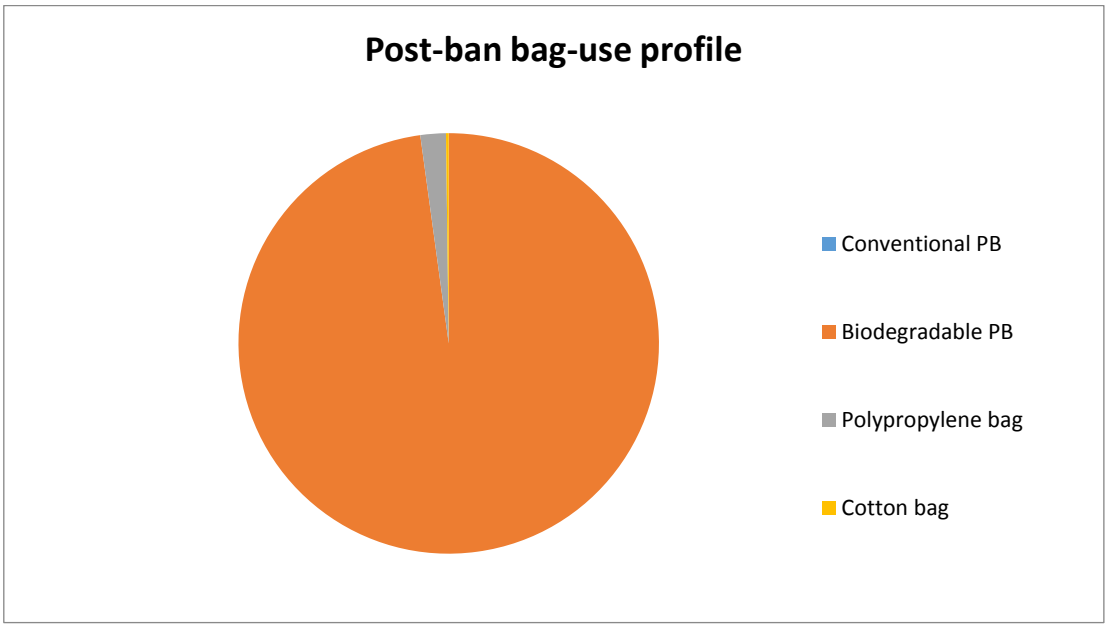

Figure 8. Italian post-ban Bag-use profile. Source: Own elaboration based on COOP Italia (2012)

2.5.2. Ban on free distribution

62. Ban on free distribution is otherwise said the enforcement of an economic disincentive.

Spain

63. Royal Decree 293/2018 transposed the European Directive 2015/720 includes these features:

a. As from 1st July 2018, ban on free distribution of SUPB (defined as those whose width is below 50 microns) in stores, including compostable bags. Annex I include indicative prices, so shops are free to decide the exact price. As from 1st January 2021, distribution will be banned unless they are compostable according to EN 13432:2000.
b. Ultra-thin plastic bag (e.g. for food in bulk) are excluded (defined as those whose width is below 15 microns), but from 2021 they will be not be allowed unless they are compostable.
c. As from 1st January 2020, ban on oxo-degradable plastic bags.
d. For bags whose width is above 50 microns, free distribution is not allowed unless the recycled content is above 70%. As from 1st January 2020, these bags must include at least 50% of recycled material.
e. Set up of the Plastic bag producers' registry by which they will have to report on their production (in line with other European countries).
f. The Ministry and the regional administrations are obliges to implement awareness campaigns during the first year of enforcement. Campaigns must stress the differentiated disposal of conventional and compostable bags (the latter to follow the bio-waste stream).

3. Alternative Options

64. The reduction of conventional single use plastic bags used as carriers, regardless of the type of measure, undoubtedly comes with the need to substitute the conventional plastic with an alternative material. In the case of strict bans, this substitution is often abrupt as forced. In this chapter some of the alternatives to convention plastic are presented. Special emphasis is given to the biodegradable plastic bags for two reasons: i) the are most commonly used alternatives to conventional plastic bags, ii) questions are often raised on their actual biodegradability and their impacts on the environment.

3.1. Biodegradable plastics (including bio-based plastics and oxo-degradable plastics)

65. Below, some excerpts from the comprehensive document from UN Environment *Biodegradable Plastics and Marine Litter. Misconceptions, concerns and impacts on marine environments* (2015) are presented in order to clarify some misconceptions about biodegradable plastics.

66. Some biodegradable plastics are made from fossil fuels, and some non-biodegradable plastics are made from biomass. Once the polymer is synthesised, the material properties will be the same, whatever the type of raw material used.

67. The following figure illustrates the sources of plastics, types, and their likelihood to become marine (micro)litter.

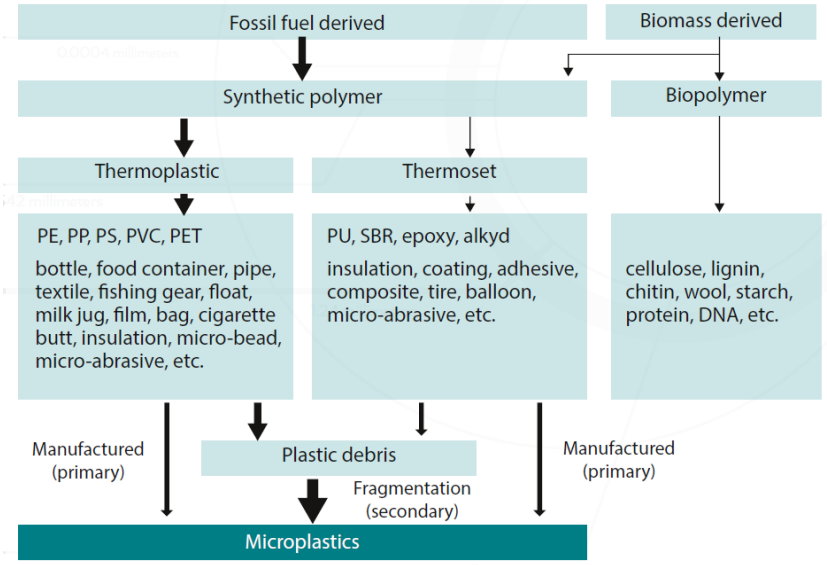

Figure 9. Schematic illustrating the relationship between primary materials source, synthetic and natural polymers, thermoplastic and thermoset plastics and their applications. Source: GESAMP, 2015

68. The conditions under which ‘biodegradable´ polymers will actually biodegrade vary widely. For example, a single-use plastic shopping bag marked ‘biodegradable’ may require the conditions that commonly occur only in an industrial composter (e.g. 50 °C) to breakdown completely into its constituent components of water, carbon dioxide, methane, on a reasonable or practical timescale (UNEP 2015).

69. A polymer may be marketed as ‘biodegradable’ but this may only apply to a limited range of environmental conditions, which are probably not encountered in the natural environment. This can lead to misunderstandings and confusion as to what constitutes biodegradability. For example, some items, such as plastic shopping bags supplied for groceries, may be labelled as ‘biodegradable’. However, it is quite possible that the item will only degrade appreciably in an industrial composter. Such polymers will not ‘biodegrade’ in domestic compost heaps or if left to litter the environment. This lack of clarity may lead to behaviours that result in a greater degree of littering. The State of California has passed legislation that covers the use of the terms ‘biodegradable’ and ‘compostable’ on consumer packaging.

70. Biodegradable and compostable bags must be collected together with organic waste aimed at composting/anaerobic digestion treatment. This means that controlled organic recycling collection schemes must exist and other forms of collection and disposal will have the conventional negative effect on the environment. Biodegradable plastics interfere with the conventional plastic recycling

process reducing the quality of recycled plastic. Similarly, plastics containing pro-oxidants are not recommended for recycling as they have the potential to compromise the utility of recycled plastics.

71. If a product is marketed as biodegradable it should conform to a recognized standard defining composability, for example ASTM 6400 (USA), EN 13432 (European), NT 22.127 (Tunisia) or ISO 17088 (International). These standards are appropriate for conditions that occur in an industrial composter, in which temperature are expected to reach 70 °C. The EN standard requires that at least 90% of the organic matter is converted into CO2 within 6 months, and that no more than 30% of the residue is retained by a 2mm mesh sieve after 3 months composting.

72. There is not specific standard that can guarantee plastic degradation in marine conditions. ASTM produced a standard for 'Non-floating biodegradable plastics in the marine environment' (ASTM D7081-05). It has been withdrawn, so far without replacement. An additional standard (ASTM WK42833) is being developed that will cover 'New Test Method for Determining Aerobic Biodegradation of Plastics Buried in Sandy Marine Sediment under Controlled Laboratory Conditions.

73. Oxo-degradable plastics are conventional polymers, such as polyethylene, which have had a metal compound added to act as a catalyst, or pro-oxidant, to increase the rate of initial oxidation and fragmentation. They are sometimes referred to as oxy-biodegradable or oxo-degradable. Initial degradation may result in the production of many small fragments (i.e. microplastics), but the eventual fate of these is poorly understood. As with all forms of degradation the rate and degree of fragmentation and utilisation by microorganisms will be dependent on the surrounding environment. There appears to be no convincing published evidence that oxo-degradable plastics do mineralize completely in the environment, except under industrial composting conditions.

74. Furthermore, the European Commission's plastics strategy warned that biodegradable and compostable plastics could lead to greater littering and compromise recycled material streams unless they were clearly labelled. The Commission wants to see harmonised rules for labelling compostable and biodegradable plastics, but indicated that oxo-biodegradable plastic would be phased out. A statement read: "As regards so-called oxo-biodegradable plastics, there is no evidence that they offer any advantages over conventional plastics. They do not biodegrade and their fragmentation into microplastics causes concern. Taking into account these concerns, the Commission will start work to restrict the use of oxo-plastics in the EU."[29]

75. The standards that are claimed to confirm the biodegradability of such products, most notably the US standard ASTM D6954, do not provide pass/fail criteria, leaving these misleading claims wholly unsubstantiated (European Bioplastics 2016)[30].

76. Examples/evidence of initiatives questioning oxo-degradable plastics:

a. Ellen MacArthur Foundation's a statement calling for a ban on oxo-degradable plastic packaging, with over 150 signatories. https://newplasticseconomy.org/news/over-150-organisations-back-call-to-ban-oxo-degradable-plastic-packaging
b. Court of Milan ruled against D2W producer for a false biodegradable claim according to European market standards. http://resource.co/article/plastic-additive-d2w-does-not-give-biodegradability-9824

77. It has to be concluded that: "On the balance of the available evidence, biodegradable plastics will not play a significant role in reducing marine litter" (UNEP 2015).

[29] EC (2018). A European strategy for plastics in a circular economy. http://ec.europa.eu/environment/circular-economy/pdf/plastics-strategy-brochure.pdf
[30] European Bioplastics (2016). Factsheet Bioplastics – Industry standards & labels. http://bit.ly/2DIJHB0

3.1.1. Relevant standards and labels for biodegradable plastics

78. *The factsheet Bioplastics – Industry standards & labels* from European Bioplastics contains key information on this topic. The following lines try to extract crucial information.

a. Standardisation is an effort by industrial stakeholders to define generally accepted criteria and guidelines for the description of products, services, and processes. The aim is to ease competition and commercial growth by overcoming barriers that result from unclear or inconsistent specifications and communication, to introduce benchmarks for desirable quality requirements, and to prevent fraudulent market behaviour. Adherence to standards is typically voluntary, which means that it is up to individual market participants to seek compliance with a standard or not.
b. The key standardisation bodies creating standards are ISO (International Organization for Standardization), CEN (European Committee for Standardisation) and ASTM (American Society for Testing and Materials). In addition, there are many national standardisation organisations. The harmonisation of standards on a supranational level, for example on the EU-lev-el through CEN, certainly has added value insofar as standards should apply equally across participants in the same market.
c. To claim a product's biodegradability, the ambient conditions have to be specified and a timeframe for biodegradation must be set in order to make claims measurable and comparable. This is regulated in the applicable standards.

Standards for industrial composting and anaerobic digestion

79. The European standard EN 13432 "Requirements for packaging recoverable through composting and biodegradation" requires at least 90% disintegration after twelve weeks, 90% biodegradation (CO2 evolvement) in six months, and includes tests on ecotoxicity and heavy metal content. It is the standard for biodegradable packaging designed for treatment in industrial composting facilities and anaerobic digestion.

80. Standard EN 14995 describes the same requirements and tests, however it applies not only to packaging but plastics in general. The same holds for ISO 18606 "Packaging and the environment – Organic Recycling" and ISO 17088 "Specifications for compostable plastics".

81. Labels for industrially compostable products are, for example, the Seedling Logo, OK Compost, and DIN-Geprüft Industrial Compostable.

Standards for home composting

82. There is currently no international standard specifying the conditions for home composting of biodegradable plastics. However, there are several national standards, such as the Australian norm AS 5810 "Biodegradable plastics – biodegradable plastics suitable for home composting". Belgian certifier Vinçotte had developed the OK compost home certification scheme, requiring at least 90% degradation in 12 months at ambient temperature. Based on this scheme, the French standard NF T 51-800 "Plastics — Specifications for plastics suitable for home composting" was developed, specifying the very same requirements for certification.

83. Labels proving home compostability are OK compost Home and the DIN-Geprüft Home Compostable Mark.

Biodegradability in soil

84. The certification scheme "Bio products – degradation in soil" developed by Vinçotte is based on EN13432/EN14995 (Standards for the industrial composting of packaging/plastics) and adapted for the degradation in soil. The test demands at least 90% biodegradation in two years at ambient temperatures.

85. The standard EN 17033 "Biodegradable mulch films for use in agriculture and horticulture – Requirements and test methods" specifies the requirements for biodegradable films, manufactured from thermoplastic materials, to be used for mulching applications in agriculture and horticulture, which are not intended to be removed. A degradation of at least 90% in two years at preferably 25°C will be required.

86. The label OK biodegradable Soil is certified by Vinçotte in case a product meets the requirement of their certification scheme. DIN CERTCO awards DIN-Geprüft biodegradable in soil in accordance with CEN/TR 15822.

Biodegradability in marine environments

87. Currently, there is no standard providing clear pass/fail criteria for the degradation of plastics in sea water. The US standard ASTM D7081 "Standard Specification for Non-Floating Biodegradable Plastics in the Marine Environment" has been withdrawn without replacement.

88. Research and development is ongoing to develop harmonised standards for marine biodegradation, which are needed before relevant products can be introduced to the market. With research underway and standards and certified products likely to see the light of day in the near future, questions concerning the limitations for this technology need to be answered: In which context and for which products does this technology make sense and how can it complement a circular economy? Once these questions have been answered, sound communication and advertising rules need to be defined.

89. Vinçotte has developed a certification scheme based on ASTM D7081, which demands, in a simplified way, a bio-degradation of at least 90% in 6 months. The corresponding label is OK biodegradable Marine.

3.2. Other materials and means

90. Beyond conventional and biodegradable plastics, there are other alternatives to be considered and that are already providing good results. It is important to take into consideration all environmental aspects with tools such as life-cycle assessment (LCA) to determine the impact of each option. Indeed, the negative impact does not only stem from the littered product, but also from production, transport, use etc. However, it is important to note that not all effects of litter, especially marine litter, are considered by LCA (e.g. harm on biota). Many studies have explored the different alternatives to single-use plastic bags[31], being generally multiple-use plastic bag the preferred option. In fact, the key is to reuse the bag (or other mean) as much as possible to have less environmental impact.

91. Notwithstanding, the adequacy of each alternative may depend on the type of store, industrial production, citizens' awareness, etc. Thus, each alternative could be promoted at different levels and for different target groups. Some examples[32] and indications include:

[31] For example, the Environment Agency : Life cycle assessment of supermarket carrier bags: a review of the bags available in 2006. http://bit.ly/2DrAa3C

[32] In this website some examples can be found with further explanations per bag: https://1bagatatime.com/learn/reusable-bag-types/

a. Kraft paper bags in shops and for products which are relatively light. For example, in pharmacies (promoted in Tunisia) or for spices.
b. Bag-for life in supermarkets and smaller shops. These bags are made of LDPE that can be bought and used many times, usually one that the supermarket replaces when it is broken and then recycles. There are standards develop for this kind of bags such as in Spain the UNE 53942 which establishes several parameters such as a minimum width of 30 microns, which allows at least 15 times use.
c. Woven and non-woven polypropylene bags (or others such as nylon and polystyrene bags). This option is very suitable to be sold in supermarkets, and they can be reused later at smaller grocery shops. In Ireland, non-woven bags are now by far the preferred bag by consumers, chosen by 66% of those surveyed as their bag of choice.
d. Recycled multi-use plastic bags. Reusing conventional and other plastic bags to produce reusable bags are a good option to raise awareness on the issue, while taking advantage of existing material.
e. Coffins. This is a traditional option in MENA countries that could be fostered in specific shops like souvenirs stores, airports, etc. It can be marketed as a responsible option from which local population benefit.
f. Shopping trolleys. This option allows replacing many bags and it can be an opportunity to develop local industry.

92. Providing alternatives to SUPB can indeed turn into an economic opportunity, especially in national and local context. Developing alternatives may also counteract a potential job loss in the plastic industry. For example, in USA, Green Vets is a non-profit that employs local veterans to create reusable bags which are sold in zones impacted by local bans. Santa Monica purchased 26.000 Green Vets bags when their ordinance passed (Equinox 2013).

93. Another case can be found in Morocco, where the Docteur Fatiha association, with the support of the EU-funded program SwitchMed, has designed a reused and reusable carrier bag from flour bags. They are being produced by women cooperatives that were trained to gain speed and improve final result. Finally, these bags are being tested in shops and further marketing work is on-going.

4. The state of the art of single-use plastic bags in selected Mediterranean countries

4.1. State of the art

94. This section intends to provide a snapshot of plastic bags in the five MENA countries participating in ML Med project in terms of production, import/export, consumption and reduction efforts. Sources are diverse and often based on rough estimates so they should be cautiously considered. Selected countries are in different stages in the process of tackling SUPBs and thus the overview provides wide baseline scenarios for the purpose of these guidelines.

	Production	Consumption	Main Legal and Regulatory Measures	Other Measures
Morocco	• Before the plastic bag ban, turnover of the plastic industry was 4,5 MAD milliards, and generated around 8.000 jobs[33] • It is estimated that the informal sector is responsible for 80% of bags in the market[32] • The annual production capacity of alternatives is estimated in 4,6 billion of paper bags, 100 million of woven bags and 120 million of non-woven bags.	• In 2015, Morocco was the second largest consumer of plastic bags in the world: 800-900 bags/person/year. • After the ban, in July 2016, consumption has decreased but did not fully disappear because of informal market supply. No recent consumption estimates exist. • Conventional bags have been mostly substituted with non-woven polypropylene bags.	• In 2014, eco-tax of 1,5% on plastic products, both locally manufactured and imported, was introduced. This tax should fund collection and recycling systems. • On 1st July 2016, a ban on plastic bags became effective (law nº77-15): production, import, sale and distribution of single-use plastic bags is forbidden. The ban does not apply to certain plastic bags for specific uses: agriculture, industry and waste collection. Full text: http://bit.ly/2Dl5b9u	• National fund for industrial adaptation: 200 million dirham. Companies must prove they dedicate 30% of the production to plastic bags.[34] [35] • Public awareness campaign to support the ban implementation: Zero Mika. It consisted mainly on collection of littered plastic bags which are burnt in cement ovens[36]. • Participation in SWIM-H2020 including action plans for marine litter reduction and monitoring
Tunisa	• Estimation of jobs created by the plastic bag industry: 1.229 (including informal sector).[37] • 46 companies identified employing between 833 and 920 people. [36]	• 4,2 billion (3 billion produced nationally and 1,2 billion imported), representing 380 bags/person/year [36]	• A ban on distribution of SUPB bags in supermarkets was approved on 1st March 2017, agreed with the Union Chamber of large retailers (UTICA). Reusable plastic bags are charged at 0,08-0,09 TND • Draft decree banning non-biodegradable plastic bags. Only bags according to the Tunisian compostable norm would be accepted.	• Voluntary agreement with pharmacies to use paper bags[38] • The tax on plastic import (5%) does not apply to biodegradable plastic. • The government announced a subsidy of 70% for companies that wish to convert to biodegradable plastic bags production. • *Tunisie Recyclage*. An initiative promoted by an association that collects domestic waste to sort it and sell it.

[33] Huffpost Maroc (2016). Comment le Maroc compte appliquer la loi sur l'interdiction des sacs plastique. http://www.huffpostmaghreb.com/2016/06/09/sacs-plastiques-interdiction-maroc_n_10379698.html
[34] L'Économiste (2016). Sacs en plastique: Le compte à rebours. http://www.leconomiste.com/article/999024-sacs-en-plastique-le-compte-rebours
[35] Ministere de I'lndustrie, de I'lnvestissement, du Commerce et de I'Economie Numerique (2017). Interdiction des sacs plastiques : un bilan positif, six mois après l'entrée en vigueur de la loi. http://www.mcinet.gov.ma/fr/content/interdiction-des-sacs-plastiques-un-bilan-positif-six-mois-apr%C3%A8s-l%E2%80%99entr%C3%A9e-en-vigueur-de-la
[36] http://www.agrimaroc.ma/la-campagne-de-sensibilisation-zero-mika-est-lancee/
[37] SAMEF (2018). Étude de diagnostic et mise à niveau de la filière des sacs en plastique en Tunisie.
[38] Maghreb Émergent (2017). Tunisie-Pharmacies: les sacs en plastique remplacés par des sacs en papier à partir du 1er mars 2018. http://maghrebemergent.info/actualite/breves/fil-maghreb/79228-tunisie-pharmacies-les-sacs-en-plastique-remplaces-par-des-sacs-en-papier-a-partir-du-1er-mars-2018.html

	Production	Consumption	Main Legal and Regulatory Measures	Other Measures
Algeria	• 600 production units, 20.000 jobs, of which 9.000 are direct jobs.[39]	• Between 7,5-5,5 billion plastic bags per year are used (190-140 bags/person/year) [40]	• Executive Decree n° 09-87 (2009): tax on plastic bags locally produced or imported: 10,5 DA/kg	• Operation « *Déplastiquage* »: Governmental convention for the collection, stock and recycling: 400 million DA[41] • UNO supermarkets distributes only reusable bags at 100 DA since February 2018[42]
Egypt	• Plastic sector counts more than 1.273 factories and employs 415.000 people. Total market volume is about 4$ billion[43]	• 12 billion plastic bags per year (136 bags/person/year) [44]	• No national measures. Ban in the Red Sea Governorate (2009) but single use plastic bags are still used in supermarkets[45].	• On-going national initiative to reduce single-use non-biodegradable plastic bags in Egypt, based on an Integrated Communication – awareness campaign, including[46]: - Distribution of oxo-degradabale bags to supermarkets - Distribution of multiple-use carrier bags to associations • An initiative of the Red Sea Governorate to promote employment opportunities for women who are creating cloth bags to replace plastic bags
Lebanon	• No reliable data	• No reliable data	• No national measures.	• Company Cedar Environmental produces Eco-boards: it recycles plastic bags into plastic panel boards. • Entrepreneur Nour Kays repurposes used plastic carrier bags into fashionable accessories

4.2. Discussion on on-going MENA initiatives tackling SUPB

95. As briefly described in chapter 2.1, Morocco and Tunisia have legislatives initiatives regarding SUPB. While in the case of Morocco the law was enforced in 2016, the Tunisian decree is under an approval phase. Moreover, Tunisia completed an interesting agreement between the government and the retail sector. These three examples, in addition to other international experiences, offer important insight in the design of a strategy for the Mediterranean region.

[39] http://www.leconews.com/fr/actualites/nationale/industries/les-algeriens-utilisent-7-5-milliards-de-sacs-par-an-03-07-2014-170429_340.php
[40] https://www.huffpostmaghreb.com/entry/les-algeriens-consomment-55-milliards-de-sacs-en-plastique-selon-zerouati_mg_5b1612f0e4b014707d2791e9
[41] https://www.liberte-algerie.com/actualite/400-millions-de-da-pour-le-deplastiquage-26418
[42] http://lechodalgerie-dz.com/fin-des-sacs-en-plastique-uno-passe-a-la-consommation-ecologique/
[43] EPEMA (n.d.). Industry Profile. http://epema.org/industry_profile.aspx
[44] Egypt Today (2017). Egypt aims to curb usage of plastic bags. https://www.egypttoday.com/Article/1/6894/Egypt-aims-to-curb-usage-of-plastic-bags
[45] ACR+ (2013). Plastic bags: inventory of political instruments.
[46] https://www.switchmed.eu/en/news/news-1/plastic-bags-producers-and-consumers-join-forces-for-a-bio-degradable-alternative

4.2.1. Morocco

96. Being Morocco the only country with enforced national law on SUPB, it is important to discuss this case in detail since lessons can be learnt for the other countries in the region. On 1st July 2016, a ban on plastic bags became effective (law nº77-15): production, import, sale and distribution of single-use plastic bags is forbidden. The ban does not apply to certain plastic bags for specific uses: agriculture, industry and waste collection. More info: http://bit.ly/2Dl5b9u.

Implementation of the law

97. Once the law entered into force, the government has put in place a control and penalty system. After two years of implementation (mid-2016 to mid-2018), these are some of the figures that have been made available:

- Industry:
  - 3.659 control missions
  - 60 contentious cases
  - 670 tones banned bags requisitioned (including from commerce)
- Commerce:
  - 596.348 shops visited
  - 4.000 contentious cases
- Borders:
  - 767 cases
  - 83,1 tones banned bags requisitioned
- Judgements
  - 713 judgements pronounced
  - 4,9 MDhs fines

98. Furthermore, other legal arrangements have been completed. Several decrees have been approved detailing the technical characteristics and the marking or printing of plastic bags excluded from the ban. Another decree sets the raw material (polyethylene) under the import licensing regime to ensure the traceability and to avoid its use in the manufacture of banned plastic bags, particularly by the informal sector.

99. Other decrees are being prepared in order to avoid law bypass and consist in the ban of industrial bags whose width is less than 50 cm in the market and non-woven polypropylene bags whose grammage is less than 50 g/m². As for the latter, indeed this type of bags has been manufactured in very low grammage resulting in short-term damage and thus inability to be considered as reusable. However, the issue is difficult to tackle since the formal sector competes with informal conventional plastic bags.

Production capacity of plastic bags substitutes

100. The annual production capacity of substitute products is estimated at 8 billion paper bags, 1 billion, 1,8 billion million nonwoven bags, 1.500 tons of thermoforming products and 60 million of non-woven laminated bags.

Support to industrial adaptation

101. In order to implement a support mechanism for affected industries, a convention was signed between the Ministry of Inductry, the Ministry of Economy and the National Agency for the Promotion of Small and Medium enterprises (Maroc PME).

102. In terms of support to operators impacted by the law, the Department of Industry has set up a fund of 200 million dirhams, dedicated to financing and support for restructure. 73 companies were eligible to receive support from the fund. 29 of them have submitted their investment dossier (the others were not able to submit due to non-conformity with fiscal situation). 26 out of these 29 companies have been validated and a global investment of 136,7 MDhs has been made, as well as 71,7 MDhs as technical support. It is also important to note that 636 jobs are maintained and 650 news jobs have been created.

Case discussion

103. Morocco has shown strong political will and commitment as well as efficient administrative arrangements to enforce the SUPB ban. Although it seems the circulation of SUPB has considerably reduced, the law was significantly abrupt which may have hampered better results after two years implementation. The main obstacles can be described as:

a. Illegal market. This existed already before the ban, but after since, it is playing a crucial role in maintaining SUPB in the market. Indeed, small shop tenders (which are the majority of the commerce tissue in Morocco) are confronted to consumers' demand on plastic bags and non-economical viable alternatives. Thus, afraid of losing customers, they purchase from the illegal market and offer for free to costumers. The low needs for SUPB production in terms of infrastructures makes difficult to identify them.
b. Lack of well-developed alternatives for specific applications e.g. carrier bags, goods sold in bulk (dry and wet).
c. Lack of public awareness, not only on the effects of plastic bags, but more importantly on the alternatives that can be used.
d. Lack of technical specificities, norms and standards about allowed bags at an earlier stage, both for bags exempted in the law (e.g. industrial, freezing bags) and reusable plastic bags (especially non-woven polypropylene bags, which have been the most abundant offered alternative to date).

104. The government keeps on deploying efforts to enforce the law, notably in the fight against illegal market and the development of technical specificities for alternatives. However, in the long-term, the level of surveillance and prosecution may not be sustainable and therefore complementary actions should be boosted.

4.2.2. Tunisia

105. In the case of Tunisia, the draft decree bans SUPB unless they are compostable following the Tunisian Norm TN 22.127 (corresponding to EN 13432) that is, compostable under industrial conditions). Plastic bags thicker than 40 microns are allowed, as well as ultra-thin plastic bags for fruits and vegetables. Considering the national waste management context, there are important considerations to be made:

a. It is essential to ensure necessary infrastructures to properly manage the end of life of this new type of bags, that is, industrial composting facilities. For this, separate collection would be needed together with home bio-waste fraction. This requires a long-term investment program. In the absence of these elements, this change of material would not have the desired effect, and could even have a perverse effect by persuading people to increase litter.
b. Lack of national production. To date, there is not compostable plastic production in Tunisia. Although progressive reconversion could take place, it is envisaged that the country will have to import these products. On the long-term, the dependence on crops as raw material may jeopardize this industry.
c. In order verify the compliance with the TN 22.127, national capacity should be developed in terms of equipment and personnel skills.

106. In order to prepare the decree implementation, the government of Tunisia entrusted a study to know about the current situation with the ultimate goal to prepare a strategy supporting industry reconversion. This study estimates the quantities produced and consumed in Tunisia to later propose a general framework on state-aid to industries that would be affected by the decree. The latter is a very similar approach and proposal as in Morocco.

107. Finally, the two conventions signed between the Tunisian government and the Union Chamber of large retailers (UTICA) and The Union of Tunisia Pharmaceutics (SPOT) are a very interesting voluntary agreements by which SUPB are no longer distributed since March 2017 in supermarkets and since March 2018 in pharmacies. In supermarkets, reusable plastic bags are made available at 0,08 - 0,09 TND (circa 0,028 EUR). According to governmental officials, the distribution of SUPB by retailers, representing 30% of SUPB use, has decreased 94% during the first year of implementation[47].

4.3. Considerations and factors having an influence on plastic bags reduction options

108. Despite considerable efforts, waste management loopholes in the region lead to generalized mismanaged waste. These deficiencies relate to insufficient collection, unsound disposal and low rate of recycling.

109. Considering the current situation of conventional bags and a future reduction scenario, improving collection waste and sound disposal would be a first priority. This would reduce littering. At the same time, an increase in collection may provide more opportunities for plastic recycling industry. For this, waste sorting and treatment plants would be pivotal as well. As explained before, the option of biodegradable plastics would only make sense under a control management system, where:

a. Organic waste is collected separately
b. There are industrial composters or anaerobic digesters.

110. Without these two conditions, the problem would remain the same and even it would hamper the plastics recycling industry. Indeed, the mix of biodegradable and conventional plastics results in lower quality recycled material.

[47] Business News (2018). Interdiction définitive des sacs en plastique à partir du 31 décembre 2019 http://www.businessnews.com.tn/interdiction-definitive-des-sacs-en-plastique-a-partir-du-31-decembre-2019,520,80520,3

Public administration, funds and tax management

111. As reviewed in different cases, ecotaxes and subsidies are great allies to reduce conventional plastic bags. For this efficient and transparent use of public funds should be the rule.

Availability of alternatives

112. The phase out or ban of SUPB requires the development of alternatives, specifically for a variety of applications, especially for groceries shopping and dry and wet goods sold in bulk. In the absence of these alternatives, policies may fail to attain the desired objectives and may reinforce the illegal market.

Development of norms, standards and labels

113. Especially in the light of biodegradable plastics occurrence, norms, standards and labels should be clear and applied in the country. Indeed, legislative texts should include the obligation of using them in order to avoid false claims.

5. Strategy for the reduction of single-use plastic bags in the Mediterranean region

114. Considering experiences in the Mediterranean region and beyond, sound solutions should be designed in a long time frame. A progressive, step-by-step approach should be adopted in order to ensure that:

a. Governmental mechanisms are in place to monitor the production and consumption of SUPB, in order to review and adapt if the objectives are not met.
b. Economically/environmentally/technically sound alternatives are available, and the relevant standards and norms are in place to ensure the use and production of safer alternatives.
c. Relevant industry has time/incentives/access to technology to reconvert, without major jobs/revenues loss.
d. New green entrepreneurs come up with alternatives for which incentives to new technology development may be needed.
e. Consumers are aware of the impacts of their behaviour, and are incentivized to modify their consumption patterns.
f. The waste management system in the countries is adapted to accompanying the phase out process. First, it is important that collection/recycling rates improve, and unsound disposal is avoided. Later, the waste management system may need to adapt to the new alternatives introduced in the market, such as compostable bags (or other disposable and compostable items).

115. Different policy options may attain similar drastic reductions as proven through the experiences review. This provides flexibility to adapt to national contexts. It is important to note that economic impact of reducing/banning SUPB does not seem to be crucial for any of the cases reviewed. On the contrary, some of them consider this as an opportunity to develop internal economic activity.

116. Therefore, herewith a general 10 step-by-step guide is provided to phase out SUPB in the Mediterranean region. Countries that already implemented measures in this regard may find complementary and supportive actions.

117. **Preliminary steps:**

a. Assess production and consumption of SUPB, as well as socioeconomic aspects.

This may lead to set reduction quantitative targets and provide a baseline to monitor progress.

b. Assess different policy options, namely voluntary agreements, economic incentives and bans, given the national contexts.

In addition to economic and environmental aspects, the assessment should pay attention to the national capacity to enforce instruments such as bans and/or levies as well as on the impact on the low-income populations. The assessment should provide information on the potential effect of the reduction of SUPB for different stakeholders, including plastic manufacturers, retailers, citizens and administration. Based on this, one option may be preferred over the others.

c. Promote and develop alternatives.

Before any instrument is put in practice, there should be an assessment of the alternatives for SUPBs applications, in terms of national production capacity and needs, that is, offer and demand. Indeed these two aspects must go hand to hand and should be boosted equally for effective switch to alternatives. Furthermore, this may represent an economic opportunity for the countries since often a share of plastic bags is imported.

Options for upgrading production capacity include: tax rebates, research and development funds, technology incubation, public-private partnerships, support to projects that recycle disposable items and turn waste into an alternative to SUPB, and reduction/abolishment of taxes on the import of material used to make alternatives.

Citizens may be reluctant to switch to alternatives for different reasons, mainly due to habits and higher price. For this, it is needed a continuous communication on the benefits of using alternatives to SUPB and negative effects of the latter. At the start of implementing policy measures, alternatives may be subsidised with funds originated by levies or ecotaxes to boost change. Regarding alternatives, it is important to note that thicker plastic bags and compostable bags may be considered as such. In order to avoid legal bypass or promote not safer options, it is of utmost importance to set norms and labels for these alternatives, for example, for plastic bags which have a minimum thickness or volume.

Finally, the promotion of a particular alternative should consider the end-of-life phase in order to prevent more harmful options to develop. This may be the case of compostable bags in the absence of separate bio-waste collection and treatment.

118. **Adoption of a policy option:** After these preliminary steps, the policy option could be taken and implemented. Basically, there are three options, as it follows, although a combination or a progression from 4 to 6 is possible.

d. **Promote voluntary agreements with retailers.** There two main options within these agreements, to stop free distribution of bags (regardless of their thickness or even the material) and to stop distributing SUPB. For this, the government should take the lead and count on associations of retailers as main counterparts. Other stakeholders should be invited to negotiation meetings such as plastic bag producers and customers' organizations.

The cases in Tunisia and Catalonia show excellent results in tackling SUPB at supermarkets. However, in countries where the vast majority of the groceries sector is concentrated in small shops, additional measures are advised to reach that consumption. In any case, this seems to be the preferred way to start reducing consumption, raising consumers' awareness to persuade them to start switching to SUPB's alternatives.

e. Implement levies and ecotaxes. As reviewed in different cases (Ireland and Israel), ecotaxes and levies are great allies to reduce conventional plastic bags. For this, efficient and transparent use of public funds should be the rule. A system should be put in place by the public administration by which retailers report on the amount of plastic bags being sold. It is important to find out how much consumers are willing to pay, so the levy is big enough to

change behaviour. These revenues should nourish a specific "green fund" which could fund waste collection and recycling, which in turn would create jobs. The whole process should be transparent to both retailers and consumers, conveying the "polluter pays" principle and message. Another positive aspect is that industry can progressively adapt and may not be so reluctant to this policy option being taken.

A limitation of this option may be the application of the levy in contexts where small shops and even informal sector are notable, in a way that it may jeopardize levy's implementation in larger commerce.

f. **Adopt a ban.** As reviewed in the cases, there are several types of bans on SUPB. The one on free distribution represents a "harder" form of the voluntary agreement, and enlarging it to all sectors and not only retailers. When it comes to banning the production and consumption of SUPBs, a key aspect to bear in mind is the type of alternatives being put forward. A wise approach, taken by many countries is to allow reusable bags, regardless of the material, as well as for specific uses (e.g. agriculture, industry, etc.). Another approach is to allow compostable bags, but this would only make sense when bio-waste is collected and treated separately.

   In both cases, clear specification must be made on minimum thickness or grammage, and inspection authorities have the means for verification. For that, clear norms and compulsory labelling are of great support. There is the possibility to combine the ban with a levy to avoid overconsumption of some alternatives (e.g. paper bags). In terms of enforcement, it is necessary to adopt inter-institutional arrangements for the control and surveillance of ban implementation.

119. **Accompanying measures:**

g. **Incentives to industry.** This is especially important in the case of ban, but also in the case of levies, in order to bring the industry on-board. Ecotaxes could provide the funds for these incentives. Opportunities and guidance should be given to switch SUPBs producers to durable plastic applications or other product materials. It is important to incentivize new industries and entrepreneurs that can offer alternatives to SUPBs, for example through subsidies after the enforcement of a ban or levy.

h. **Upgrade the waste management system.** Ecotaxes are of great support in raising funds to enhance collection, recycling and final treatment, which are key to avoid waste ending up as marine litter. At a later stage, if compostable bags are regarded as a preferred alternative, the system should evolve to collect and treat bio-waste separately. Given the high organic waste proportion in many countries in the region, pilot projects on domestic and industrial composting could be implemented to assess the feasibility to extend the system to the entire country. This should be regarded as a necessary condition before legally promoting composting bags.

i. **Communication and participation.** The production and use of SUPB have proven to be a very sensitive issue. In fact, they are part and important in our daily life. For this reason, it is important to actively communicate and engage citizens and stakeholders in any policy being made at this regard. Evidence-based studies, including the ones referenced in this publication, are also necessary to defeat opposition from the plastics industry.

j. **Review and adapt.** All policy measures should include a monitoring system to know how the production and consumption of bags evolve over time. For example, plastic bags producers may be required to report in a given time period about the production and destination of their products. Based on this, if the objectives are not met, a review should be made to improve implementation or adopt additional measures.