Analysis of the public consultation on the green paper "European Strategy on Plastic Waste in the Environment"

FINAL REPORT

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Chapter 1: Introduction and context

1.1 Green paper on a European Strategy on Plastic Waste in the Environment

1.1.1 Context

The Green Paper on a European strategy on plastic waste in the environment was published on 7 March 2013. Its aim is to learn more about the views of citizens and other stakeholders on how to make plastic products more sustainable throughout their life cycle, how to reduce generation of plastic waste and how to decrease the impact of any plastic waste that does enter the environment.

At the same time as the publication of the Green Paper, an online consultation was launched in order to generate possible responses to the various public policy challenges posed by plastic waste. There are many intense discussions and heated debates in Europe about the nature and magnitude of the problem of plastic waste in the environment, and potential responses. In view of these debates, and in order to understand the opinions of stakeholders and the general public, the European Commission identified the key issues and formulated the questionnaire available online.

The follow-up to the Green Paper will be an integral part of a wider review of waste legislation planned for 2014. Today, plastic is not addressed separately by EU waste legislation because it is a horizontal waste stream that cuts across several sectors and waste types.

The consultation closed on 7 June 2013. The preliminary results of the evaluation of the responses was a crucial element of the plastic waste conference that took place in Brussels on 30 September 2013 and will be a cornerstone of the 2014 waste legislation review.

1.1.2 Themes and questions

The consultation consists of 26 open questions, on topics including:

- Application of the waste hierarchy to plastic waste management

(1) Can plastic be appropriately dealt with in the existing legislative framework for waste management or does the existing **legislation need to be adapted**?
(2) How can **measures to promote greater recycling of plastic** best be designed so as to ensure positive impacts for enhanced competitiveness and growth?
(3) Would full and effective **implementation of the waste treatment requirements in the existing landfill legislation** reduce sufficiently current landfilling of plastic waste?
(4) What measures would be appropriate and effective to **promote plastic re-use and recovery over landfilling**? Would a **landfill ban for plastic** be a proportionate solution or would **an**

increase of landfill taxes and the introduction of **diversion targets** be sufficient?

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

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

- Achievement of targets, plastic recycling and voluntary initiatives

Targets and exports of plastic waste

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

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

Voluntary Action

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

- Targeting consumer behaviour

Giving plastic a value

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

Empowering consumers to know what they buy

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

- Towards more sustainable plastics

Plastic design for easy and economic cradle-to-cradle recycling

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

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

New challenges through innovative materials

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

- Durability of plastics and plastic products

Product design for a longer life, reuse and repair

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

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

Single-use and short-lived plastic products

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

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

- Promotion of biodegradable plastics and bio-based plastics

Biodegradable plastics

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

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

(21) Would the use of **oxo-degradable plastic** require any kind of **intervention** with a view to safeguarding recycling processes, and if so, on which level?[1]

Bio-based plastics

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

- EU initiatives dealing with marine litter including plastic waste

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

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

- International action

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

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

[1] Note: The German language translation of the consultation questions did not use the term oxo-degradable but used the term biodegradable to include oxo-degradable. Respondents using that language version therefore may have found this question confusing.

1.2 Analysis of the consultation

1.2.1 Objective

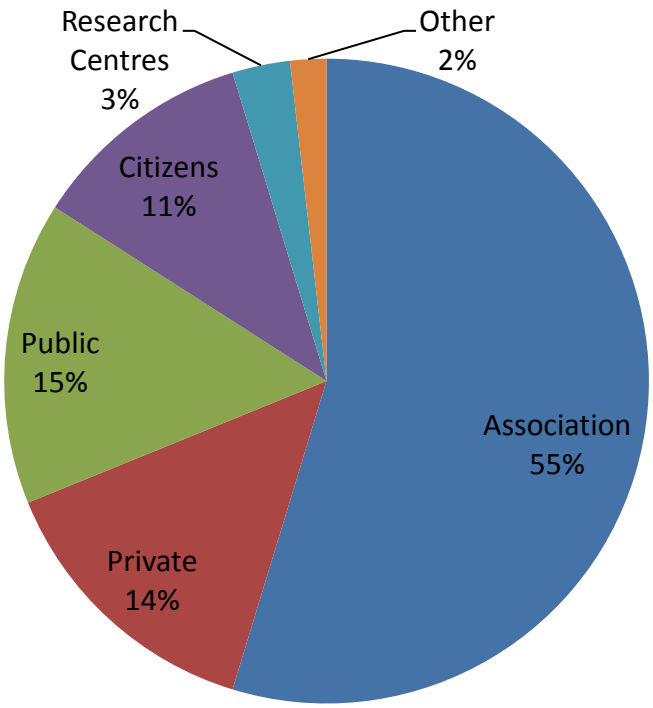
The consultation drew a large number of responses from across Europe on diverse topics and from several organisation types. The objective of this analysis is to present the results of the consultation in a clear and structured manner. The responses are analysed according to a set of criteria. The report provides an understanding of the views of citizens, organisations and authorities across the EU on challenges associated with plastic waste and possible ways to address them.

1.2.2 Main results

- Analysis of respondents

A total of **277** responses to the consultation were received.[2] The most common type of respondent was associations (this category includes trade and industry federations, NGOs, etc.). Large numbers of responses were also received from public administrations, private companies and citizens; plastic waste issues interest people right across the EU. The graph below shows the share of different types of respondents:

Figure 1: Type of respondents (276)



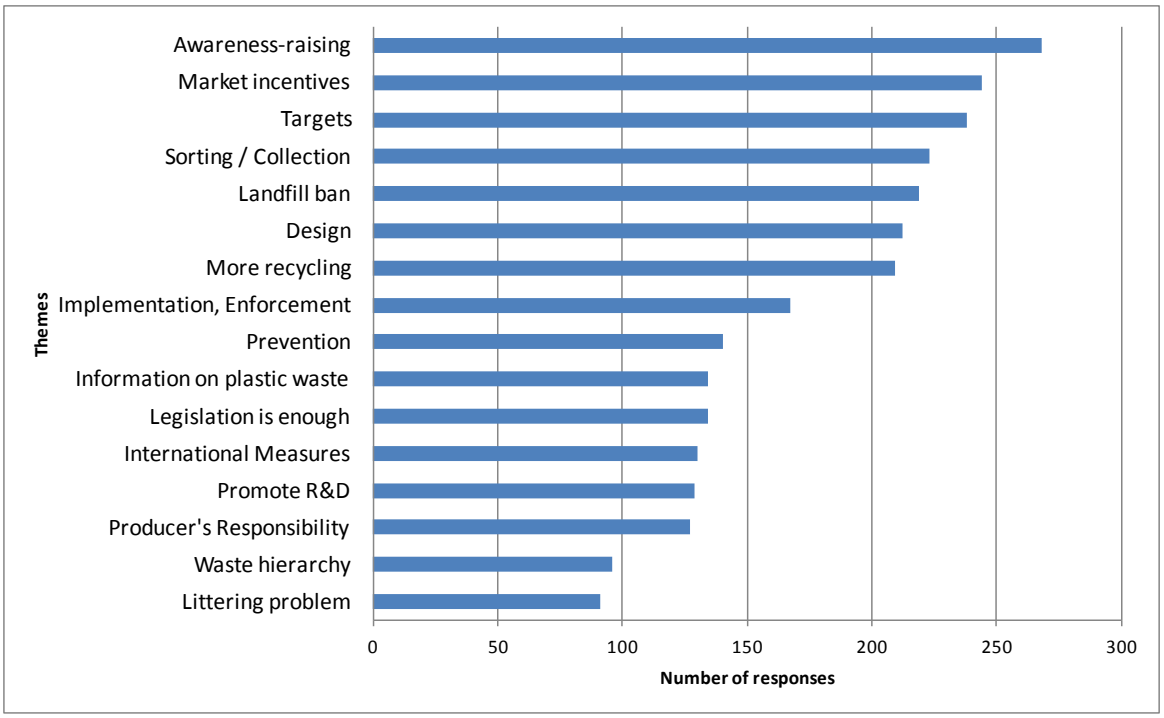
Chapter 2 develops the analysis of respondents.

[2] One response, from the German Ministry of Environment, was received too late to be taken into account in this report but was received and analysed by DG Environment directly instead.

- Analysis of responses

Taking into account all responses to the 26 questions, here are the most common topics mentioned by stakeholders concerning plastic waste:

Figure 2: Number of answers given by stakeholders by theme



This figure shows that a wide variety of topics are raised by respondents as part of their general remarks. The most common one concerns "*awareness raising*" among consumers, i.e. that the issue of plastic waste may be addressed through better education, etc.

The second most common topic mentioned is "*market incentives*". This topic is seen as important to promote secondary materials, reduce landfill, develop recycling industries, etc.

The third topic is "*targets*", meaning that legislation should change increase recycling targets or targets to reduce waste, etc. The fourth topic is based on the fact that waste management can be made more effective with better sorting and collection. Further analysis by topic and type of question is provided in Chapter 3.

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Chapter 2: Analysis of respondents

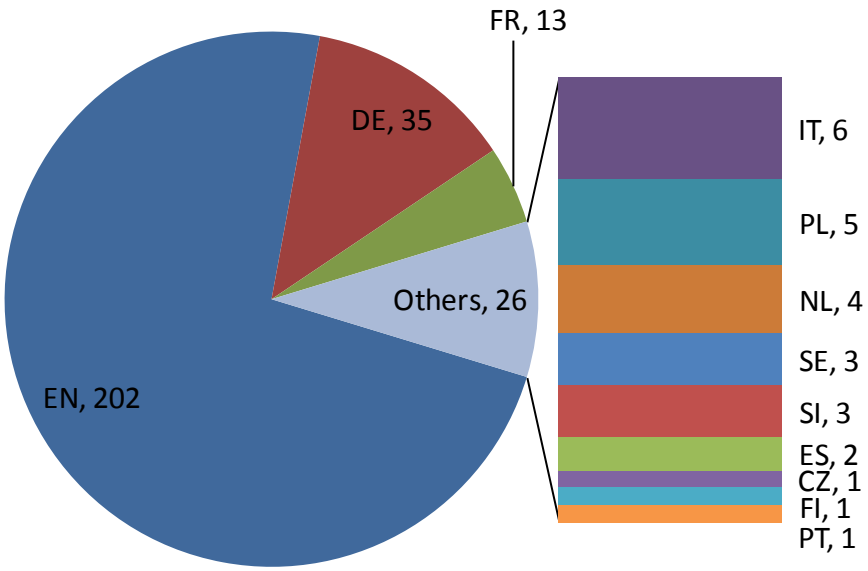
2.1 Respondents by language and geographical area

2.1.1 Language used for submission

- Overview of languages used for submission

Respondents used a total of 12 EU languages to respond to the consultation (they were requested to use English, French or German). Two-thirds of respondents submitted their answer in English (or in English and another language), with 35 responses in German, 13 in French and 26 in other EU languages.

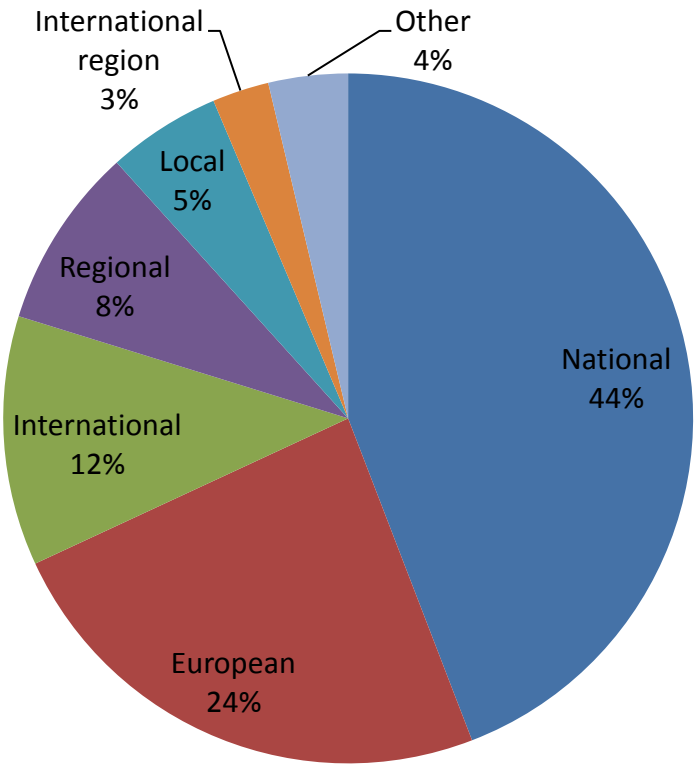
Figure 3: Number of respondents by language



2.1.2 Geographical scope

Of those respondents that specified, a little less than half had a national scope (83). However, one quarter (48) came from associations, organisations or companies at European level, most of which are based in Belgium (37). A total of 28 respondents have an international scope, while being based in Germany (5), Belgium (4) or other countries. The rest are distributed among regional (16), local (10) or other levels, such as international regions, or municipalities across regions or across Europe.

Figure 4: Stakeholders by geographical scope



2.2 Types of respondent

2.2.1 General or specific types

2.2.1.1 *Respondents other than citizens*

The 244 respondents that were not citizens can be grouped by category. Most of them have expertise or a direct interest in the Green Paper on Plastic Waste and are evenly distributed (8-16% each) among:

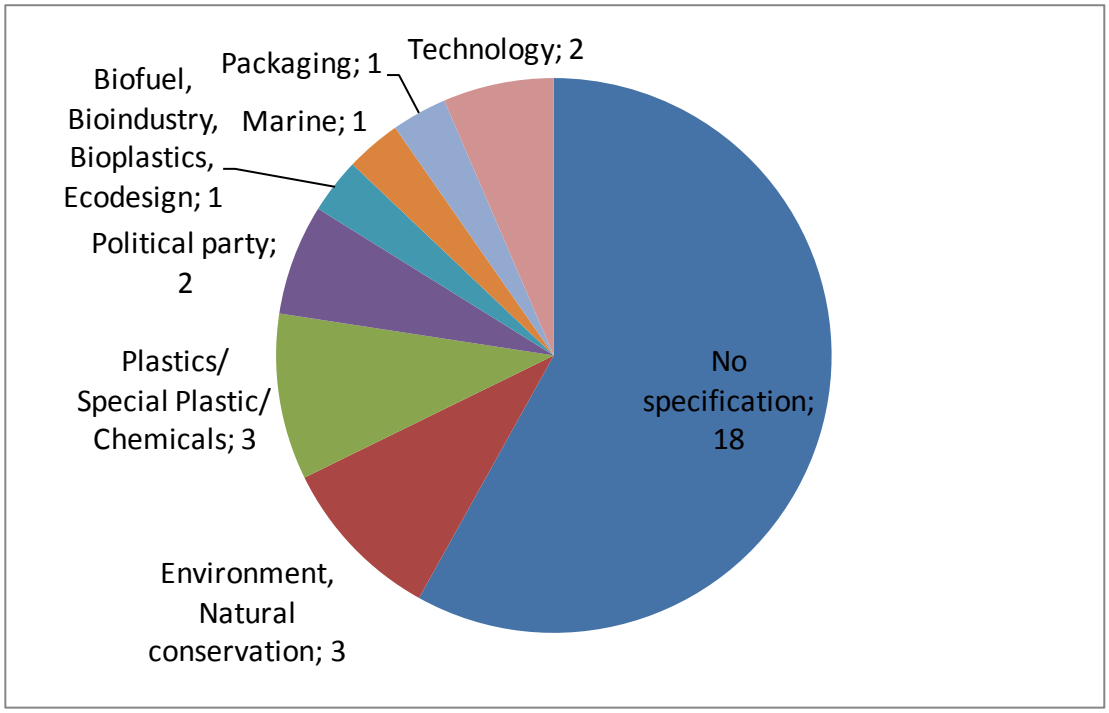
- recycling, waste management, water, utilities or transport agents;
- plastics, special plastic materials or chemicals;
- environmental or nature conservation organisations;
- packaging and plastic film industry;
- biofuels, bioplastics, ecodesign or renewable resource agents;
- municipalities, local, regional and national authorities or representatives.

The remaining one third is distributed equally among other categories with less than 6% each of total responses, such as general industry or trade associations, citizen or consumer associations, marine conservation professionals or relevant industry sectors such as food and drinks (e.g. CocaCola), toys, cosmetics, cleaning products, furniture (e.g. IKEA) or special material manufacturers (starch, cement, glass, metal).

2.2.1.2 *EU citizens*

There were **31** responses from citizens, some of which specified their profession or research interest.

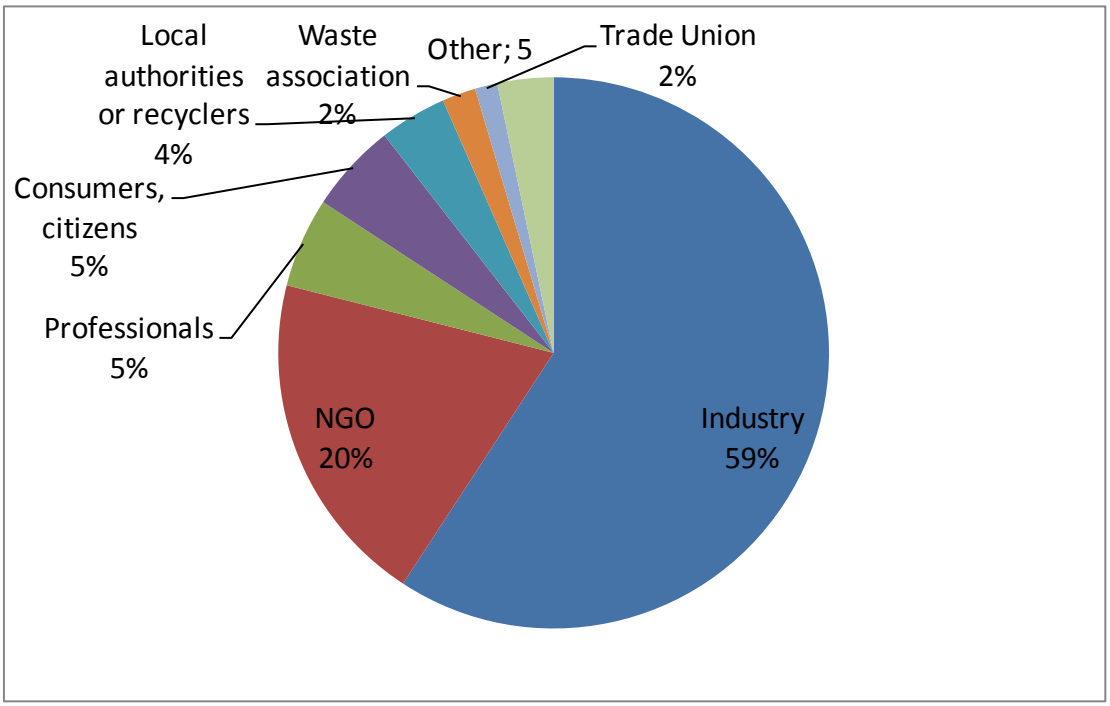
Figure 5: Citizen responses by type



2.2.1.3 *Associations*

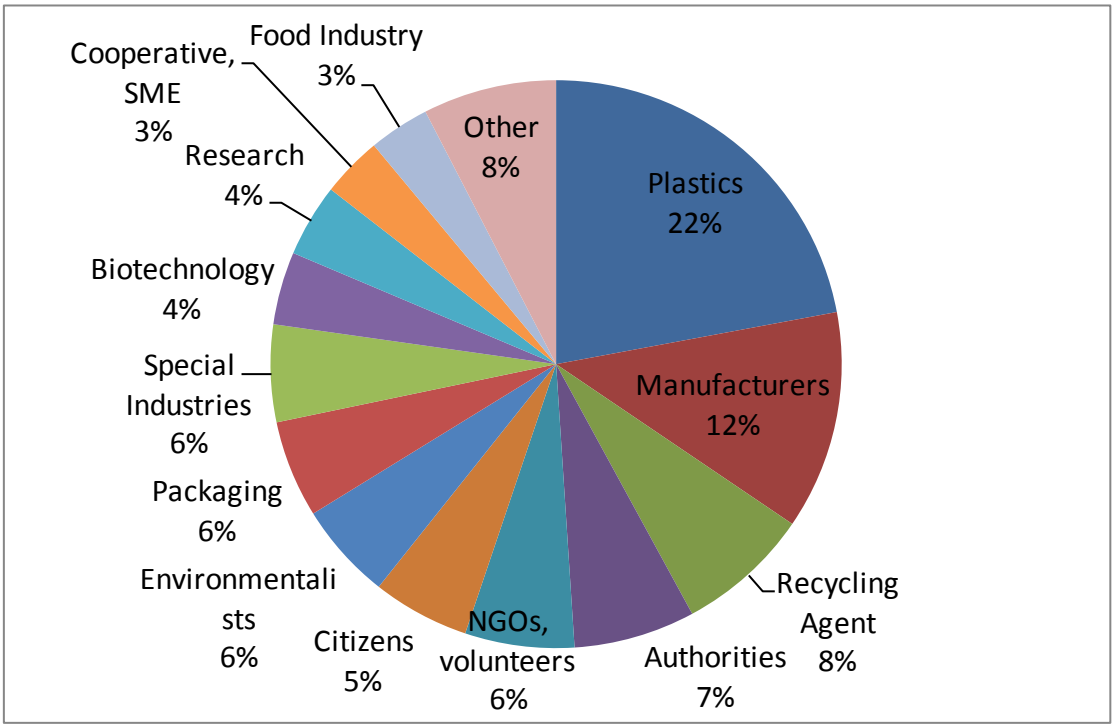
The largest group (152) of respondents were associations, federations or similar organisations. These have been broken down by type. Three-fifths of them are federations of industry (90). One fifth is non-profit organisations (30), and the other one fifth are professional organisations, consumer or citizen associations, federations of local authorities, recyclers or waste treatment agencies and trade unions.

Figure 6: Association respondents by type



Members of these associations cover a wide range of interests, most of which are relevant for the Green Paper on Plastic Waste, as represented below. There were seven respondents from Friends of Earth, from its different representations across Europe.

Figure 7: Members of associations by type



2.2.1.4 *Public administrations*

The second largest group of respondents after associations was public administrations (42). Responses were received from 13 national or (for federal states only) regional ministries, as well as Environmental Protection Agencies and other governmental bodies with a specific interest in nature conservation or the environment, waste management and local authorities, Chambers of Commerce and parliamentary bodies.

In later sections of this report, we analyse the following responses in dedicated sub-sections entitled "National or regional ministries":

- Ministry of the Environment of the Czech Republic;
- Niedersachsen regional ministry of the environment, Germany;
- Ministry of the Environment, Agriculture, Forestry and Water of Austria;
- Schleswig-Holstein regional ministry of the environment, Germany;
- Thüringen regional ministry of the environment, Germany;
- Klif climate and pollution agency, Directorate under the Ministry of the Environment of Norway;
- Ministry of the Environment of Denmark, Environmental Protection Agency;
- Ministry of the Environment of Estonia;
- Ministry of the Environment of Sweden;
- Department for the Environment, Food and Rural Affairs, UK;
- Bundesrat regional chamber, Germany;
- Ministry of the Environment of France.[3]

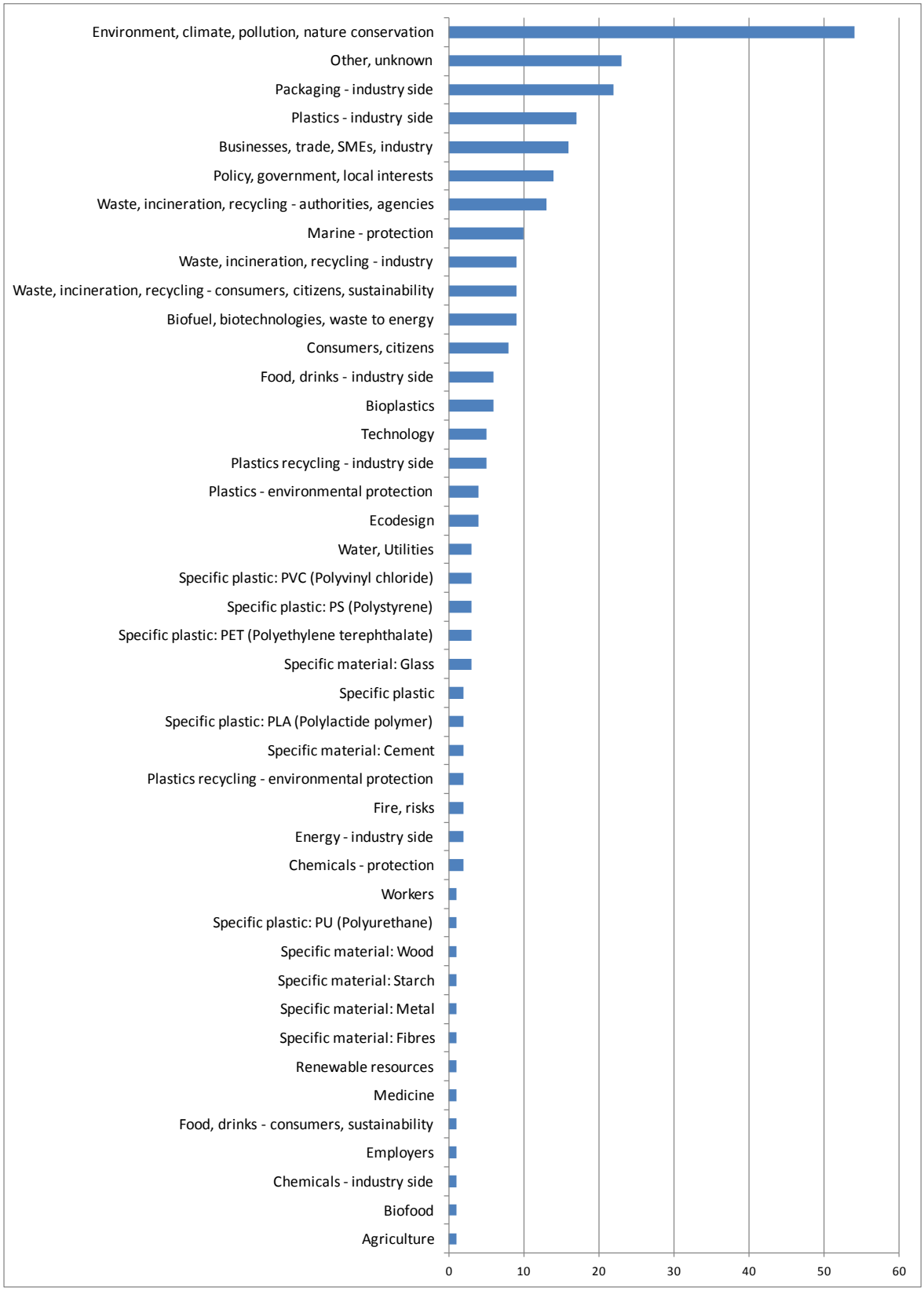
2.3 Special interests of respondents

Respondents were also classified according to their specific interests, irrespective of organisation type. As might be expected, the majority of stakeholders have specific interests in the environment, climate change, nature conservation and pollution issues (54); plastics (34); or waste, incineration and recycling in general (31) (five in plastics recycling in particular). Significant numbers were interested in packaging (22) and in biofuels, biotechnologies or energy recovery technologies, bioplastics and ecodesign (19). Other respondents had general business, trade or industrial interests or represented the interests of SMEs (16) or general public interests, such as policy, governmental or local issues (14) or general consumer or citizen interests (8). Marine

[3] Two other responses from ministries were received by the project team and taken into account in the summary statistics above but due to late receipt and/or the fact that the responses did not use the languages (English, French, German) requested, the content was not analysed but taken into account directly by DG Environment instead. These are the Ministry of the Environment of Poland and the Ministry of Agriculture and the Environment of Slovenia.

protection is also covered (10), as well as food and drinks (7). One response came from an oxo-degradable industry association.

Figure 8: Number of respondents by specific interest



Chapter 3: Analysis of responses

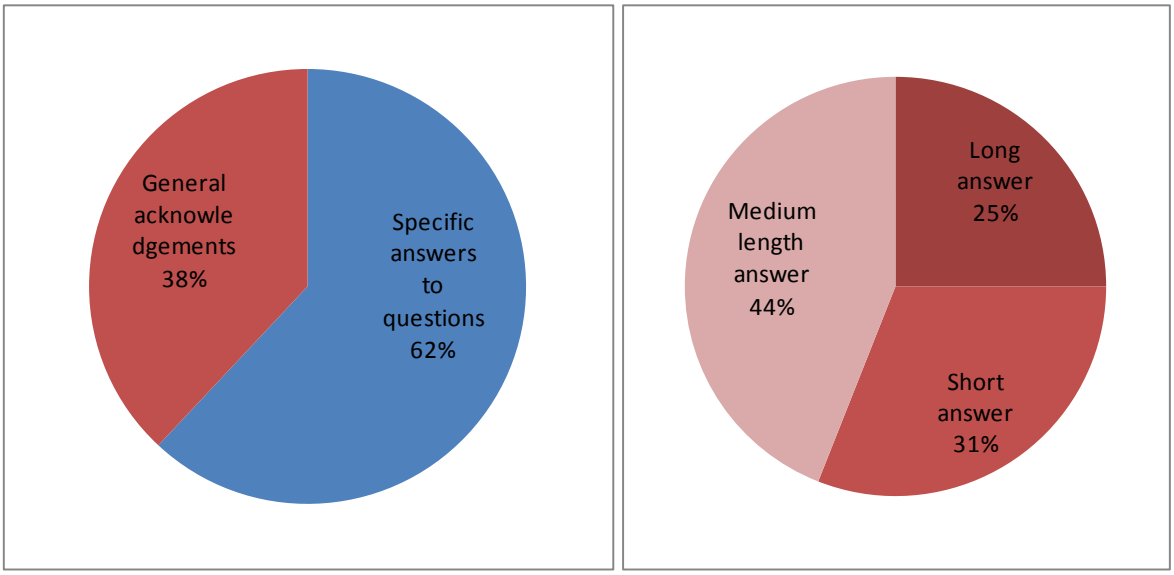
3.1 Overview

This analysis is based on **253 responses**. The remaining 24 responses could not be analysed by the project team as part of this report but have been received by the European Commission and are being considered separately. This concerns six IT, 5 PL, 4 NL, 3 SE, 3 SI, 1 PT, 1 FI and 1 CZ. We focused primarily on the three languages EN, DE and FR because respondents were asked to use one of these. For the list of questions, please refer to section 1.1.2.

3.1.1 General or specific answers to the consultation

Not all respondents gave specific answers to each question, nor did everyone answer all the questions. Some respondents included their general view on the Green Paper or only answered in general terms without going into the specific sections.

Figure 9: Type of answers to the consultation



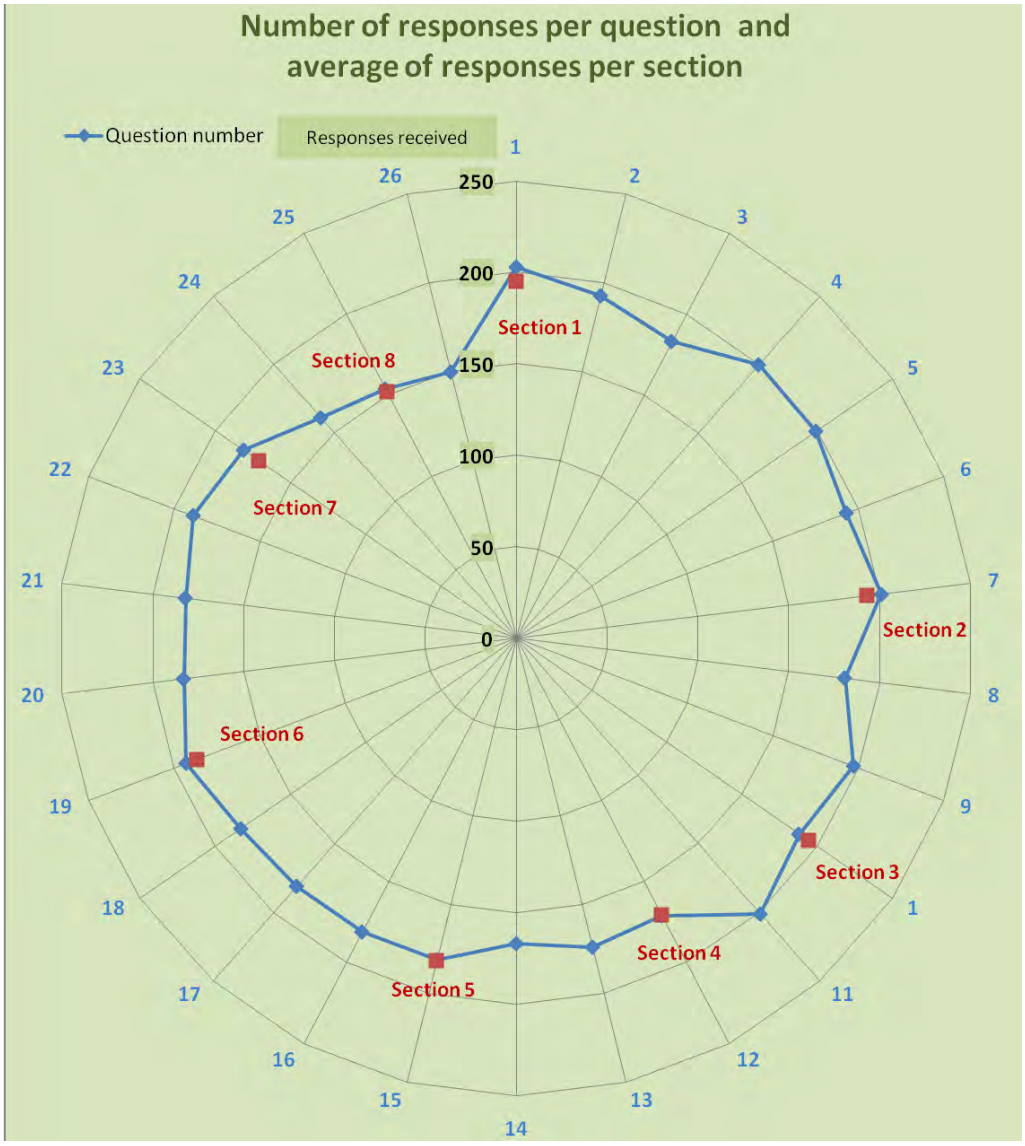
3.1.2 Responses by question and section

Overall, the sections with most answers on average were:

1. Application of the waste hierarchy to plastic waste management (195 answers on average per question);
2. Achievement of targets, plastic recycling and voluntary initiatives (193); and
3. Targeting consumer behaviour (195).

The overview is as presented schematically below.

Figure 10: Number of responses per question and per section



In general, each section attracted at least 55% of respondents. This shows a good consistency across sections on various topics.

3.2 General opinion of the Green Paper

Only **one** out of 88 respondents was **against the Green paper**. This was the *Oxobiodegradable Plastics Association (OPA)*, an association of the oxo-degradable plastics industry based in the UK and with an international scope.

Seven respondents expressed their **disagreement with the Green Paper on a particular point** as part of their introductory note.

> *Wirtschaftsvereinigung Alkoholfreie Getränke e.V (wafg)*, a German industry association of non-alcoholic drinks, expressed disagreement with the fact that the

Green Paper describes plastics as a "danger". Plastics are not dangerous for food packaging, they argue. Rather than discouraging the use of plastics, the European Commission should encourage responsible use of plastics.

Spanish industry associations related to plastics, packaging recycling, expanded polystyrene (EPS) and cleaning products (*CICOPLAST, Ecoembes, Anape* and *Adelma*, respectively) expressed their disagreement with an **excessively general approach taken in the Green paper** that does not take into account the diversity and heterogeneity of plastics in their composition and applications. Moreover, they say some data and figures are inaccurate or based on wrong or partial premises.

Die Grüne Partei Bremen, the Green Party of the City of Bremen in Germany, would like to see the Commission tackle **the question of soil litter**, not only litter in the marine environment. Moreover, it disagrees with the statements made in the Green Paper that plastic is relatively cheap, it can be used in numerous applications and that it therefore led to an exponential growth in the past and will probably keep increasing in the future. The response argues that due to future resource shortage ("peak oil"), prices are expected to increase (due to higher energy costs and oil prices), plastics are expected to be more expensive in future and a relatively costly material. In general, plastic prevention should be the focus.

Four out of 88 respondents **welcomed the Green Paper with some reserves**.

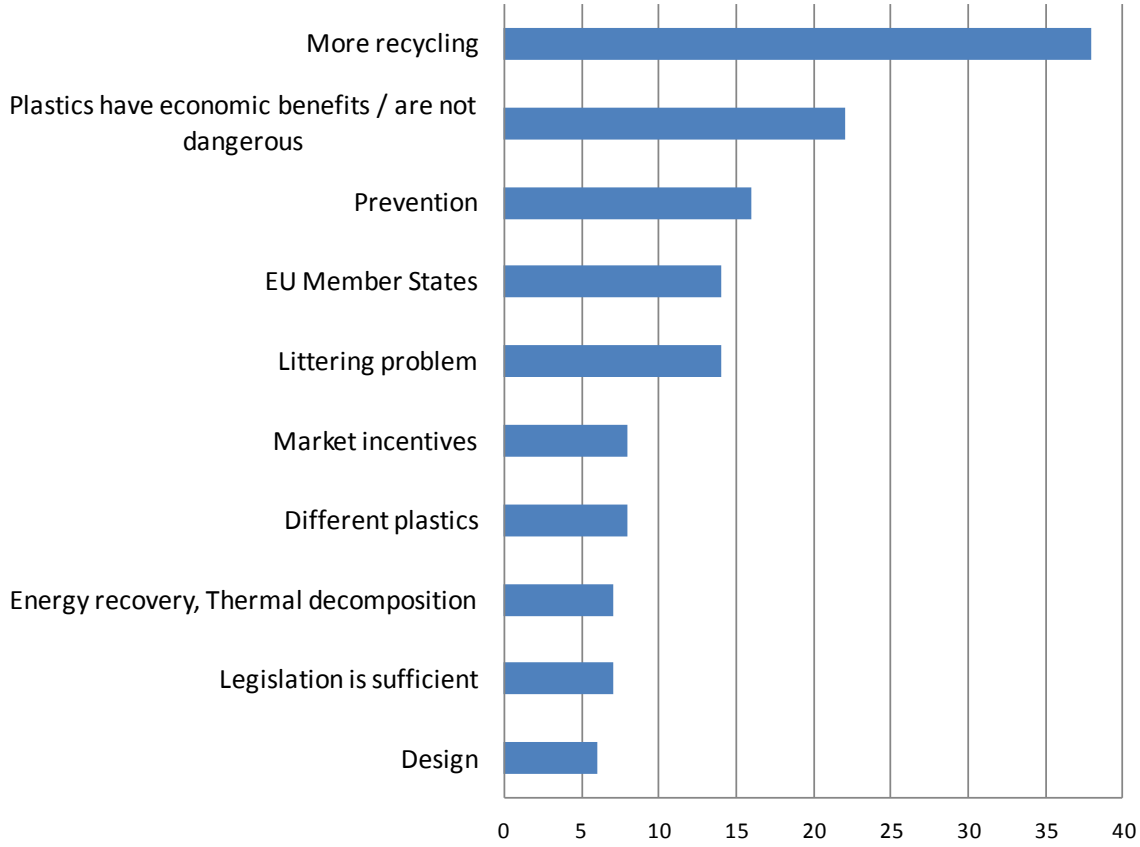
One citizen, who described himself as a "Consultant specialised in Producer responsibility issues related to packaging (UK)", felt that an important aspect was missing in the Green Paper. For most materials, it is the producer of virgin material that is also closely involved in recovery processes (for instance glass producers, who take in waste glass being recycled). However, this is generally not the case for plastics. Manufacturers of virgin plastics resin generally are not engaged in recovery processes. There are a number of reasons why this may not be helpful – resin producers have little or no motivation to facilitate recovery, and generally have no economic stake in recovery.

Veolia Environnement, a European private operator of water services, waste management and energy services, welcomed the European Commission's consultation. They drew attention to the fact that energy recovery should be considered complementary to recycling; that positive incentives are better than bans; that high standards need to be ensured and that existing legislation still needs to be implemented and harmonised.

Description of relevant/most important comments

The following figure shows the different comments classified by theme.

Figure 11: Type of answers on general opinion



- The view that **more plastics should be recycled**, as opposed to other waste treatment methods, achieved the widest consensus (38):

The most supported General view (31 responses out of 252 analysed) was that **the EU should stop funding landfill and incineration** and start using that public money to construct recycling and reprocessing infrastructure in Europe. This view was supported by NGOs with environmental interests, such as Friends of the Earth (FR, UK) or Verdegaia (ES), or those representing consumers/citizens such as CECU (the Spanish Confederation of Consumers and Users), as well as industry associations related to recycling (Gremi de Recuperació de Catalunya (ES)), the German Green Party, the Austrian Ministry of Environment and a private firm, Koan Consulting (ES).

Other views reflecting the need to respect the waste hierarchy included:

- The recycling industry still needs to be strengthened in order to allow for the development of the recycling of plastic packaging (7 respondents);
- The Waste Framework Directive (WFD) (2008/98/EC) establishes a waste hierarchy (article 4) that should be respected and effectively implemented: *a) prevention; b) re-use; c) recycling; d) other recovery, such as energy recovery,*

e) disposal (4, Austrian Ministry of Environment and DIHK, the German Chamber of Commerce, Brussels-Environment, Municipal Waste Europe).

- Plastics are not necessarily dangerous and have both **economic and environmental benefits (22)**

Respondents also expressed disagreement with the Green Paper referring to "the dangers of plastics" and said that plastic waste should be treated as a valuable resource, and that as such it should be kept in circulation within our economy for as long as possible (8);

Some of the views expressed were:

- Plastic is a wonder of modern technology: Plastic carrier bags can be made very thin, with minimal raw material, but are still strong enough to carry a full load of heavy shopping. No other shopping container can carry 2 500 times its own weight and stay strong when wet. A typical plastic carrier bag uses 70% less plastic today than 20 years ago, and no other industry has a better track record for material reduction. Plastic packaging will protect food and other goods from damage and contamination, it is hygienic and can be made in an almost unlimited number of colours and designs. It is the most cost-effective and functional solution available. It leads to innovation and technology development (especially in IT and medicine) (6);
- Moreover, plastics provide important benefits to resource efficiency and environmental protection. For instance in efficient packaging (making food usable for longer), insulation in buildings, lightweight components in cars (5).

These views were expressed by industry associations (food, drinks, plastics, oxo-degradable plastics, trade), based in Germany and the UK, as well as the German Chamber of Commerce.

UK Defra[4] commented: *"plastics provide important benefits to resource efficiency and environmental protection".* In addition, this ministry provided an example for *"efficient packaging (making food longer usable, isolating materials in buildings, lightweight components in cars)".*

- **Plastic waste prevention** is a priority for some respondents (16)

In particular, plastic waste prevention should be given much greater focus. We should teach how to produce, use and treat plastics sustainably worldwide (13). In this sense, the use of plastics should be reduced, especially knowing that energy costs and oil prices are increasing and that we are depleting resources. It is claimed that plastics contain 4% of all oil and require a further 4% of oil for their production (3).

Among these respondents were Novamont, an Italian Bioplastics company, RKW Group, VZBV, Green Party Bremen and a citizen of Austria who is a researcher in biofuels, biotechnologies and waste to energy conversion.

[4] Department for Environment, Food and Rural Affairs.

- On the question of **harmonisation of legislation and implementation at EU level and differences between Member States,** 14 respondents expressed concerns

Some stakeholders (6) stated that **EU Member states are at different levels or have different waste management systems**. Some of them argue that those regional differences should be respected (3, wafg (association of non-alcoholic drinks, DE), WVK, Plastics Europe Germany). Others argue that the problem in plastic recycling is none other than a lack of infrastructure or an underdeveloped waste management system and that countries with modern municipal waste systems face no problem of plastic recycling (3, VKU, RKW-Group (film and non-woven manufacturer), BGA (German association for wholesale, exports and services)).

A number of stakeholders (11) asked for **unified and effective implementation of EU legislation across the EU** (WVK, BGA, DIHK, RKW-Group, City of Vienna, etc.).

- **Marine and soil litter** exists and is a great environmental concern (14)

Stakeholders expressed their concern not only about marine litter (7) but also about soil litter (2) – which is not mentioned in the Green Paper and needs to be taken into account. Marine litter affects ecosystems and its prevention should be a priority. Moreover, one should take into account that it presents not only an environmental concern, but also great economic losses, since marine litter undermines tourism and fishing (3).

Related to this is the concern on illegal dumping or export of plastic waste into countries with undeveloped waste management systems (3).

These concerns were expressed by two German citizens (working in waste engineering and in an environmental consultancy), a French plastics industry federation, Green Party of Bremen, RKW Group, etc.

- The opposing view, **that plastics are dangerous for the environment** was explicitly defended by (5) stakeholders (the German section of the International Society of Doctors for the Environment (ISDE) and the Federation of German Consumer Organisations (VZBZ), etc.).

They emphasised that we need to act now, on various fronts, and that waiting until 2020 is too late. Despite the fact that plastics have improved our lives, we should not ignore their environmental and health impacts.

3.3 Specific responses

3.3.1 Introduction

The Consultation asked some open questions, to which respondents answered freely. For the analysis, we introduce each question by multiple-choice options that respondents have implicitly selected in their text. Next we analyse their precise contributions, many of which overlap across different respondents. Then, an overall recommendation is derived for each question by theme or by category (legislation, implementation, target, industrial practice, communication, etc.).

The analysis focuses on main themes with examples and numbers of respondents. A specific paragraph is provided under each question for the responses of national and regional ministries of the environment.

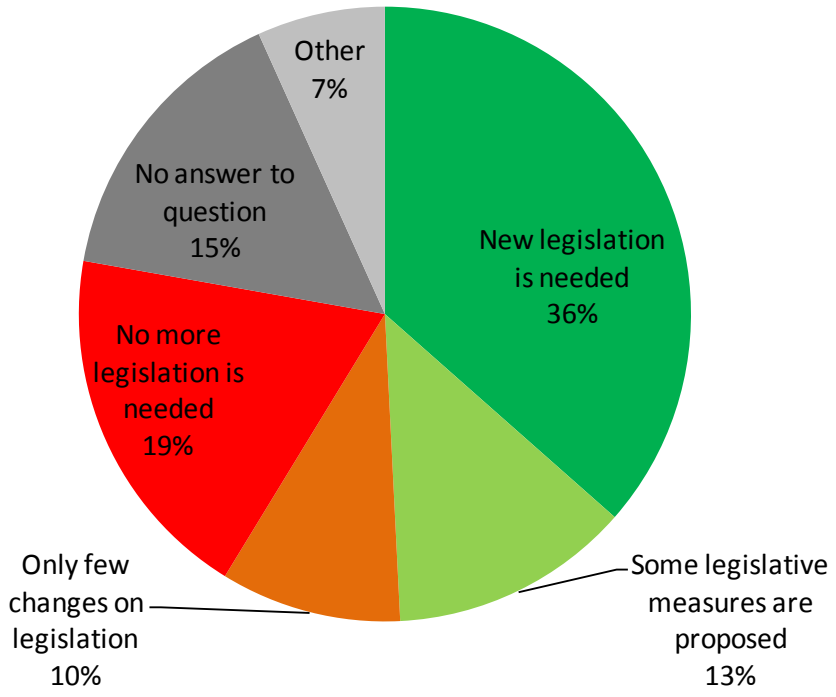
3.3.2 Responses by theme

1. Application of the waste hierarchy to plastic waste management (Questions 1-6)

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

Of 252 respondents, only 15% did not answer the question.

Figure 12: Question 1 – answers regarding the existing legislative framework

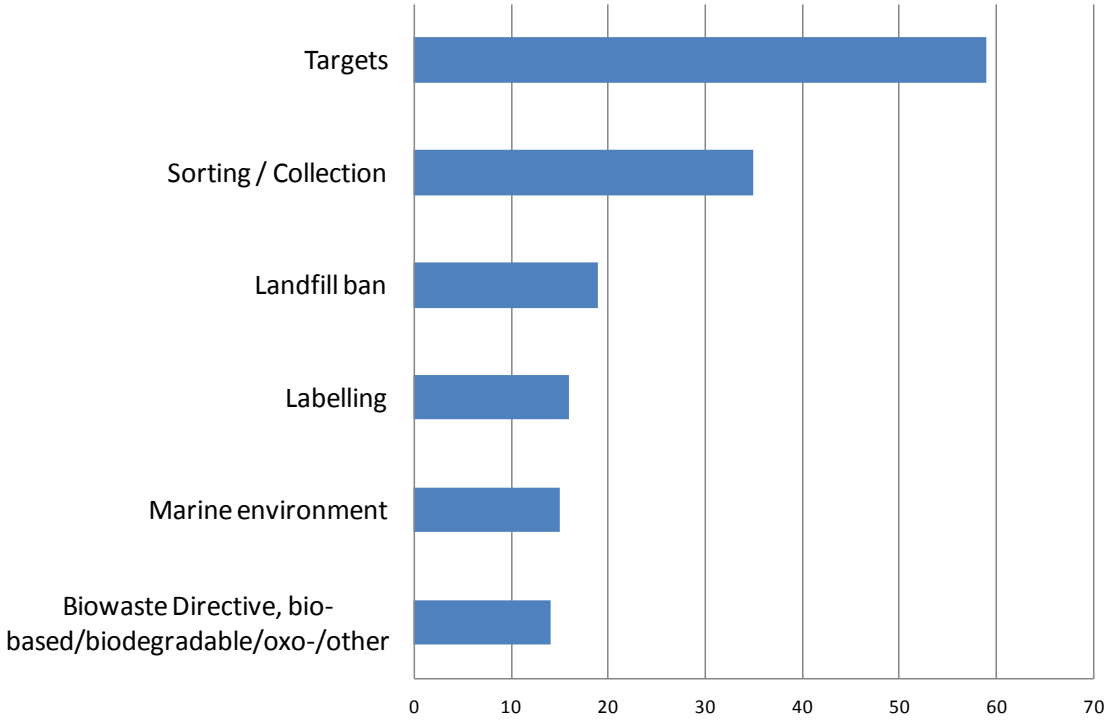


While half of respondents proposed legislative reforms, 36% explicitly requested new legislation (92), while others proposed legislative changes or new measures (32). Almost 19% of respondents thought that in general the existing legislative framework was sufficient (48), although some of these did mention some possible changes (24).[5]

[5] From now on, we will use a colour code where appropriate in pie charts, i.e. green for generally favourable opinions, red for generally negative opinions, etc.

- Concerning the type of recommendation, comments on the answers "**some legislative measures are proposed"** and **"new legislation is needed**" are shown in the figure below.

Figure 13: Question 1 – answers regarding improvements to legislation



Description of relevant/most important comments

The main comment concerning "**Targets**" is "*to increase the recycling target in the Waste Framework Directive and the Packaging Directive"* for 28 respondents. Another answer is given by 26 respondents for "*increasing the recycling rate and rate of recycled materials in product".*

Concerning "**Sorting/Collection**", 20 respondents think it is important to "*Improve legislation in the EU for waste collection and efficient sorting"*. For 15 stakeholders, the effort has to be placed on "*Harmonisation of collection, separation and general waste management across Member States*".

- It is also important to show "**why the existing legislative framework can deal with plastic**"

The main answer under this heading is the implementation and enforcement of legislation: "*Full implementation and enforcement of the Waste Framework Directive / and other regulation in Member States will further enhance recovery/recycling performance*" (48).

The second response shows that current legislation is enough: "*The promotion of recycling for plastic packaging is appropriately codified in the Waste Framework Directive (WFD) and the Packaging and Packaging Waste Directive (PPWD), in which overall recycling targets and a specific minimum recycling target for plastic packaging are set*" (11).

National and regional ministries of the environment

Of the nine ministries that provide a specific answer to this question, six (CZ, AT, DK, UK, NL, FR) agree that plastic waste can be dealt within the existing legislative framework, and three (German Bundesrat, EE, SE) answer that more legislation is needed.

The response from the AT ministry along with those of NL and FR support *"full implementation and enforcement of the Waste Framework Directive".* These ministries also mention that *"We need better enforcement / implementation before legislating more".*

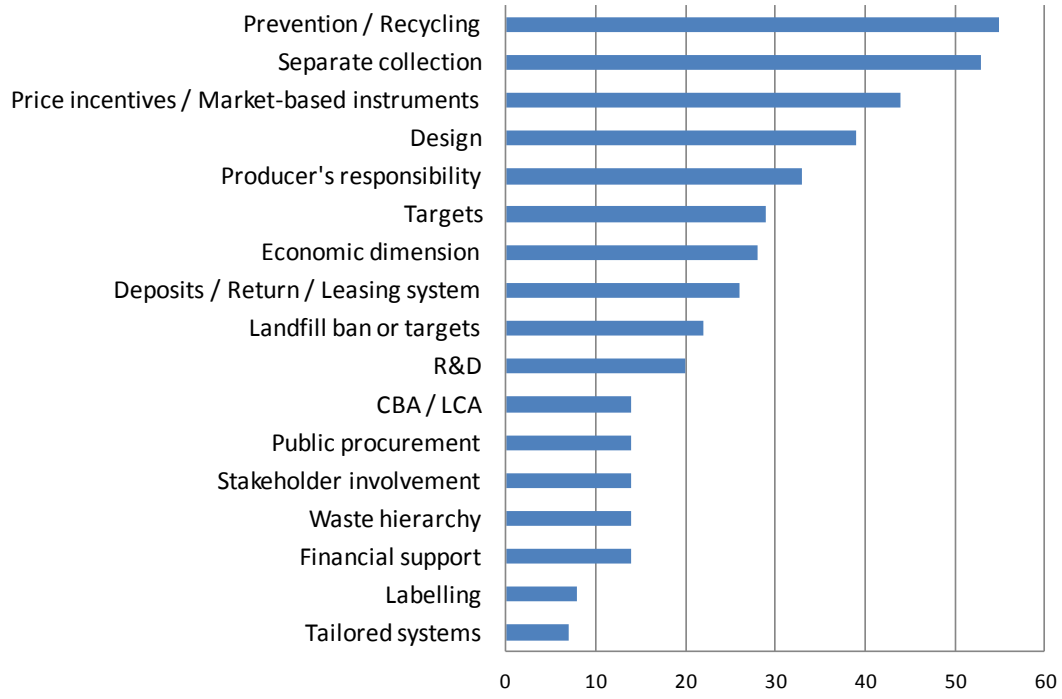
Based on the ministry of environment opinions, legislation needs to improve in **Targets,** especially with regard to increasing recycling rates and rates of recycled content in products.

The Niedersachsen (DE) ministry makes a comment about improving legislation: *"Current legislation discriminates between different kind of plastics - establishing different protection levels for raw and secondary materials".* The same response also advocates *"Harmonisation of collection, separation and general waste management across EU27 Member States".* Another ministry (UK) believes legislation needs to improve in waste collection and efficient sorting in the EU.

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

Comments on this question were made by **183** respondents. Stakeholders made very diverse recommendations concerning measures on multiple themes. The most common are as follows:

Figure 14: Question 2 – Measures to promote recycling by type and number of stakeholders



Description of relevant/most important comments

Concerning the answer "**Prevention/Recycling**", the main measure is to "*Promote higher recycling target in the WFD and the packaging directive"* (24) and to "*define better waste hierarchy in legislation"* (11).

Concerning the measure "**Separate Collection**", the comment that appears most often concerns waste collection systems: "*Set up appropriate separate waste collection systems. Optimise collection and separation of waste in all Member States"* (27). The second comment is to mix effective collection and best recycling methods: "*The optimal and all-encompassing collection of plastics at their end of life is very important as well as using the best recycling method"* (18)

Concerning "**market-based instruments**", it is necessary to put in place "*market-based instruments to promote greater recycling" (31)*. Another measure is "*to reduce VAT for products containing recycled content"* (7).

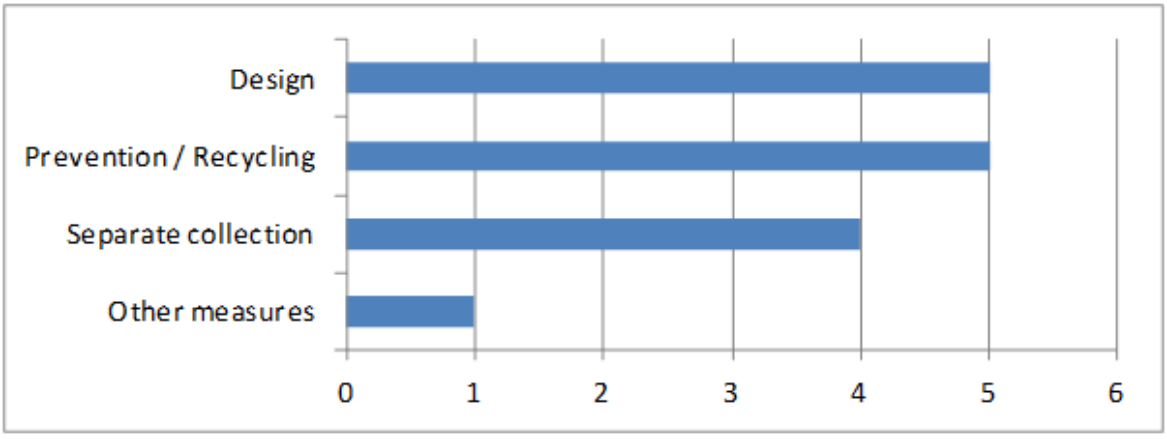
Concerning "**design**", it is important "*to plan upstream the design of the product with regard to its recycling"* (30).

An effective instrument to promote greater recycling that is cited is to put in place "**extended producer responsibility**" (33).

National and regional ministries of the environment

A summary of ministries' responses regarding the type of measures that can promote greater recycling is presented in the chart below:

Figure 15: Question 2 – Type of measures and number of ministries who promote greater recycling



Concerning **"Design"** measures, three of the ministries make a suggestion along the lines of "*Planning upstream (design) of the product with regard to its recycling. Think of the materials used, recyclability, and also on the lifespan of the product"*.

With regard to **"Prevention/Recycling"**, three ministries believe we should "*promote higher recycling target in the Waste Framework Directive and the packaging directive"*. UK Defra adds a comment: "*a greater focus on the quality of recyclates by the different actors in the supply chain will help to ensure our approach to extracting recyclables, such as plastic, from our waste generates material or sufficient quality to promote high quality recycling"*.

As for **"Separate collection",** three ministries comment along the lines that: *"The optimal and all-encompassing collection of plastics at their end of life, is very important), as well as using the best recycling method"*.

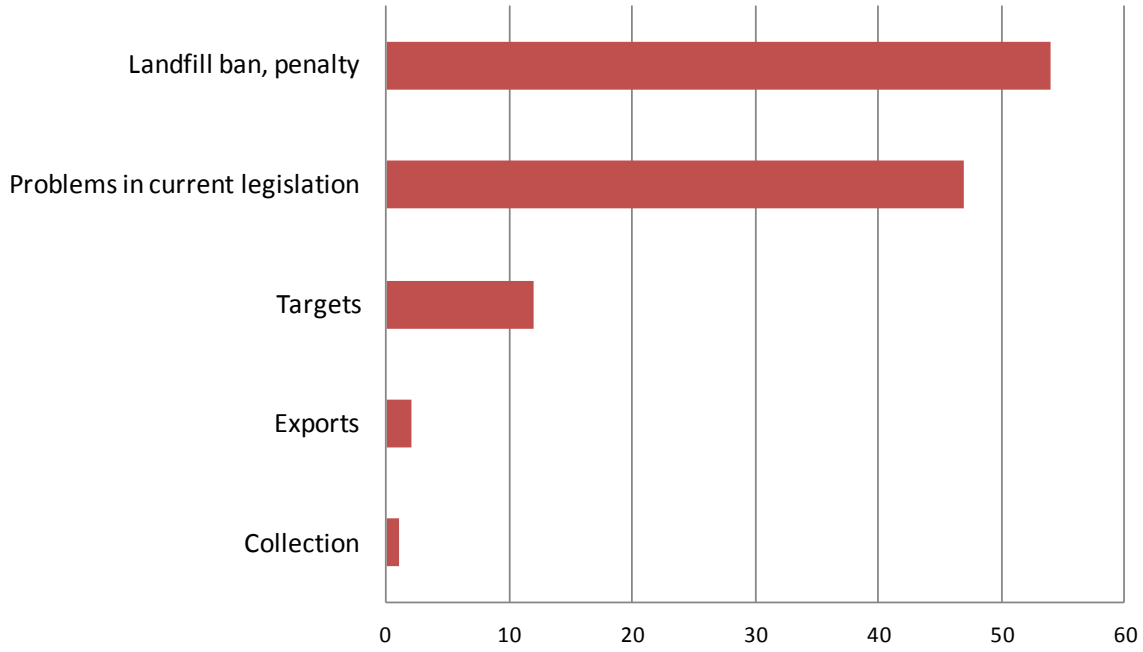
(3) *Would full and effective implementation of the waste treatment requirements in the existing landfill legislation reduce current landfilling of plastic waste sufficiently?*

Out of **252** respondents**, 139** give an explicit answer (75 say that "legislation and implementation are not sufficient" and 44 that "implementation needs to be taken care of".

Description of relevant/most important comments

In the category of answers "legislation and implementation are not sufficient", two types of shortcoming in legislation are frequently cited, see below.

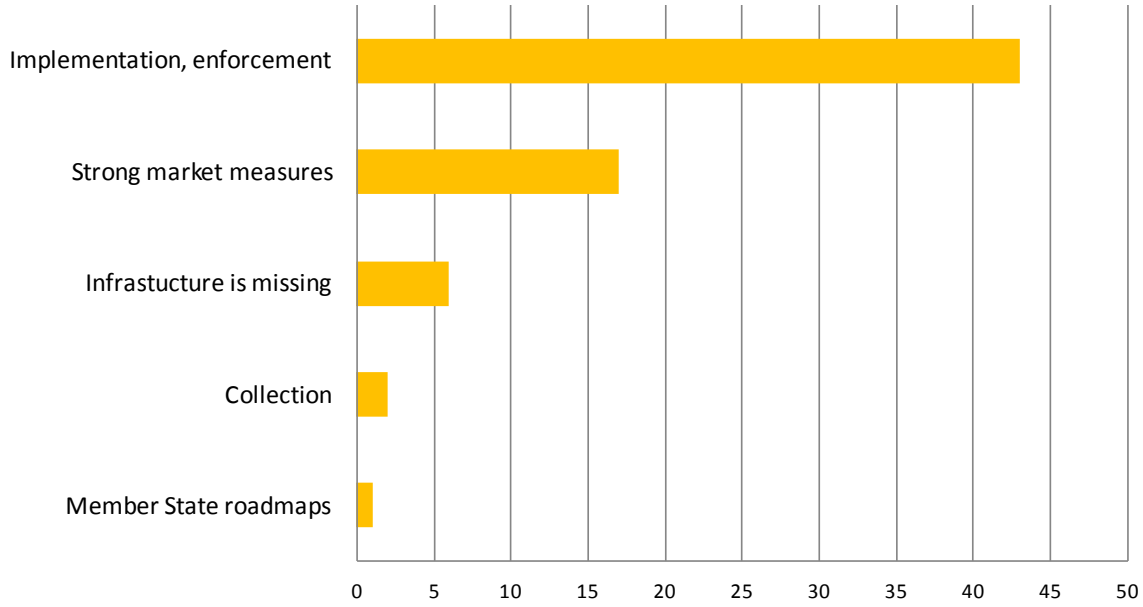
Figure 16: Question 3 – Gaps in existing legislation



Existing landfill legislation lacks *"a prohibition for landfilling of plastic"* (22). A second recommendation is to create "*landfill diversion targets with ban of untreated waste and recyclable waste"* (17). Concerning the category "Problems in current legislation", the main comment is a general one and it is that "*the Landfill Directive is not sufficient"* (31).

The figure below shows types of answer concerning the need for improvements to the implementation of existing legislation from 44 respondents.

Figure 17: Question 3 – Types of improvement needed



In general, improvements in legislation are necessary according to 43 respondents. For 24 stakeholders, "*the reduction of landfilling plastic is effective with a full implementation of landfill legislation in a unified way*".

The second answer concerns the improvement of legislation with market measures. For 17 stakeholders, "*Legislation has to be accompanied by measures to create a strong market for secondary raw materials to incentivise recycling*".

National and regional ministries of the environment

Concerning the third question, seven ministries provided a specific answer, of which: 57% answered "Legislation and implementation are not sufficient", and 43% that "Implementation needs to be taken care of".

Ministries' remarks on the subject of a "**Landfill ban**" are: "*EU-landfill ban for all plastic waste / separating and collecting all plastic particles*" (2), followed by "*Landfilling of plastic waste should be prohibited*" (1) and "*Landfill ban is missing*" (1).

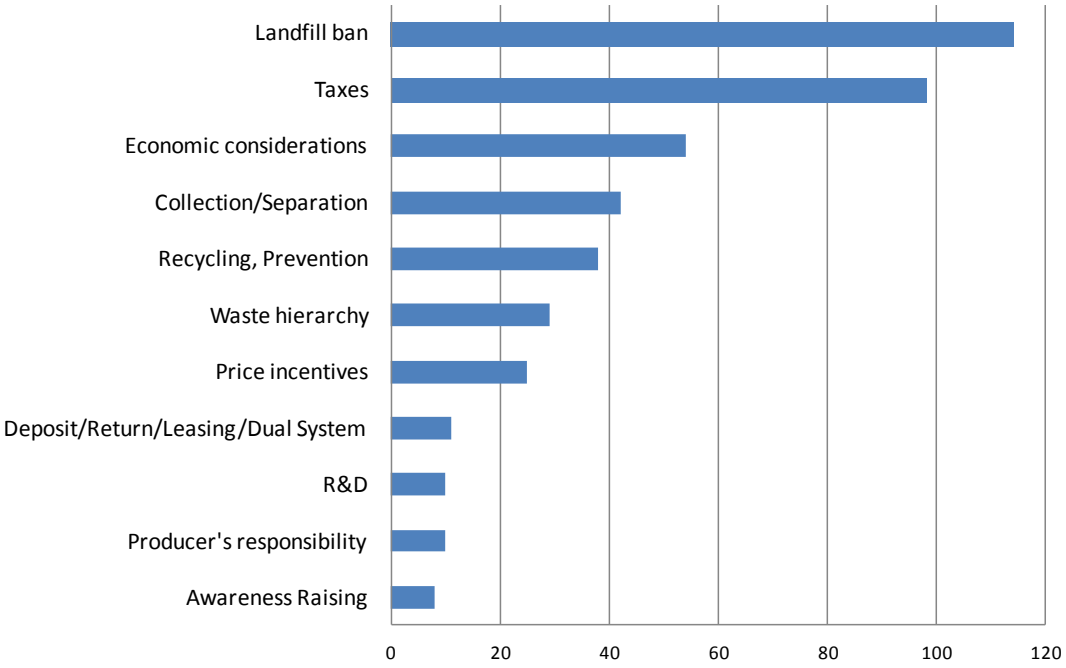
Ministries highlight "**Problems in current legislation**" as do the majority of stakeholders.

The last remark concerns the implementation of existing legislation. The CZ ministry provides this comment "*Consistent and effective fulfilment of waste management requirements arising from the already existing legislation is a necessary step towards the implementation of any new stricter regulations*".

(4) *(a) What measures would be appropriate and effective to promote plastic reuse and recovery over landfilling?*

Comments on this question were made by **173** respondents. This includes answers given to the second part of the question. Stakeholders give very diverse recommendations concerning measures on multiple themes.

Figure 18: Question 4a – Type and number of responses to promote plastic reuse and recovery



Description of relevant/most important comments

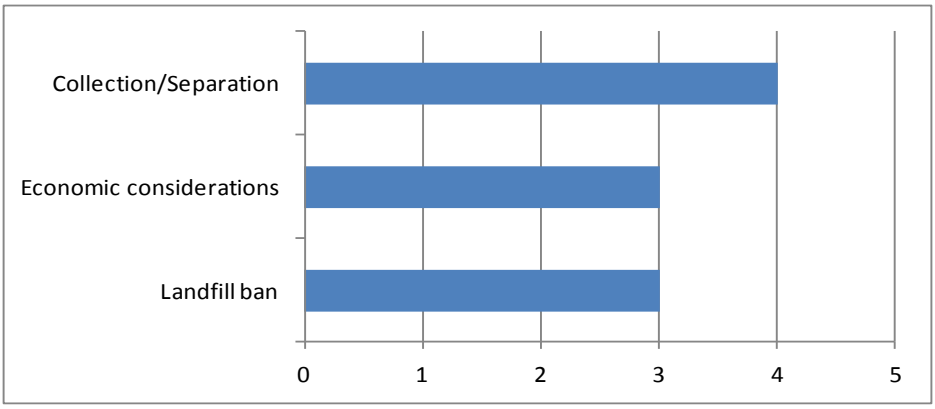
The figure shows that landfill bans and taxes are the most common kind of answer to promote plastic reuse and recovery over landfilling. These responses are analysed in the next question.

Concerning the third type of answer "**Economic considerations",** the main comment is "*The key to the development of plastics recycling begins with the development of markets for recycled materials and the creation of a network of companies in competitive recycling*" (24). Stakeholders are worried about the lack of development of recycled materials in the market.

National and regional ministries of the environment

With regard to the type of appropriate and effective measures to promote plastic reuse and recovery over landfilling, ministry of answers are summarised in the chart below:

Figure 19: Question 4a – Type of measures and number of ministry responses to promote plastic reuse and recovery

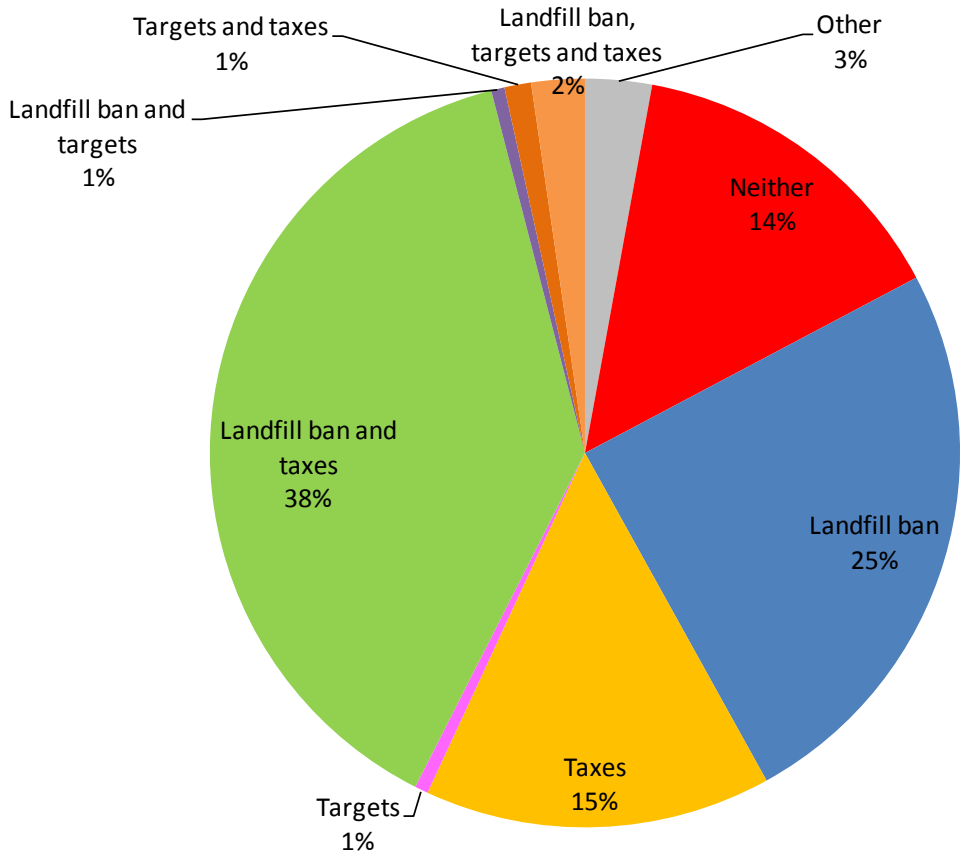


A majority of ministries consider the problem of waste **collection and separation** systems to be important. The CZ ministry states that "*Preference should be given the collection systems that enable citizens to separate all plastic waste and not only some of its components".* The response from the EE ministry points out "*The priority should be on source separation"*.

(4) *(b)Would a landfill ban for plastic be a proportionate solution or would an increase of landfill taxes and the introduction of diversion targets be sufficient?*

Answers to this question were provided by 173 respondents.

Figure 20: Question 4b – Answers concerning landfill ban and taxes by type



The main type of answer received is to combine landfill bans and taxes. For 26 stakeholders, the introduction of landfill tax is necessary to improve waste recycling.

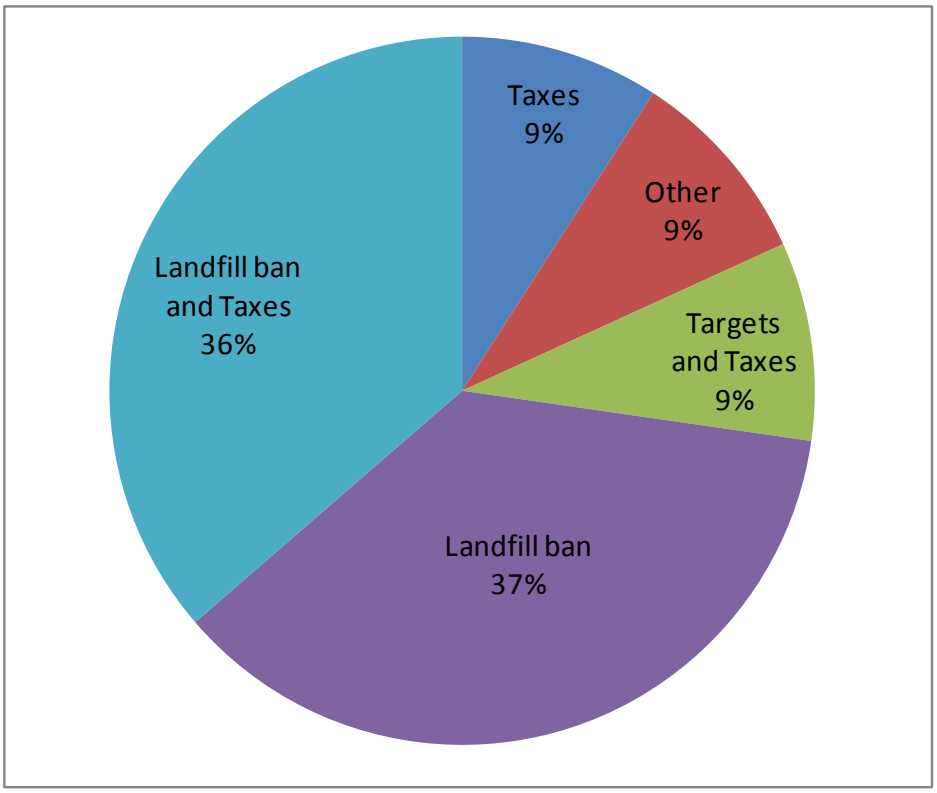
Concerning landfill bans, the most common option response recommended is to consider a "*Landfill ban for all recyclable and energy recoverable plastic waste*", with 18 respondents. Stakeholders urge care not to send waste to landfill that can be considered a future resource.

National and regional ministries of the environment

Concerning a landfill ban for plastics, increased landfill taxes or introduction of diversion targets, 11 ministries provide a specific answer, of which the majority support "**Landfill ban**" (37%) and

"Landfill ban and Taxes" (36%). Ministry answers in this regard are summarised in the figure below:

Figure 21: Question 4b – Ministry answers concerning landfill ban and taxes



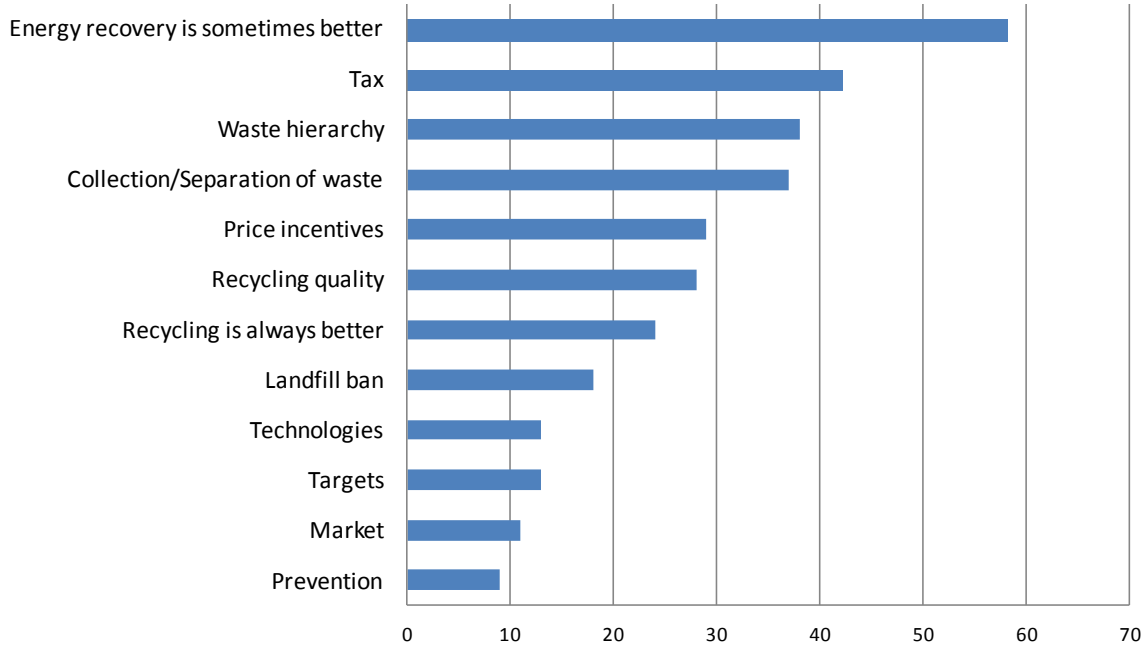
Concerning "**Landfill ban**", a majority of ministries consider a ban on landfill to be useful only for certain flows. A landfill ban for all materials is not appropriate. For example, the DK ministry points out "*it would be wrong to pursue a general ban on landfilling plastic waste, as it may be relevant to landfill certain types of plastic waste; e.g. PVC waste and waste containing heavy metals. it would be more appropriate to pursue a ban on landfilling waste suitable for incineration*".

Concerning the "**taxes**" response, an example of a proposal would be an increase in a tax on flows entering a landfill facility.

(5) *What measures might be appropriate to move plastic waste recovery higher up the waste hierarchy thereby decreasing energy recovery in favour of mechanical recycling?*

Comments on this question were made by **165** respondents. This includes answers given to the second part of the question. Responses were diverse.

Figure 22: Question 5a – Types and number of answers concerning mechanical recycling



Description of relevant/most important comments

- **No measure is needed**: The main answer is that "**Energy recovery is sometimes better**" for waste management. This response implies that it is not necessary to introduce new measures. Indeed, it is "*impossible for many products to have a mechanically recycling, due to the contamination with other materials or to recycle complex"* (35). Many stakeholders think it is impossible to ban completely energy recovery because mechanical recycling is not always better than energy recovery.
- **New measures are needed**: The second response for "**Tax**" is analysed in the next question.

The third answer for "**Waste hierarchy**" shows that waste management has to follow the waste hierarchy wherever possible. Indeed, mechanical recycling is above energy recovery: "*the waste hierarchy approach to waste management should be followed since it keeps the resource at highest material value for longer*" (19).

National and regional ministries of the environment

Ministries of environment have the same opinion of "**Waste hierarchy**" as most stakeholders. Defra (UK) mentions "*recycling should be preferred in line with the waste hierarchy, and incineration with energy recovery should only be pursued after the other steps in the hierarchy have been exhausted*".

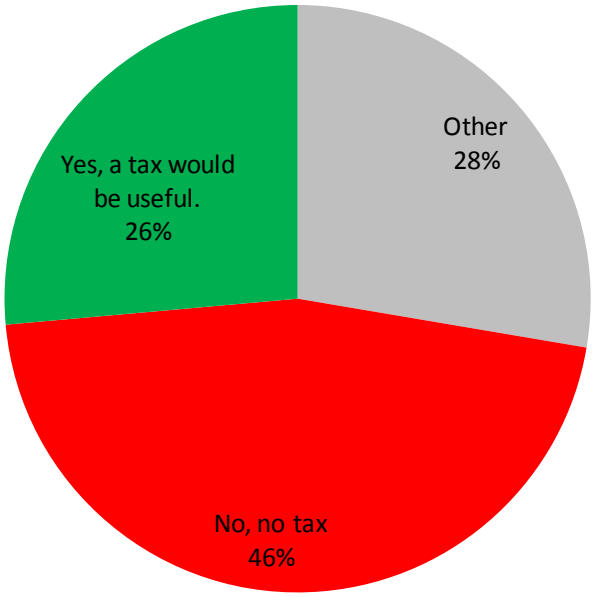
Another measure should be to ensure high quality recycling. For example, the NL ministry explains, "*Ways to promote better quality of regranulates must be sought, so that it becomes more attractive for the actors*".

That last theme is in relation to the development of the market for recycled plastics. The NL ministry specifies that "*if market demand for high-quality regranulates can be increased, whereupon the revenue potential of plastic waste also increases*".

(5) *Would a tax for energy recovery be a useful measure?*

Of **165** respondents, **159** gave an answer for the tax:

Figure 23: Question 5b – Proportion of respondents for or against tax



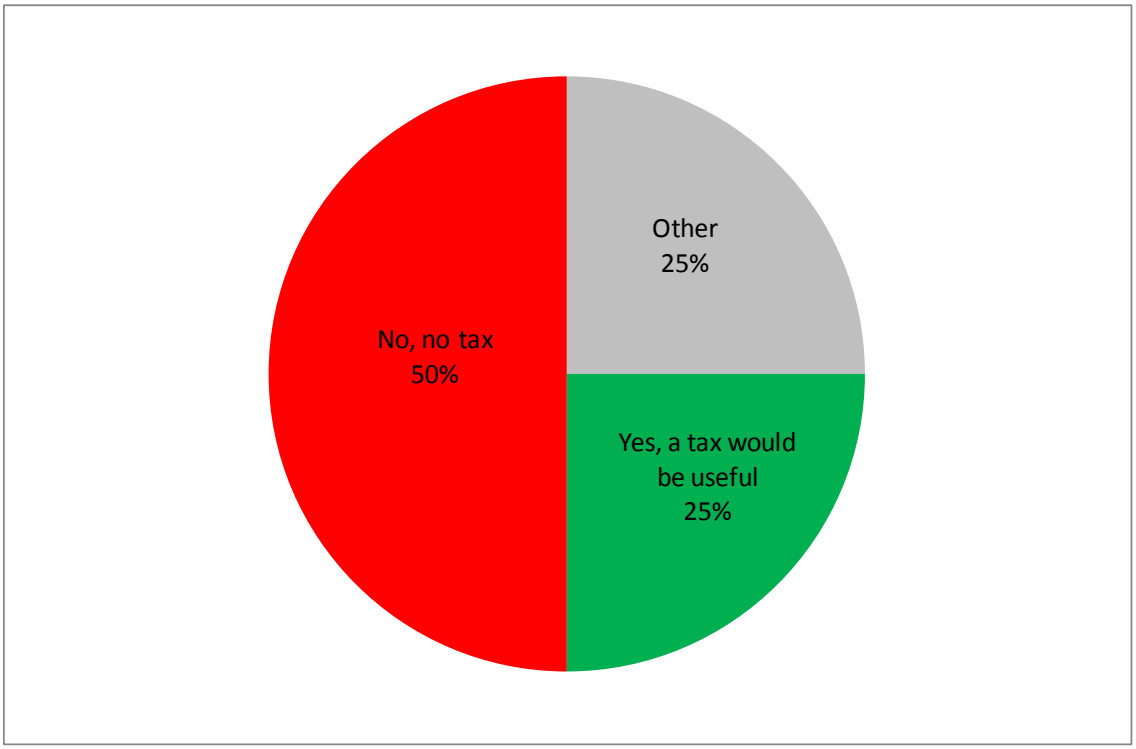
The main type of response received is not to introduce a tax (73). Reasons not to introduce taxes are varied but the main type of comment is simply "*it is not a solution*" (23). The second comment is "*tax on incineration could have undesired indirect effects, such as faked recovery, low-cost landfill, illegal transport or burning in biomass or other"* (8).

For supporters of a tax, the main reason is that an incineration tax is useful to discourage the use of incineration over other more environmentally and socially friendly options (30).

National and regional ministries of the environment

Eight ministries give a specific answer for tax. The figure below shows the proportion.

Figure 24: Question 5b – Proportion of ministry responses for or against a tax on energy recovery

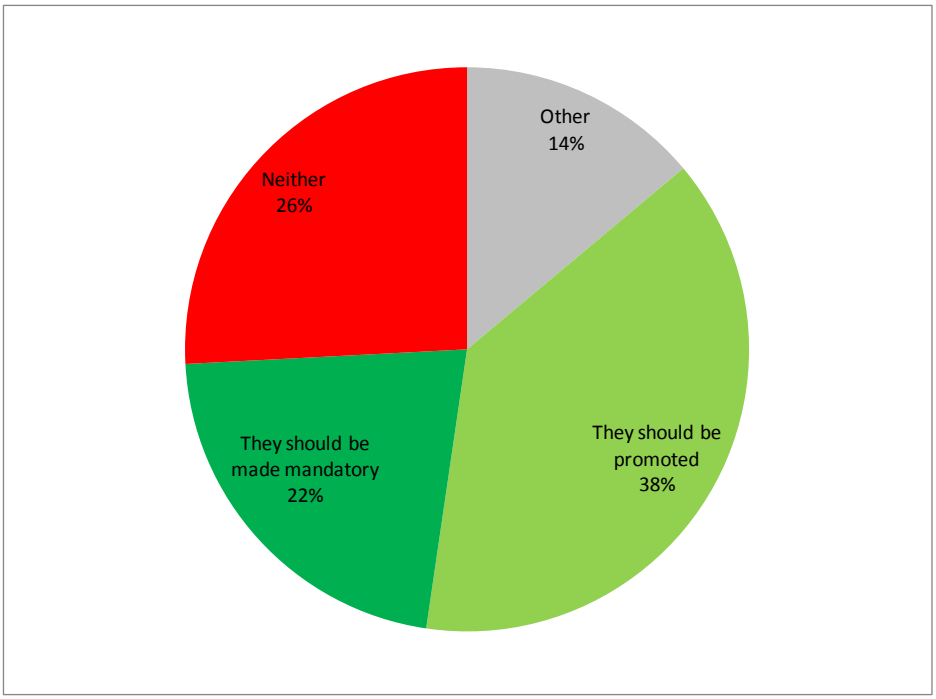


The main comments against a tax concern the fact that it is not a solution and would not stimulate recycling. For the Austrian ministry, a tax could be useful if implemented with other measures like quality of recycling.

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

Answers to this question were provided by **121** respondents. The figure below shows the proportion of respondents who are in favour of the promotion or mandatory introduction of this measure. Generally, responses are in favour with certain conditions.

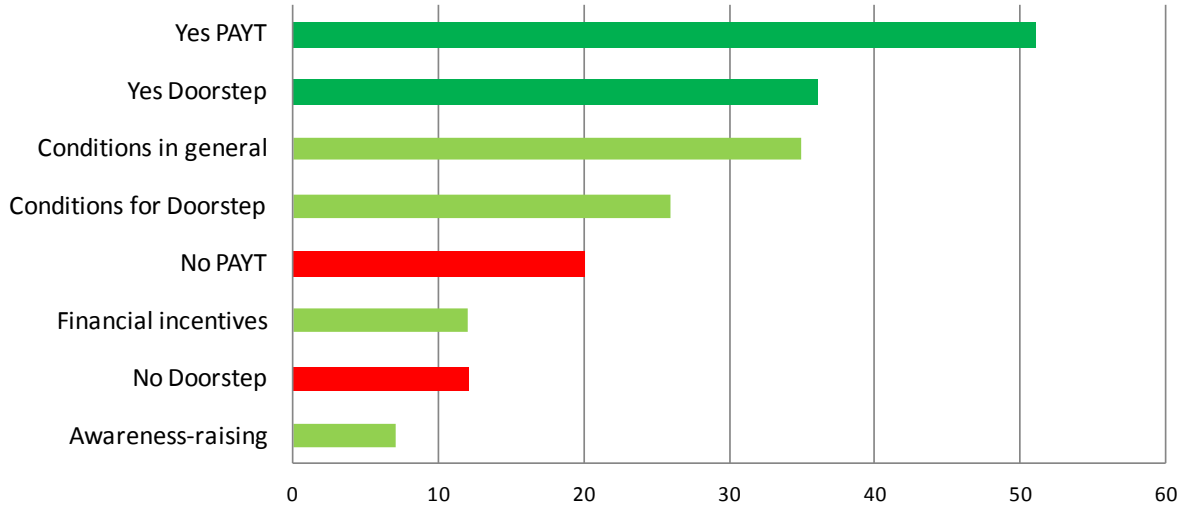
Figure 25: Question 6 – Proportion of respondents for or against the measure



Description of relevant/most important comments

The main comment in favour is that measures should take into account local conditions (35): "*Any measures on waste collection should take account of local conditions, e.g. population density, level of economic development, local political priorities and current waste management infrastructure since there multiple working solutions available, for example kerbside collection, waste islands, igloos, container/bag collection, door to door collection etc.*" If these parameters are considered, this measure can work. The next figure shows the different comments and can be split into two parts: "Separate door step collection" and "Pay as you throw".

Figure 26: Question 6 – Type and numbers of answers concerning separate doorstep collection and pay-as-you-throw (PAYT) schemes



In general, the introduction of "**PAYT**" is a very good solution because "*Pay-as-you-throw is the easiest and quickest method to reduce waste arising and should be introduced across Europe"* (18). Also, PAYT increases recyclability (10).

Concerning "**Separate door step collection**", it increases "*high quality recycling"* (10) and "*this initiative has to be recommended for bio-waste too"* (15).

National and regional ministries of the environment

Ministries have the same point of view as stakeholders about taking into account local conditions before establishing measures. For example, the Czech ministry mentions that "*the operability of these systems is largely affected by many factors, which may at local levels differ significantly*". The Dutch ministry also adds, "*Member States must be free to apply whatever system is most appropriate given the local circumstances*"

Concerning "**PAYT**", most ministries are **against this measure**, unlike the majority of stakeholders. For example, the Defra (UK) response says that "*Pay as you throw could also provide an incentive on householders to break the law either through fly-tipping or by putting sacks next to their neighbours' rubbish"*

Concerning separate doorstep collection, in the view of most ministries it would be worth implementing this measure. According to the French ministry, this measure is useful if the plastic recycling industry has time to adapt.

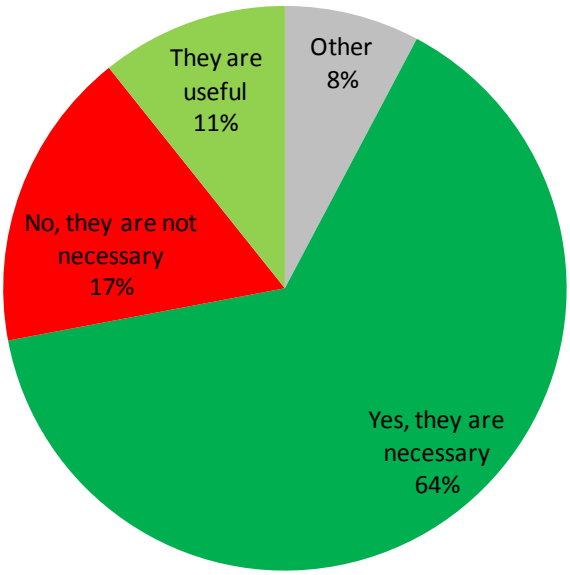
2. Achievement of targets, plastic recycling and voluntary initiatives (Questions 7-8)

Targets and exports of plastic waste

(7) *(a) Are specific plastic waste recycling targets necessary in order to increase plastic waste recycling?*

Answers to this question were provided by **136** respondents. Generally, stakeholders are in favour of the establishment of recycling targets.

Figure 27: Question 7a – Proportion of respondents for or against recycling targets

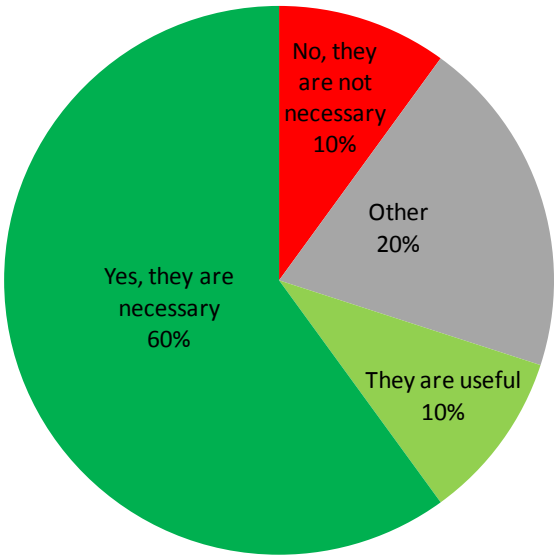


According to nine stakeholders, "*Specific recycling targets are only advised if there is a market for secondary plastic materials*". A second comment is to take into account recycling targets by type of product (WEEE,[6] ELV, etc.) and to complement recycling targets by recovery targets (13).

National and regional ministries of the environment

Ten ministries give a specific answer to this question. The figure below shows the proportion.

Figure 28: Question 7a – Proportion of ministries for or against recycling targets



[6] Waste Electrical and Electronic Equipment.

Most ministries believe setting targets for recycling is an interesting proposal to stimulate the development of recycling. Targets should be realistic and verifiable (ministry of Schleswig-Holstein). Targets have to be set by type of product (WEEE, etc.) and it would be interesting to conduct a study on the suitability of a recycling target for major waste sectors using plastics according to the ministry of FR.

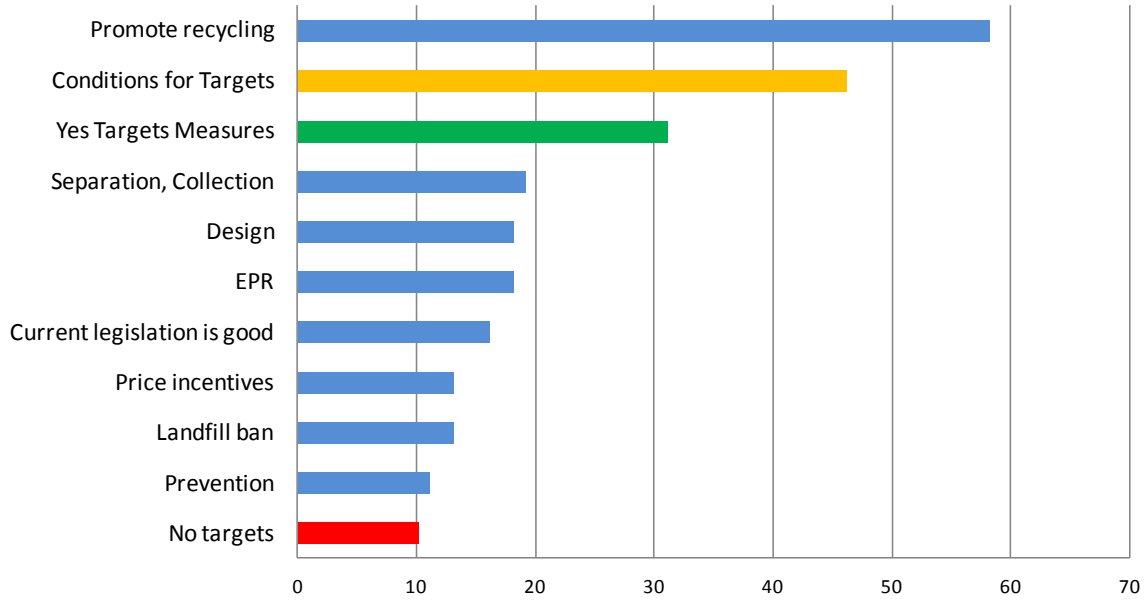
On the other hand, the Czech ministry does not approve of a new recycling target "*it would not be appropriate to set any new specific target for material recovery at the time before assessing the effectiveness of existing objectives set out in the Waste Framework Directive*".

(7) *(b) What other type of measures could be introduced?*

Description of relevant/most important comments

The graph below concerns the different measures that can be introduced and the recommendations.

Figure 29: Question 7b – Number of answers by type of measure



The most common category of answer is "**Promote Recycling**". Stakeholders believe *the most important step is not to improve the target already but to improve specificity about recycling such as the quality of recycling* (10), the use of recycled materials in products (10) or the introduction of closed-loop recycling to provide high quality material (12). Another measure mentioned is to change the way the recycling rate is calculated by taking into account the actual output of secondary materials and not the flow of input from collection (10). Of the other measures cited, the most frequent is to have good separation of plastic materials at the earliest possible stage, before promoting the recycling target (11).

National and regional ministries of the environment

Most ministries have the same point of view as stakeholders about quality of recycling and the use of recycled materials. For example, the Danish ministry believes in "*securing quality in the*

recycling process and securing end products that truly can replace virgin plastic". Defra (UK) emphasises this point that "*it is more important to focus on the overall quality of recyclate obtained*".

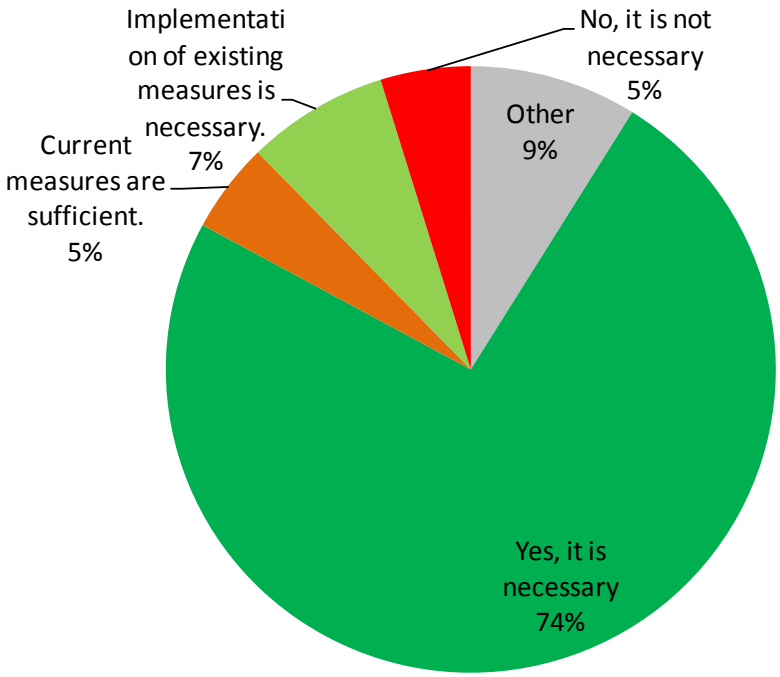
Ministries are in favour of better separation of materials and sorting. For example, the NL ministry believes "*appropriate measures include a better separation to increase the number of monoflows, improved sorting*".

Another comment concerns the development of the Extended Producer Responsibility (EPR) principle. The French and Estonian ministries support this approach.

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

Answers to this question were provided by **146** respondents. A majority of stakeholders support new measures to avoid substandard recycling or dumping of recyclable plastic waste through export to third countries.

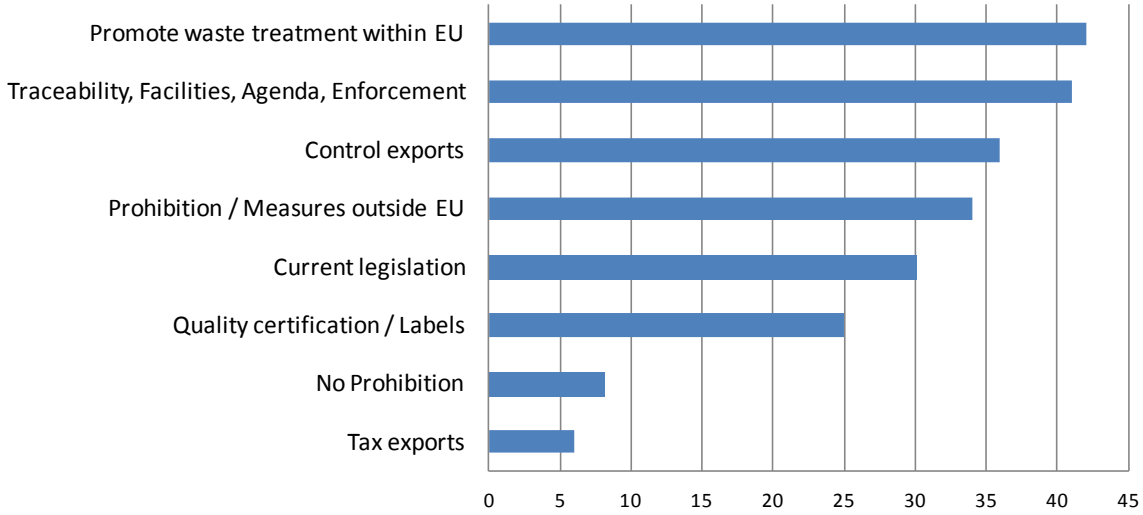
Figure 30: Question 8 – Proportion of respondents for or against measures



Description of relevant/most important comments

Most stakeholders have many measures in mind, from proper waste management in the EU to strengthening of legislation and improvement of checks on exports. The graph below shows various general measures that could be introduced:

Figure 31: Question 8 – Type and number of answers concerning measures



The main concern for respondents is to "**promote waste treatment in the EU**". The EU has to ensure that "*preference for recycling is in EU industry*" (21). This point highlights that "*the responsibility of each country which has to treat in the EU plastic waste occurring in the EU*" (20).

The second kind of response concerns the strengthening of legislation: 20 stakeholders give the view that it is necessary to "*Strengthen the application of the Waste Shipment Regulation 1013/2006*". On the topic of "**facilities**", these stakeholders say "*a list of certified facilities outside the EU should be established to avoid shipment of waste to substandard treatment facilities*" (16). Next, responses on "**traceability**" concern the necessity of imposing traceability and transparency of trade to prevent substandard recycling or export of recyclable waste (6).

The third answer is linked to "**control exports**" by "*increasing waste shipment controls*" (13) and "*controlling the flow of resources inside EU*" (10). The fourth comment is the promotion of "**prohibition and measures outside the EU**". According to 15 stakeholders, the EU has to apply the same standards in third countries for exporting waste. Finally, a prohibition on plastic waste to third countries has to be implemented according to some (10).

National and regional ministries of the environment

As regards introducing measures to avoid substandard recycling or dumping of recyclable plastic waste through export to third countries, six ministries provide a precise answer. Most believe the EU has to ensure that preference for recycling is with EU industry in some way. The French ministry considers "*it is necessary EU develop a legal study on the possibilities and conditions to focus on national and European level local recycling*". If there are exports of plastic waste, it is necessary to have the same EU standards in third countries as well according to Schleswig-Holstein for example.

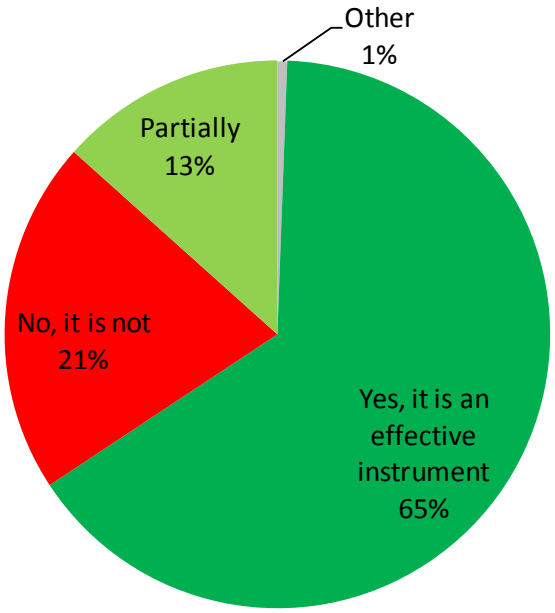
Another comment for most ministries is that existing legislation is sufficient about export waste for disposal under the Waste Shipments Regulation "green list". This rule has to be respected and implemented. Indeed, the export of waste on the green list for landfill is prohibited.

Voluntary Action

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

Answers to this question were provided by **172** respondents. A majority of stakeholders (65%) encourage this initiative of voluntary action and think it is an effective instrument. For 21% of respondents, voluntary action is useless.

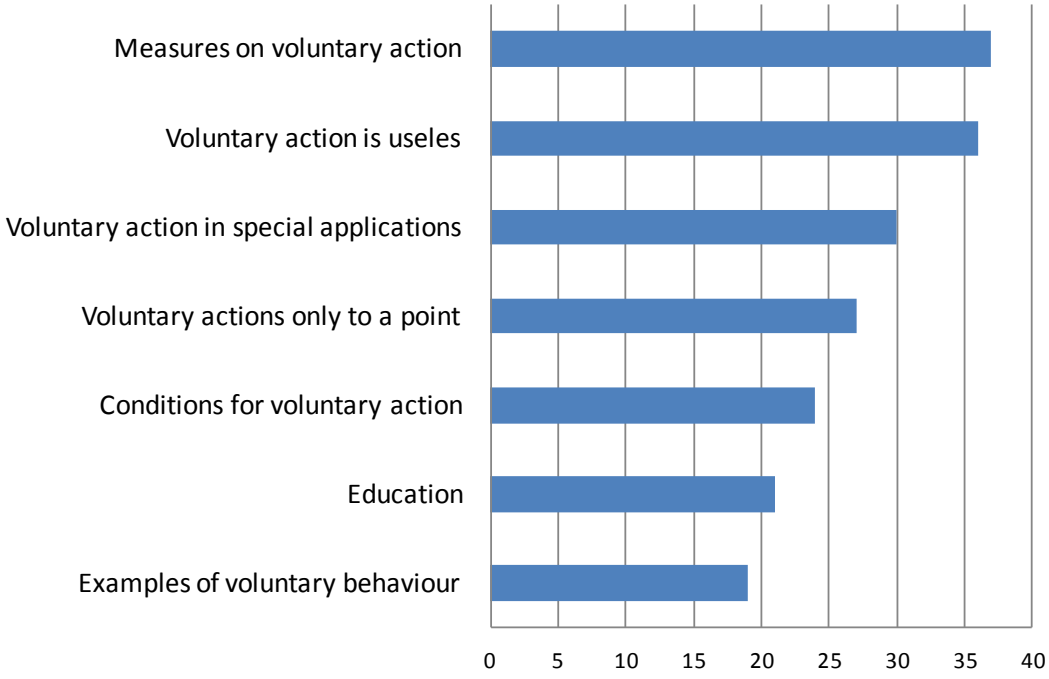
Figure 32: Question 9 – Proportion of respondents for or against further voluntary action



Description of relevant/most important comments

Voluntary action can be split into several themes: Support by EU, promotion of existing application in several products, combination between voluntary action and legislation, etc. The graph below concerns the different themes mentioned by stakeholders

Figure 33: Question 9 – Type and number of answers concerning voluntary action



The main category of answer "**measures in voluntary action**" involves encouraging and supporting voluntary actions by the EU (17). This implies better interaction between industry and authorities (13).

Concerning the answer category "**Voluntary action is useless**", the main comment is to improve legislation "*Voluntary action will never replace legislation. Therefore, we would rather want to see legislation developed, which will provide certainty, rather than putting any effort into new voluntary action* "(20). Other answers say that voluntary action is insufficient and is a weak instrument (11).

The third response "**Voluntary action in special applications**" reveals the utility of this measure for many products. For example, programmes are applied for PET bottles, PVC windows, etc. (20). Stakeholders wish to develop voluntary action in eco-design (7).

The fourth answer shows that voluntary action is useful if legislation follows the lead of VA "*Voluntary actions are to be supported as a first approach and allow testing before legislation takes over*" (24).

National and regional ministries of the environment

Most ministries believe more efficient resource use can be preserved by voluntary action. In France, several examples (COTREP) show that voluntary actions play an effective role in the preservation of natural resources and the development of recycling. The purpose of COTREP is to promote the integration of new packaging with a goal of economic development and environmental compliance with legislation, while allowing innovation.

In the UK, voluntary actions (Plastics Action Plan) have proven effective in reducing waste production. Another comment made is that voluntary initiatives should be promoted under certain conditions, e.g. efforts should be made to involve relevant parties including manufacturers and retailers across borders.

For the Schleswig-Holstein ministry, voluntary actions are useless because they would only be undertaken if they are economically profitable or neutral. The danger of misuse for commercial reasons exists.

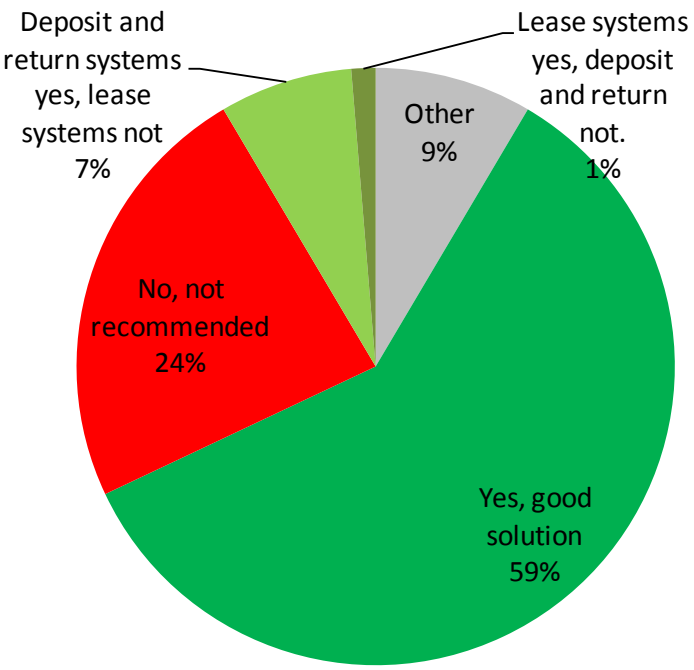
3. *Targeting consumer behaviour (Questions 10-11)*

Giving plastic a value

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

Answers to this question were provided by **153** respondents. Most stakeholders (59%) support this measure, 24% are not in favour.

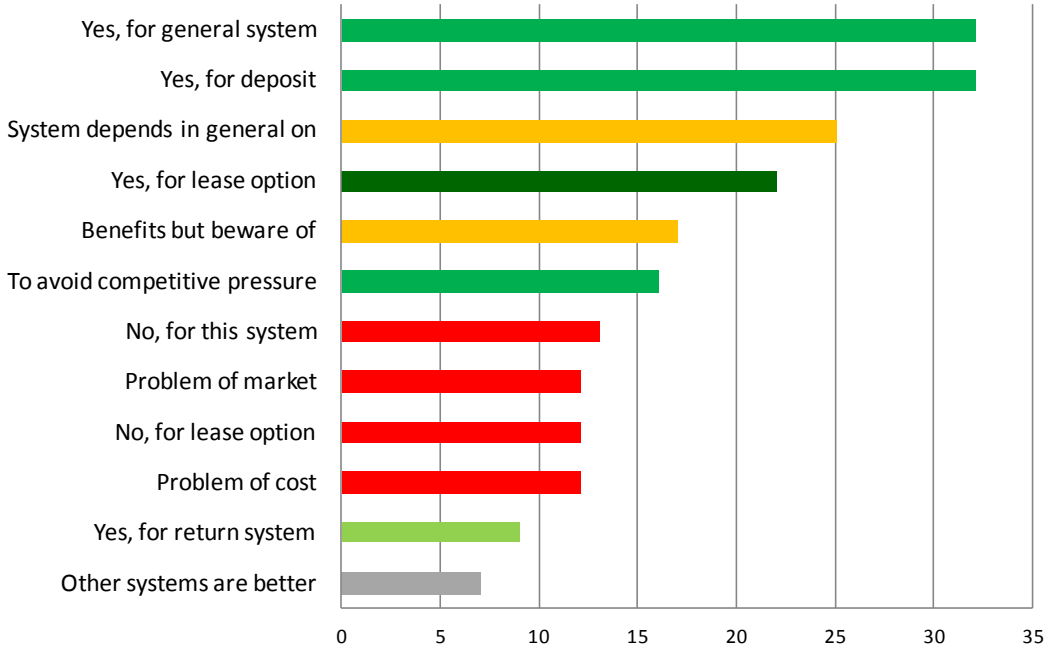
Figure 34: Question 10 – Proportion of respondents for or against developing deposit-return systems



Description of relevant/most important comments

In general, most respondents are for the implementation of this system. The different comments can be classified by themes: general system (deposit and return), deposit only, lease, conditions if the system is applied. The graph below concerns the different answers given by stakeholders.

Figure 35: Question 10 – Type and number of answers concerning deposit, return and lease



The first answer "**Yes for a general system**" concerns deposit and return. For 15 stakeholders, deposit and return systems have huge benefits and should be applied EU-wide. For six stakeholders this system should be mandatory across the EU. At the same time, "*deposit and return are not a problem for competition. It is a false argument*" (6).

The second comment "**Yes, for deposit**" illustrates the benefits generated by deposit only. For example, deposit systems are working well (single-use products, PET) (17), and deposit systems should be promoted through legislation (4).

The third answer "**system depends in general on**" shows the different measures that are necessary to take into account before applying this solution. For example, it is important to take into consideration the general situation in the EU and by product: "*Any proposals in this area should be mindful of the differing situation across the member states and also they must be considered by specific product sector / application*" (10). For six stakeholders, it is necessary to first measure the costs and benefits of this solution.

Concerning the response "**against this system",** for five stakeholders the system is not relevant. For eight respondents, the system can create competitive market distortions and can lead to negative purchase decisions. For others, the system is expensive and not cost effective (9).

National and regional ministries of the environment

Most ministries are in favour of developing deposit and return or lease systems. Deposit systems are working well for PET bottles in Germany according to five ministries. This allows a homogenous stream of recovered material to be ensured. An extension of this experience to other products may be a good proposal.

For three ministries, the success of these systems depends on the costs and benefits. An analysis of environmental, economic and social points of view should be evaluated through study on a European scale.

One ministry (CZ) response was against the implementation of these systems: "*The introduction of such a system can significantly affect the existing systems of collection and recycling of not only plastic waste (the separation of deposit packaging flow from other waste types confuses a consumer, and generally complicates the system of waste sorting, reduces the effectiveness of collection of non deposit components of packaging waste and deteriorates the economy of sorting)".*

(10) *(b) If so, how could negative impacts on competition be avoided?*

Concerning the **question of avoiding competition,** the first answer is to require LCA to check systems performance (5). The second comment is "*to make a law avoiding competition and keep it fair for all"* (3). Another comment concerns control: "*it is essential to monitor the activities of such entities in the market, not allow over-concentration, and in case of existence of a quasi-monopolistic structures to lower the barriers of entry for new entrants, and to create other positive incentives for the market" (2)*

National and regional ministries of the environment

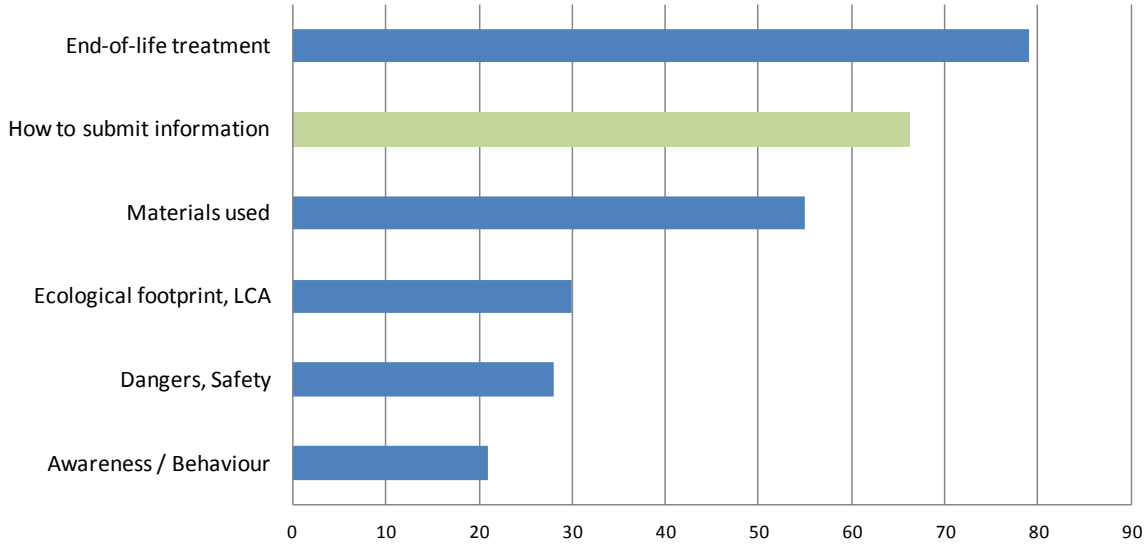
Concerning deposit, the French ministry makes a comment about avoiding competition: "I*n order to avoid negative effects on competition when setting up a deposit system for recycling, this should be made mandatory for all businesses, so as not to penalise establishment applying deposit system compared to their competitors who do not do it."*

Empowering consumers to know what they are buying

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

Answers to this question were provided by **186** respondents. Several comments were made by stakeholders on different types of information necessary to empower consumers. This includes information on end-of-life, on materials (type of plastic or recycled content, etc.) or on environmental footprint. The graph below concerns the different information needed for the consumers.

Figure 36: Question 11 – Type and number of answers concerning information to consumers



Description of relevant/most important comments

First of all, many stakeholders are interested in **how the information should be introduced**. For example, "*information has to be clear, simple and accessible for the consumer*" (31). Also, a clear label and easily identifiable is necessary (20).

The main answer concerning "**End of life treatment**" deals with information on recyclability (25). Another comment is "*to know how to treat plastic in the end of life*" (28). For 17 stakeholders, consumers need information about where we can put material in the end of life.

The second comment "**Materials used**" concerns "*the importance to inform about the materials used in product" (15).* Next, the type of plastic has to be defined: "*each plastic product should be well described as regard to which type of plastic it belongs so that the consumer could easily recognise how to recycle it*" (12). Finally, consumers need to know the rate of recycled material in plastic products (27).

The third kind of answer concerns "**Life cycle assessment**". It is important to know the environmental footprint with the use of resources for each plastic product (29).

Concerning the theme of "**Dangers and safety**", the useful point is to give information on harmful substances (persistent organic pollutant, additives, etc.) (15). For six stakeholders, it is important to give environmental information if the plastic is not treated correctly at its end of life (6).

Finally, "**awareness raising"** is effective at school (5) and a global advertising campaign is necessary to change consumers' minds (20). A total of 37 stakeholders believe that **information is useless and confusing** for consumers.

National and regional ministries of the environment

Most ministry responses are in line with stakeholders. They believe information is important on the question of end of life (recyclability and the appropriate method of disposal) for consumers. Information on environmental impact (for example carbon footprint) could also be useful.

Concerning the product, information on recycled content is also proposed by ministries. Consumers can be encouraged to choose a product that respects the environment. Concerning the subject of how information could be provided, most ministries think information should be clear, simple and understandable by all citizens.

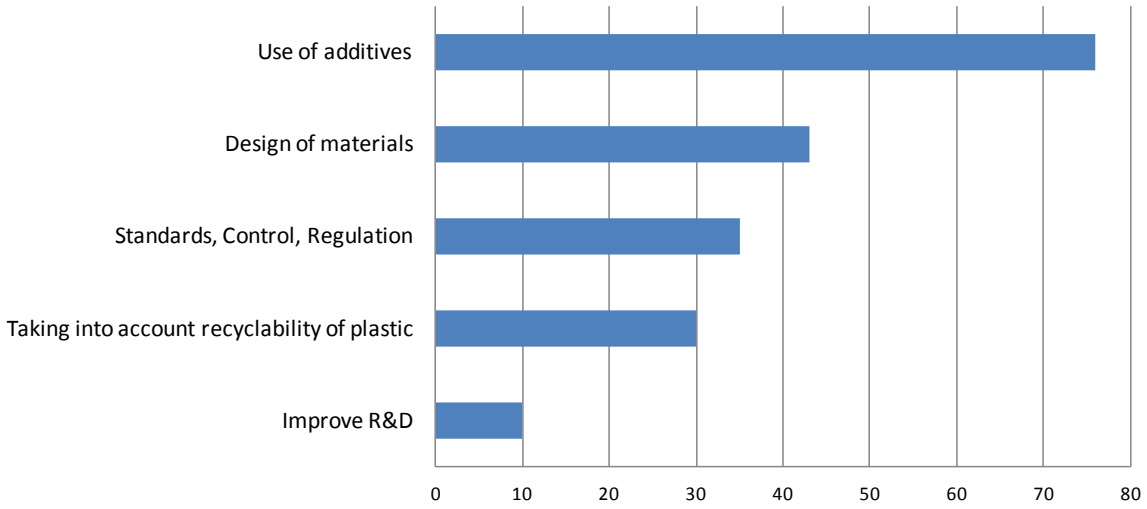
4. *Towards more sustainable plastics (Questions 12-13)*

Plastic design for easy and economic cradle-to-cradle recycling

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

Comments on this question were made by **146** respondents. Many stakeholders would like to tackle some criteria like the use of additives or the design of materials. Recyclability will improve if other measures are taken into account like regulation, or control. The graph below shows the different themes concerning chemical design of plastics

Figure 37: Question 12 – Type and number of answers concerning chemical design



Description of relevant/most important comments

Concerning the theme of "**the use of additives",** 11 respondents would like to improve REACH on additives: "*Registration, evaluation and authorization of additives in plastics should be part of the REACH Regulation processes*". The prohibition of hazardous additives is promoted:" *Limiting or even completely prohibiting the use of certain hazardous substances would make plastics much easier to recycle, without sending them to special installations that deal with such substances" (35).*

Concerning responses on "**design of materials",** 26 stakeholders promote the use of mono materials for plastic to improve their recyclability. The view is also expressed that chemical design should be changed for biodegradable/compostable plastics (6).

A third type of answer concerns overall "**control/standard/regulation**". For 16 stakeholders, "*if*

plastics are difficult or impossible to recycle or their chemical composition makes has clear negative health effects, they should be removed from the market". Therefore, if a product is hard to recycle it should be banned. Before introducing new plastics, a control and evaluation could be put in place to prevent any contaminated waste flows in the end-of-life cycle (7).

National and regional ministries of the environment

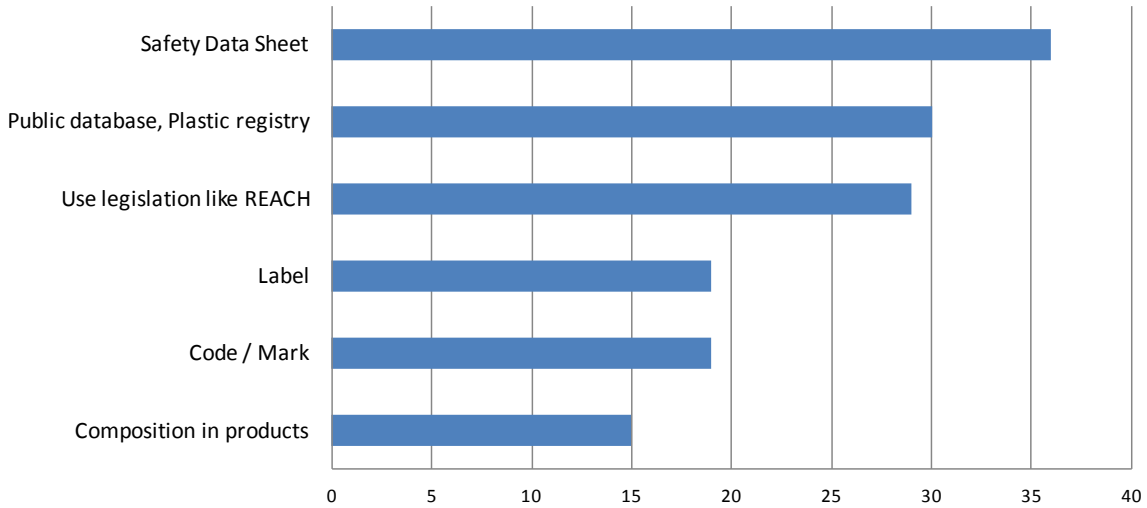
Most ministries have the same point of view as stakeholders about hazardous substances. These additives should be limited to the absolute minimum. Another comment is to control input materials in the recycling phase which contain substances that are already banned (as deca-DBE, POP, heavy metals etc.). These substances can contaminate recycled pulp.

To increase recyclability, three ministries consider it necessary to use mono material plastics and to avoid multi-layer plastics. For example, the Netherlands response explains that "*the number of elements or components which make up the product should be reduced*".

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

Comments on this question were made by **122** respondents. Many solutions (data sheet, database, plastic registry, REACH, label, code, etc.) are proposed by stakeholders to provide information to all actors. The graph below shows the different possibilities that can be used to make information available:

Figure 38: Question 13 – Type and number of answers concerning chemical design



The main answer is the use of **safety data sheets** for all actors in the chain (28), i.e. for industrial manufacturers but not for consumers (9). The second main response is focused on the **creation of a registry**: "*A plastic type registry could be introduced to standardise a common treatment. It should be at least clearly marked that those plastics that contain additives and toxics so that they can be easily separated from clean plastics"* (25). Along the same lines, a public database about the quality of material or the process could be created (5).

The third answer concerns **REACH and the use of current legislation**. For 27 stakeholders, REACH should be the legislation restricting and providing information on materials for recyclers.

The fourth response concerns the subject "**how information should be provided".** For 17 stakeholders, chemicals information can be provided by the implementation of a label.

The fifth answer deals with the possible improvement of chemical design to facilitate better separation of plastic waste. For example, establishing a colour code or a mark for different types of plastics should improve sorting for consumers and automatic separation for sorting (19).

National and regional ministries of the environment

Most ministries think information should be available in a database: "*development of a product database in EU containing product specifications for reference, led by industry*". Another comment for two ministries is to develop a label corresponding to a certain standard, which gives information on the chemical content of plastics.

Only the Danish ministry recommends the use of safety data sheets in response to this question: "*it would be advisable to examine and assess the possibility to introduce 'safety data sheets", containing appropriate information about a given plastic product*".

New challenges through innovative materials

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

Comments on this question were made by **136** respondents. Responses can be divided into three sections: the first concerns general recommendations. The second is for micro-plastics and the last for nano-particles. The graph below gives a general view of what stakeholders think about challenges.

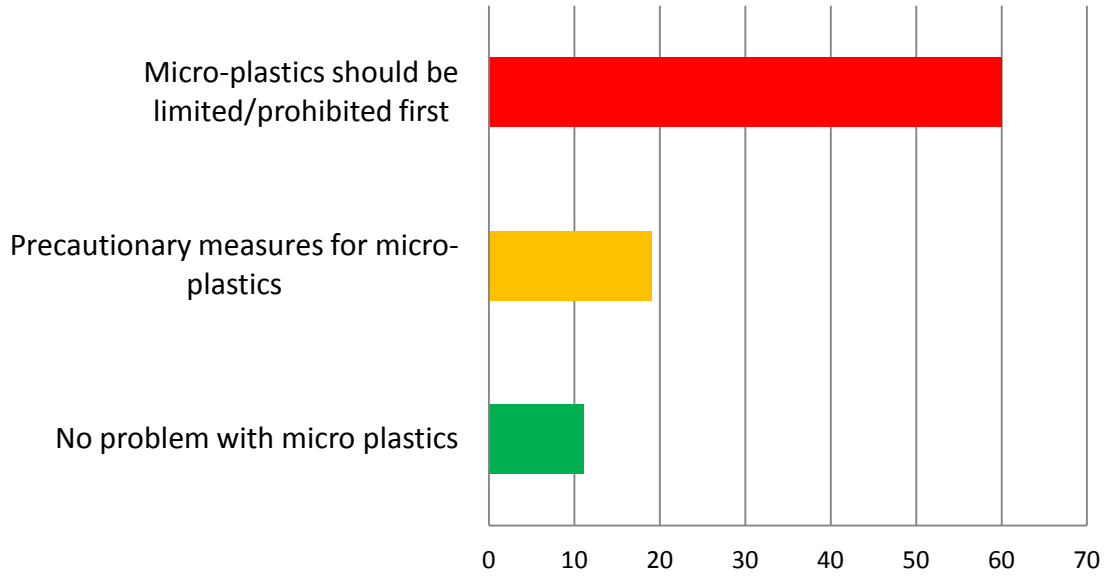
Figure 39: Question 14 – General recommendation for micro plastic and nano-particles

The main answer is to have more tests before products are placed on the market: "*Precautionary principle should be enforced which requires more detailed tests before putting the product on the market and more controls after being released*" (28). For seven stakeholders, it is good to have an environmental and toxicological test.

The second category of comment is to do with "**precautionary measures**". Products that contain micro plastic or nano-particles should be labelled (11). Another recommendation is that these products have to be biodegradable or absorbable (10).

Concerning the answer type "**R&D**", research into this issue should be supported with more funding (20). According to three stakeholders, the application of REACH is sufficient against danger of these products. The figure below concerns recommendations for micro plastics only.

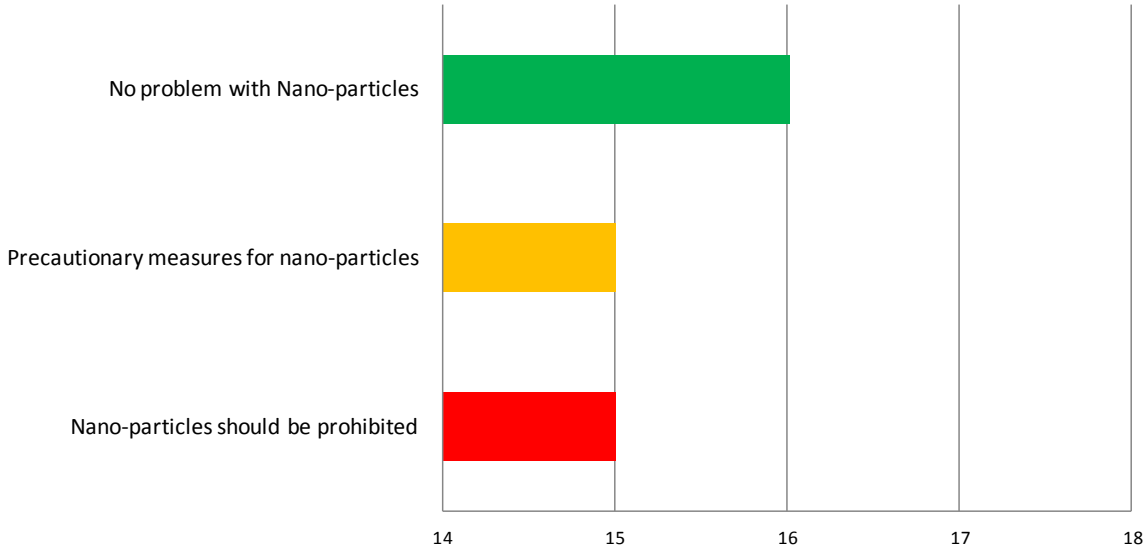
Figure 40: Question 14 – Recommendations for micro plastic only



The use of micro plastic is not widely recommended by respondents. For 30 stakeholders, "*micro plastics in products have to be prohibited because their dangerousness is unknown*". Their use should be limited. Also, intensive research is needed on the effects before allowing micro plastics onto the market (13). For 11 respondents, "*the use of micro plastics has to be eliminated gradually*". The main advice for precautionary measures is to set standards before allowing micro plastics onto the market (9).

Five stakeholders think that micro plastics is not a problem. For example, "*The use of these new materials by industry is really small and there are not sound technical nor scientific studies about their environmental or toxicological impacts, so it cannot be considered a problem, as the Green paper suggests*". The figure below concerns recommendations for nano-particles only.

Figure 41: Question 14 – Recommendations for nano-particle only



In general, nano-particles are perceived as less dangerous than micro-plastics; most stakeholders do not think there is a problem with these products. There seems to be a view that nano-particles are not dangerous: "*Following recent studies, Non-organic Nano materials used in plastics remain embedded in the plastic matrix and do not leach into food or water. Consequently, no noteworthy exposure to nanoparticles from plastics needs to be expected" (7)*. However, support for research into the incorporation of nano-particles in plastics should be continued (7).

Concerning comments on "**precautionary measures**", five stakeholders believe it is necessary to verify safety before incorporation into products. In addition, a guide on how to extract or disassemble a component containing nano-particle could be very useful (3).

Finally, the last comment concerns the prohibition of nano-particles, notably on the basis of "*risks on environment and health (potential carcinogen and mutagen)"* (10).

National and regional ministries of the environment

In general, ministries give precautionary answers. They promote R&D on nano-particles and micro plastics as "*the issue is not covered with the sufficient level of research- and additional studies are needed in many aspect".*

Micro-plastics in cosmetic products for example are dangerous for the environment because they can go directly to drain water or surface water. For nano-particles, three ministries point out the importance of checking safety for health and the environment. For example, the Netherlands ministry develops this idea that "*in the case of nanomaterials that are incorporated into equipment, it is important that safety is thoroughly assessed*"

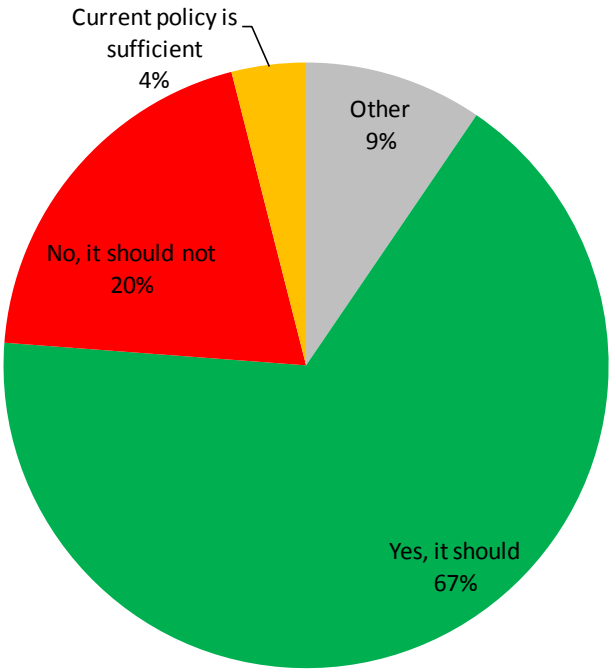
5. *Durability of plastics and plastic products (Questions 15-18)*

Product design for a longer life, reuse and repair

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

Answers to this question were provided by **126** respondents. Many stakeholders (67%) agree to tackle planned obsolescence by design policy although 20% of stakeholders are against this initiative. The figure below shows an overview.

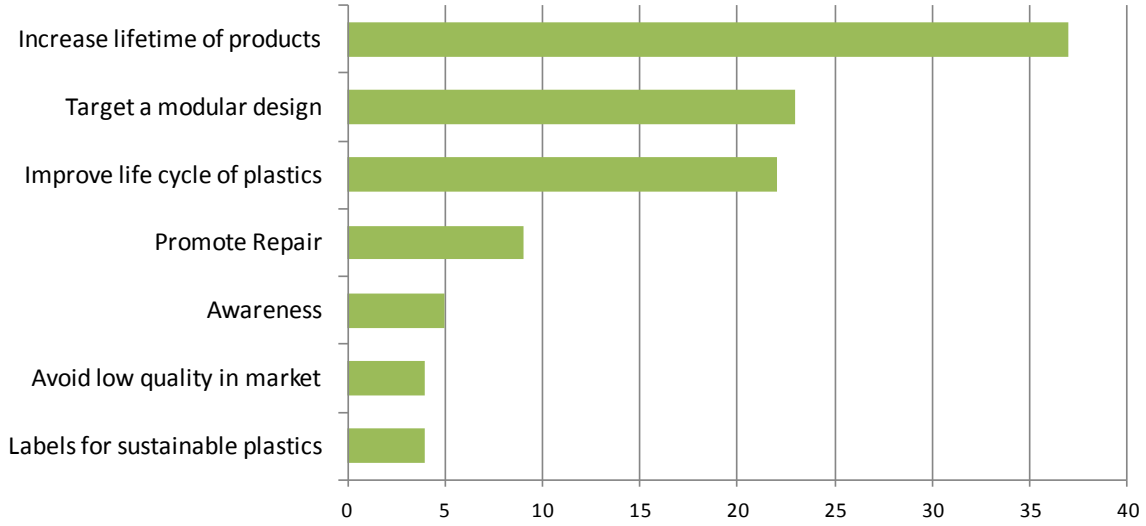
Figure 42: Question 15 – Proportion of respondents for or against planned obsolescence



Description of relevant/most important comments

To counter planned obsolescence, it is necessary to improve some characteristic of products such as the lifetime, the design, the end of life, etc. Among the answers along the lines of "**it should tackle planned obsolescence**", the different types of measures to tackle planned obsolescence are shown in the figure below:

Figure 43: Question 15 – Type and number of answers concerning measures to tackle planned obsolescence



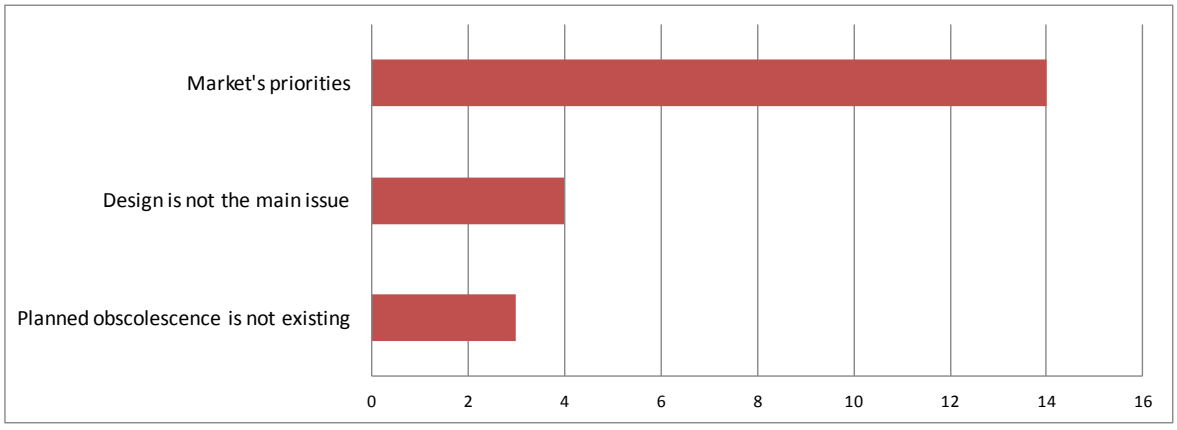
The category "**Lifetime of product"** expresses the view of 25 respondents that "*The policy of plastic design should be on the duration of product life, their potential for repair, reuse and recovery"*. In addition, it is recommended that "*we impose a longer warranty period on products (e.g. 10 years) to increase their life and sustainability*" (9).

On the topic **"modular design",** the main comment is that "*Plastics should target a modular and reusable design and this should be made mandatory"* (14). The second recommendation deals with legislation: "*Sanctions for products with built-in obsolescence should be the norm*" (8).

The third comment concerns "**The improvement of life cycle of plastics**". For 23 stakeholders, it is important to promote a concept of sustainable ecodesign that considers end of life and waste recycling.

Many stakeholders think "**product design policy should not tackle planned obsolescence**". The main explanation, as shown in the figure below, is that market priorities are more important than planned obsolescence for modular design.

Figure 44: Question 15 – Type and number of answers arguing it is not important to tackle planned obsolescence



The most common response against tackling planned obsolescence concerns market priorities, i.e. that "*establishing restrictions on design would hinder the production process; the **modular design should be left to market***" (10). Another answer cites consumer interests: "*Product design needs to take into account practical products and meet the desires of the client*" (3).

The second category of answer is that "**design is not the main issue of plastic waste**". In other words, the problem is with waste management "*The main problem for plastic waste is the waste management, not the design of the product*" (3).

For three stakeholders, the question of "**planned obsolescence does not exist**" at all because "*Plastics are designed with an optimal use of resources, thinking of the whole life cycle of the product. There is no planned obsolescence*" (3).

National and regional ministries of the environment

Six ministries of environment think obsolescence should be tackled by considering the lifetime of a product. It has to be assessed with expiration time in labelling. One ministry response (CZ) does not believe in tackling obsolescence: "*these measures are unnecessary and unfeasible in practice, which, in addition, would reduce the competitiveness of European manufacturing industry*".

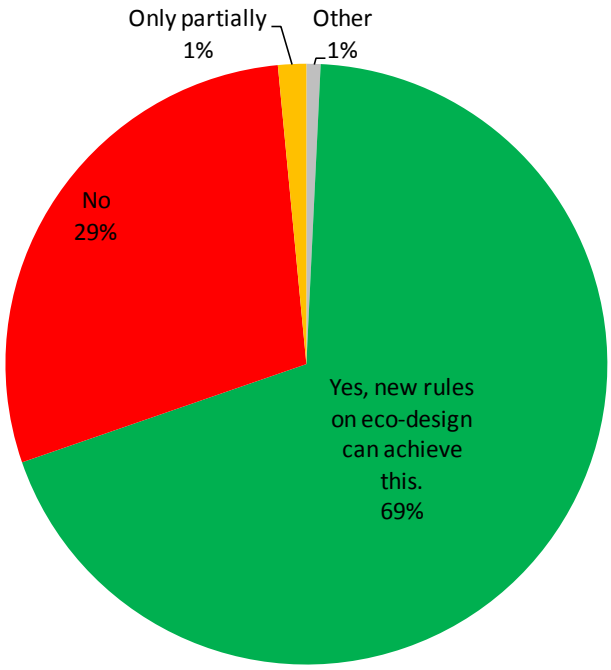
The French ministry considers the possible establishment of sanctions on planned obsolescence. Concerning "**modular design**", another ministry (Schleswig-Holstein) supports this concept for electrical and electronic products.

For UK Defra, product design depends on a commercial view: "*Making a radical change to product design and business model is a big step for any company, and one that will only be widely replicated if it leads to commercial success*".

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

Answers to this question were provided by **132** respondents. Many stakeholders (69%) believe that new rules on eco-design are beneficial to increase reusability and durability of products. On the other hand, 29% of respondents think new rules would be useless.

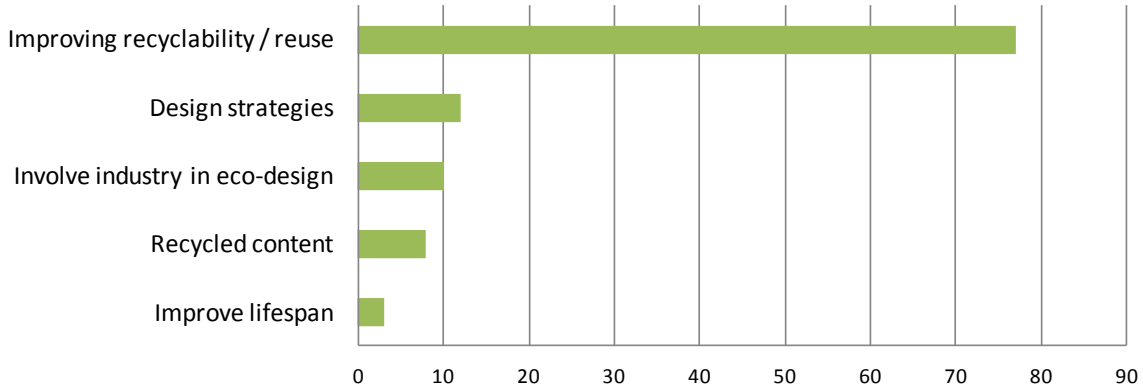
Figure 45: Question 16 – Proportion of respondents for or against rules on ecodesign



Description of relevant/most important comments

Of the various responses concerning" **implementation of new rules**", the main kind of response is to do with the need to improve recyclability and reuse via ecodesign. The figure below shows the main recommendations for improving ecodesign.

Figure 46: Question 16 – Number of responses by type for new rules on ecodesign



The main answer to establish new rules in the Ecodesign Directive is "*to focus more on reuse, recycling and making products reparable and longer lasting"* (39). The second major comment is "*to introduce measures to ensure that products can be disassembled"* (35). For 19 stakeholders, ecodesign can improve only on final recycling and reuse.

The second type of comment, "**design strategies**", is to improve the requirement on ecodesign by strategy. For example "*Encourage preventive eco-design before the creation of product"* (8).

Concerning "**industry**", implementing new rules on design is necessary only by an involvement between authorities and industry: "*It is practical and cheap to establish a better interaction between authorities and industry that can help to agree upon a common practically feasible roadmap to further enhance design practises in general" (6).* The second comment under this heading shows that the consideration of ecodesign allows an improvement on process and operation for industry (4).

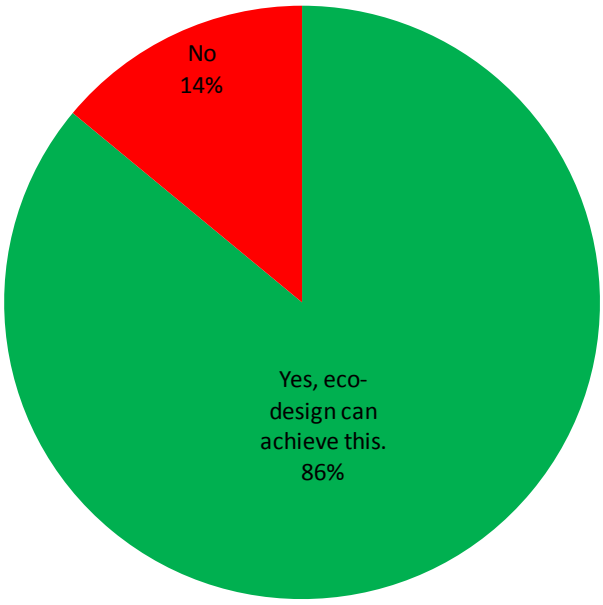
The fourth kind of answer is to take into account "**recycled content**" in ecodesign: "*Recycled content for plastic could also be considered to ensure a stable market for plastic recycling"* (7)

Concerning the answer category "**Do not create new rules**", 34 respondents think new rules are useless. Of these, 10 stakeholders explain that "*Rules reduce innovation*" and nine want "*guidance on eco-design instead of rules*". Another reason given is to do with voluntary measure. Indeed, "*Instruments to be adopted voluntarily are better than further rules, since it would give more flexibility to firms and it would permit them to choose environmentally friendly and economically efficient measures*" (5).

National and regional ministries of the environment

Seven ministries give an explicit answer about rules on ecodesign. The figure below presents the proportion for or against market-based instruments.

Figure 47: Question 17 – Proportion of ministry respondents for or against market-based instruments



Ministries agree with most stakeholders about rules on the Ecodesign Directive about reusability and durability. Single components can be replaced and repaired. According to the CZ ministry, recycling is a priority in standard "*For major material flows there could be established general standards for eco-design of specific products, in order to avoid technological barriers limiting or*

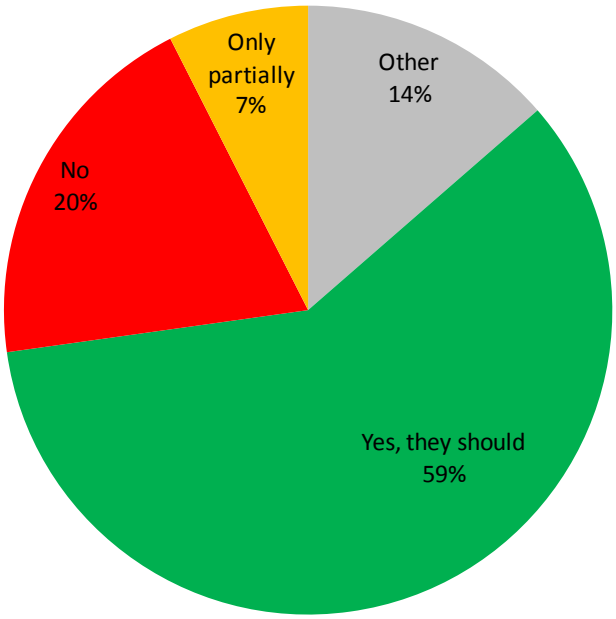
preventing recycling." For UK Defra, new rules are not necessary: "*existing Ecodesign for Energy Related products Directive can address these issues for products subject to the Directive*".

Single-use and short-lived plastic products

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

Answers to this question were provided by **147** respondents. Many (59%) believe in market-based instruments to reflect environmental costs. 20% of respondents think it is not suitable.

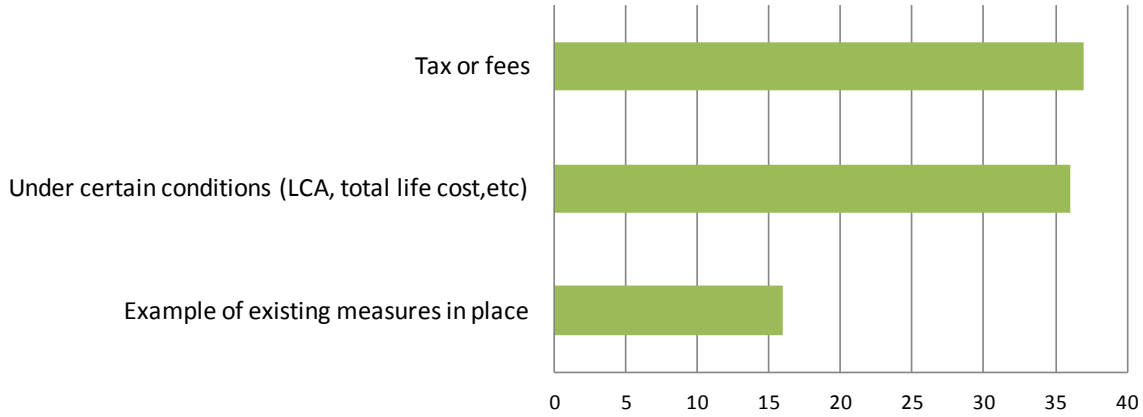
Figure 48: Question 17 – Proportion of respondents for or against market-based instruments



Description of relevant/most important comments

Among respondents in favour of the introduction of market-based instruments, the main comment concerns the implementation of tax or fees. The second kind of comment shows that instruments are good under certain conditions like life-cycle assessment (LCA). The figure below illustrates the different answers.

Figure 49: Question 17 – Type and number of answers for market-based instruments



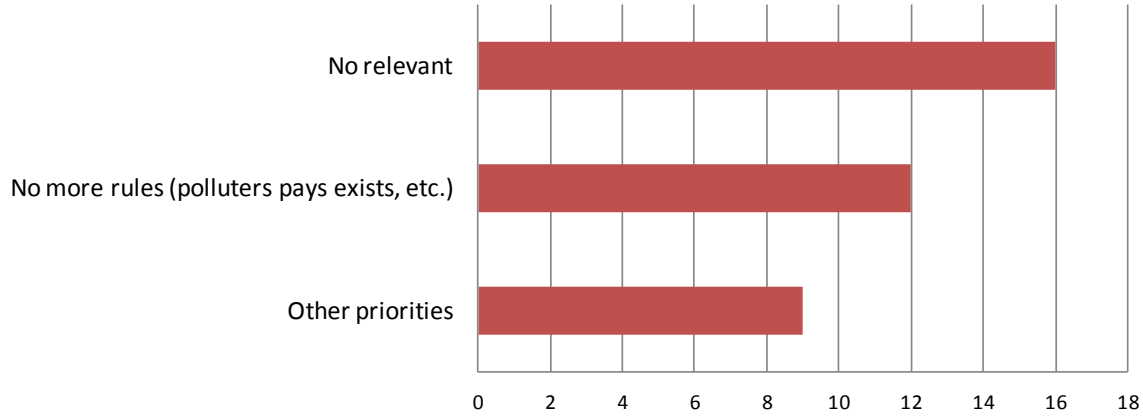
The main comment under "**Tax**" is to implement this instrument to influence the pricing of waste treatment or of disposal activities (17). The second comment under this heading is to eradicate the use of materials with high environmental costs (6). Also for six stakeholders, market-based instruments have to be available for other materials than plastics.

The second category of answer shows the benefits of instruments "**under certain conditions**". For 10 respondents, "*it is necessary to include total life cycle product cost*". The next comment is "*to implement instruments if there is an analysis of costs and benefits*" (8). In addition, "*a full analysis by LCA should be reviewed when implementing this system*" (7).

As for the heading "**good existing measures in place**", stakeholders give examples like "V bags Europe" and "Extended Producer Responsibility for household waste in France" to reflect environmental costs (14).

About 20% of respondents **do not believe in market-based instruments** because they can be irrelevant or inappropriate. The figure below illustrates why it is said to be useless to implement market-based instruments.

Figure 50: Question 17 – Type and number of answers against market-based instruments



The main answer given is that it is very difficult to have an applicable tool: "*It is virtually impossible to find a universally applicable measurement tool to measure the environmental costs of*

various types of plastic products" (11). The next kind of answer argues that environmental cost is not effective (3).

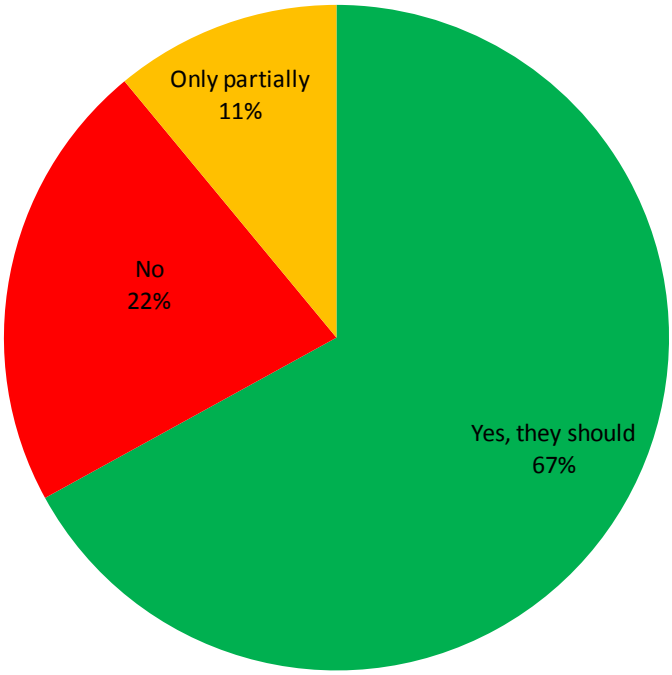
In the category "**no more rules**", additional measures are not needed because existing legislation is effective. For example, the polluter-pays principle in the Packaging and Packaging Waste Directive is sufficient (10).

According to four stakeholders, "**other priorities**" like collection and sorting should be put first instead of wasting time on environmental costs. The same idea is promoted on the subject of informing consumers before establishing market-based instruments (3).

National and regional ministries of the environment

Nine ministries give an explicit answer about market-based instruments

Figure 51: Question 17 – Proportion of ministry respondents for or against market-based instruments



Most ministries believe in tax/charges or fees to initiate good practices in waste treatment. These instruments should also target manufacturers in order to promote more sustainable design. The French ministry highlights the value chain of EPR, in which producers are made responsible for waste management costs.

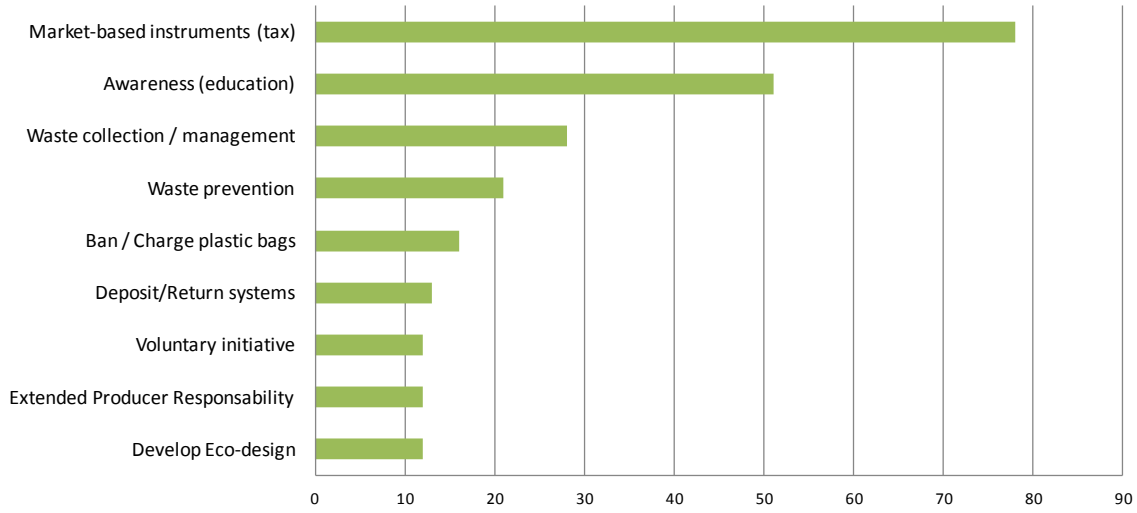
For two ministries (CZ, Niedersachsen), market-based instruments are not the priority for plastic waste. For example, they say is important to focus on the development of collection networks and to increase waste recovery. The Czech ministry believes it is impossible to find a universally applicable measurement tool to measure the environmental costs of various types of plastic products.

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

Comments on this question were made by **170** respondents. **162** stakeholders explain that there is a problem concerning short-lived and single-use disposable plastic. Only **eight** respondents think this kind of plastic is not a problem.

Stakeholders offer several ideas to combat single-use disposable plastic, in the areas of tax, awareness-raising or waste management. The figure below shows the different types of comments.

Figure 52: Question 18 – Type and number of answers on addressing single-use disposable plastic



The main measure is to establish a "**market-based instrument**". For 51 stakeholders, it is important to "*make single-use products more expensive through systematic taxation reflecting their true environmental costs, in order to encourage the consumer to buy an alternative, long lasting, durable substitute*". A general tax system that addresses unnecessary environmental costs is needed (18). Another comment is to increase consumption tax (valued added tax) for single-use products (7).

The second category of comment is to encourage consumer **awareness raising**. "*Citizens should be informed about the environmental consequences and costs of plastic waste"* (22). Another comment received under this heading is "*to promote reusable products over single-use products"* (17). Finally, consumers have to be made aware of environmental impacts (12).

The third kind of measure proposed is to do with "**waste collection / management**" by promoting collection and recycling of single-use products (16). In the view of five stakeholders, it is important "*to establish EU-wide a functioning waste management"* (5). Then, for these products, LCA is needed to know if it is better to use recycling or energy recovery (3).

The fourth category concerns the use of plastic. "**Waste prevention**" is useful to reduce consumption of plastics and their use can be replaced by other more durable plastics (21).

Recommendations concerning plastic bags were made by 15 stakeholders, going as far as a ban, for example: "*The ban of plastic bags is not only an environmental measure, but also brought investments in the bio-economy, development of the separated collection of the organic fraction and better quality of the organic waste collected*" (15).

The sixth most common response is "*to implement reusable or return or deposit system with attractive fees"* (12).

Concerning the answer that "**this kind of plastic is not a problem**", the main reason given is that "*these products are needed and useful in hygienic or medical division"*.

National and regional ministries of the environment

To address single-use products, most ministries believe in the establishment of taxes. For example, the Estonian ministry mentions such a measure: "*Also the taxation of the single-use plastic products would be an effective option*".

The second idea given is to awareness among citizens. In the end, waste prevention remains important to decrease the use of these products. Another comment is to establish a ban on specific plastic products or to further develop ecodesign.

6. Promotion of biodegradable plastics and bio-based plastics (Questions 19-21)

Biodegradable plastics

(19) *(a) What are the applications for which biodegradable plastics deserve to be promoted?*

Description of relevant/most important comments

A majority of responses to this question (45) want to use biodegradable plastics in order to improve the collection and recycling of bio-waste as:

- Waste bags for the collection of bio-waste;
- Single-use bags, short life;
- Tableware, used in fast-food restaurants, events, canteens, etc.;
- Agricultural mulch films and auxiliary products, enabling improved operating performance without polluting the soil.

Also, "*biodegradable plastics, in accordance with European standards, should be promoted for all applications in which the use of products made with these plastics (packaging, but also cutlery, dishes, glasses, etc.) can be connected to a clear strategy for the end of life: that of the organic recovery. Resulting in exact definition of the timing and manner in which the biodegradation takes place. In accordance with standards EN 13432"* (6).

Another response given by five respondents concerns the use of biodegradable plastics on ships,

where it would be very convenient to use such products if they could be disposed of in the ocean.

National and regional ministries of the environment

According to three ministries, biodegradable plastics should be promoted for waste bags. These products are destined for bio-waste collection.

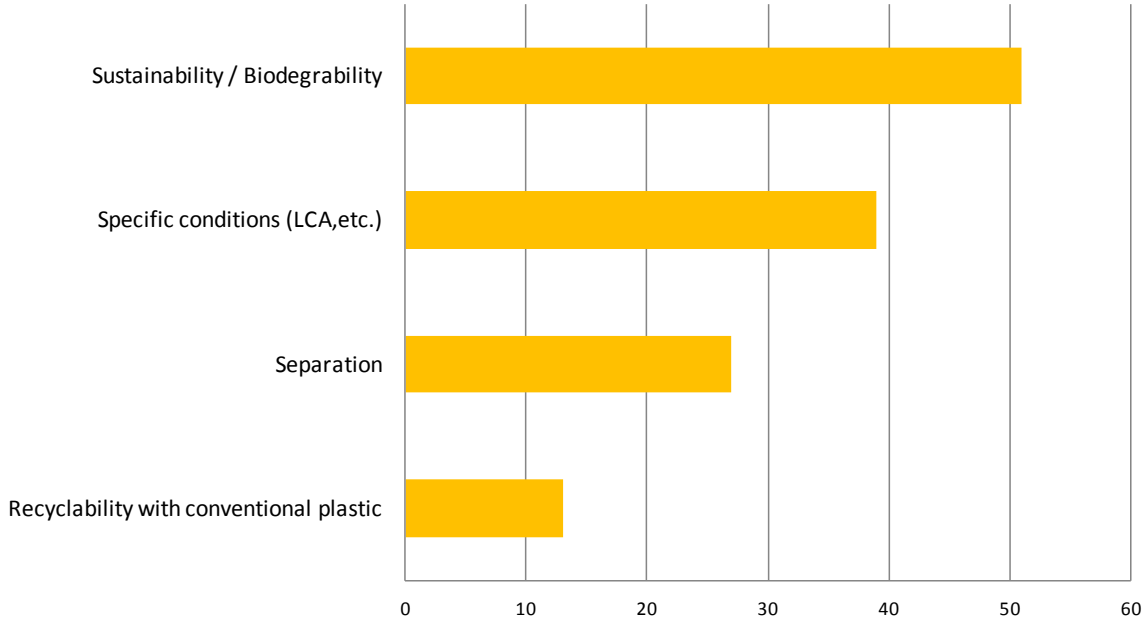
(19) *(b) What framework conditions should apply?*

Answers to this question were provided by **151** respondents.

Description of relevant/most important comments

The majority of stakeholders want to promote biodegradable plastics only if sustainability or biodegradability has been proved. The question of LCA or of durability is necessary to prove the benefits of these products. The figure below shows various topics to discuss before promoting biodegradable plastics.

Figure 53: Question 19 – Type and number of answers to discuss before promoting biodegradable plastics



For 25 stakeholders, the question of sustainability has to be confirmed before using biodegradable plastics. The next comment deals with biodegradability: "*Biodegradable plastics should only be allowed if they are actually entirely biodegradable*" (12). Also, competition with food production should be avoided before authorising these products (13).

Concerning the topic of "**specific conditions**", the main comment is "*to trust biodegradable plastics if life cycle assessment proves the benefits over conventional plastics"* (12). The second kind of answer mentions economics: "*Biodegradable plastics are useful only in very specific settings and should only be promoted in specific occasions. They should target high quality and an efficient ecologic/economic product cycle"* (8). Another recommendation is to use biodegradable plastics if a recycling stream for conventional plastic does not exist (8). The performance of a product

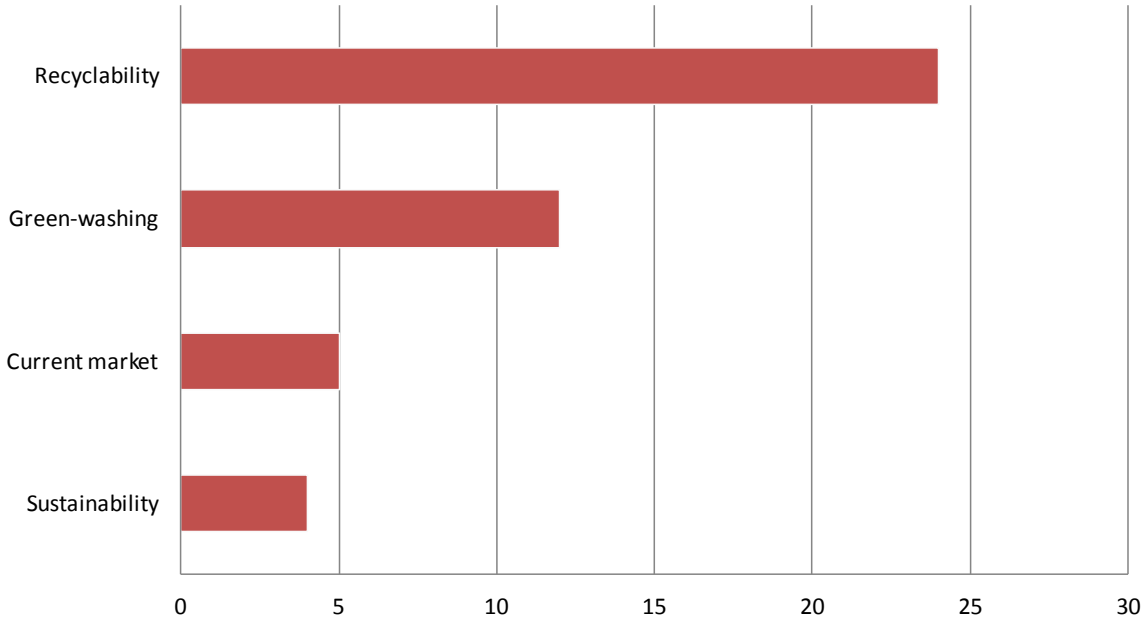
needs to be revealed: "*Use of biodegradable plastics only if the durability and the recyclability does not change" (7).*

As for the category of "**separation**", to achieve a high quality of recycled plastic, separate collection has to be ensured (16). According to eight stakeholders, a system has to put in place to permit the degradability of biodegradable plastics.

The last kind of comment provided deals with recyclability with other plastics: "*biodegradable packaging can be added to the stream of plastics to be recycled up to at least 10% for biodegradable flexible packaging without affecting the final technical performance*" (12).

Many stakeholders think biodegradable plastic should not be promoted. The main reason is to do with recycling. The various types of concern are shown in the figure below.

Figure 54: Question 19 – Types and number of answers against promotion of biodegradable plastics



The introduction of biodegradable plastics complicates standard "**recycling**" (14). According to nine stakeholders, recycling with conventional plastic is impossible.

"**Green-washing**" is to be avoided because biodegradable plastic bags or plastic films are not necessarily better in environmental terms than traditional plastics (9).

The next type of answer is "**Current market**": "*Only in certain applications, are biodegradable films or plastic bags better than the Dual System. However, in these cases, the market provides them. There is no need for further intervention*" (4).

Concerning sustainability, competition with food may exist for biodegradable plastics (2)

As for the different "**applications of biodegradable plastic**", respondents **promote** the use of biodegradable-compostable plastics like waste or single-use bags or tableware (36). For nine stakeholders, biodegradable plastics are useful in agricultural mulching films. The next comment is to recommend these products in ships because they could be disposed of in the ocean (5).

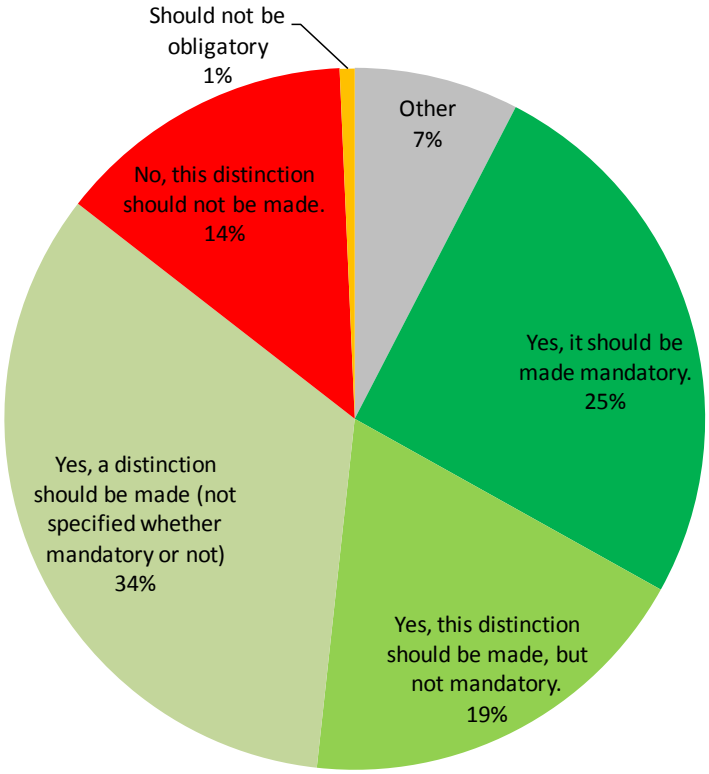
National and regional ministries of the environment

Most ministries agree with the majority of stakeholders about biodegradable plastics. Certain conditions have to be fulfilled before promoting these products, for example that the question of sustainability has to be proved by (LCA). Biodegradable plastics may threaten the recycling process because the separation of biodegradable and conventional plastic is not applied. So, it is necessary to have further research and study before approval of these products.

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

Answers to this question were provided by **145** respondents. This distinction is needed according to 78% of stakeholders. Only 14% think it should not be made.

Figure 55: Question 20 – Proportion of respondents for or against a distinction between naturally compostable and technically biodegradable

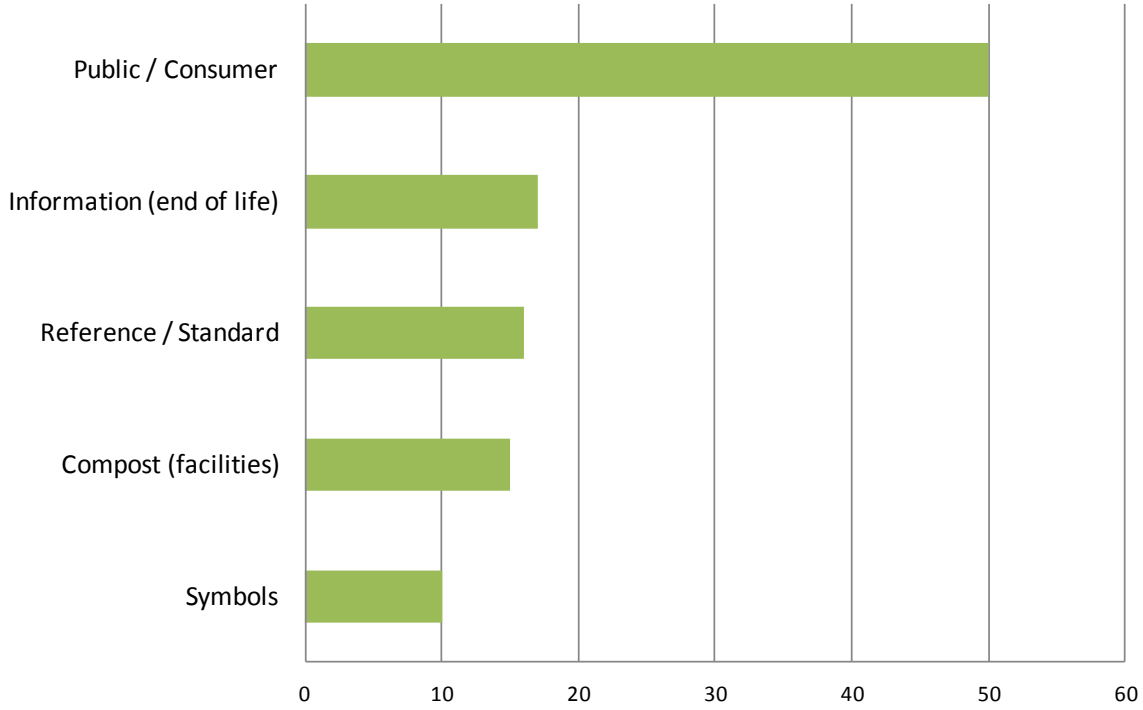


Description of relevant/most important comments

Many stakeholders believe it is important to make a distinction between these terms for consumers in the first place. Then, a reference standard has to be used to avoid ambiguity.

Another comment is to reinforce information on the end of life of these products. The figure below shows the purpose of a distinction and the information needed.

Figure 56: Question 20 – Type and number of answers concerning the purpose of a distinction and the information needed



The main answer is to do with making a **clear distinction for the public**. For example, 17 respondents think it is necessary to inform all stakeholders about what are the different bio-based plastics. This information has to be clear: "*Mandatory and clear labelling between biodegradable and compostable products for all materials*" (16). The same idea of mandatory labelling is to distinguish "industrial composting "and "natural biodegradability" (10). For seven stakeholders, this information should be clear and succinct for the consumer.

The second kind of response is to give **information on end of life** for these products. For example: "*We need to study/inform whether biodegradable/compostable plastics is better in each case, since this is not always the case"* (6). It is also important to have clear information on the treatment method, which means telling the consumer what to do with the waste (6).

The third recommendation on making a distinction is to use a "**reference / standard**" with a time limit for biodegradability. For example, the term biodegradable plastic can use a reference standard: "*Reference standards should be used: an item should therefore be defined as "biodegradable" if it is actually biodegradable within a specified time limit, using a reference standard, such as the standard on biodegradability and composting UNI EN 13432-2002*" (15).

The fourth category of answer is **compost facilities.** A clear distinction is needed to help compost facilities to operate at the best temperature for this waste (10).

The fifth comment concerns the use of a **symbol** to distinguish biodegradable objects. For seven stakeholders, "*It might be useful to apply a unified symbol / emblem on biodegradable objects: it*

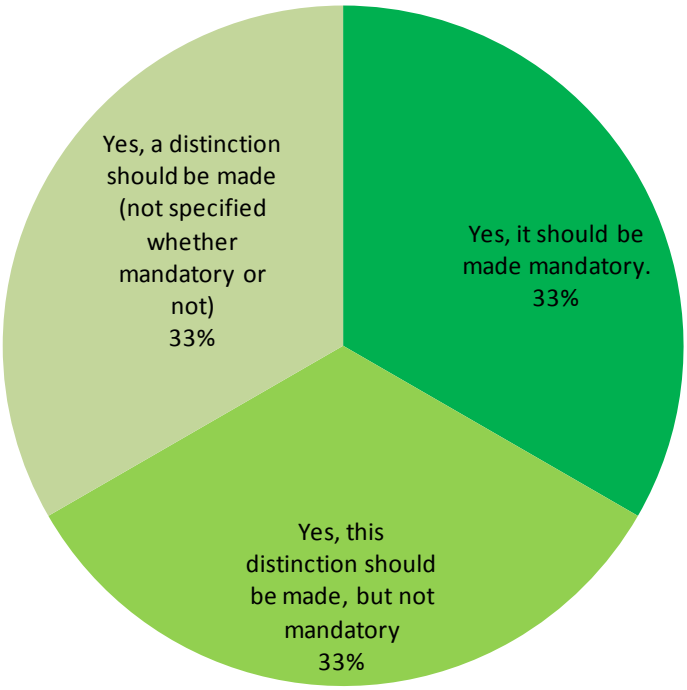
would give the public the opportunity to easily distinguish the biodegradable and compostable item from the non-biodegradable one, to avoid sources of contamination during collection".

Concerning the answer "**This distinction should not be made**", the main concern is to do with green-washing of materials: "*EU contributes to green-washing*" (5). The second comment is about terminology: "*We should not use "naturally compostable", but rather "naturally biodegradable*" (4). Other comments state that the distinction is not important because biodegradable plastics can also be treated like other materials (3). Finally, voluntary initiatives could be effective: "*Some manufacturers are already providing consumer information on a voluntary basis to increase consumer understanding on the separation of products"* (2).

National and regional ministries of the environment

Six ministries of environment answered this question specifically. The graph below shows the share of different answers.

Figure 57: Question 20 – Ministry respondents on the distinction between naturally compostable and technically biodegradable



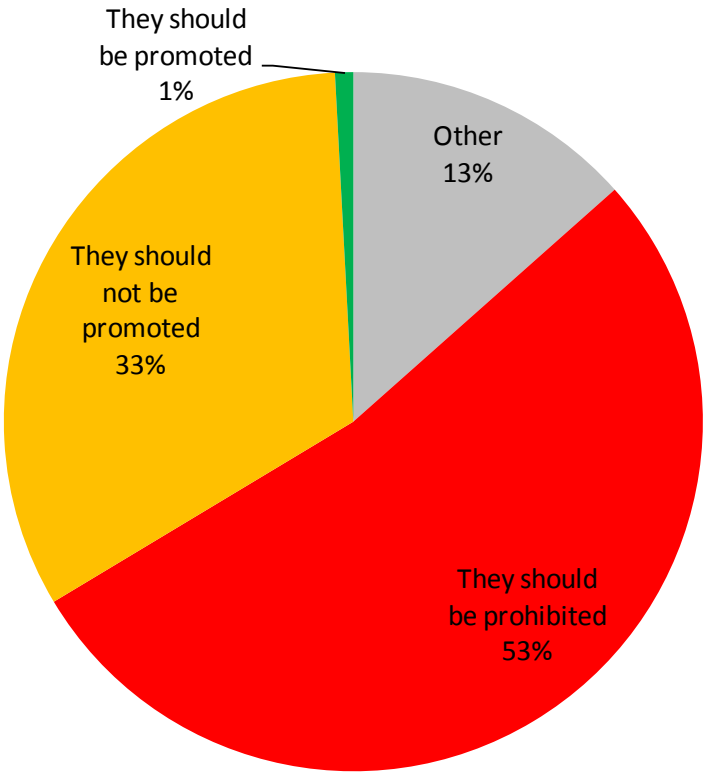
According to two ministries (FR, UK Defra), it is important to consider reference standards for the terms "biodegradable" and "compostable". Consumers can be confused because the use of the word "biodegradable" does not mean "compostable". In addition, "biodegradable" should be coupled with information on the environment, extent and rate at which biodegradation will occur.

For three ministries (CZ, Niedersachsen, EE), clear information on the treatment method at the end of life of a product is needed for consumers; they have to know how to deal with the waste.

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

Answers to this question were provided by **119** respondents. Before answering the question of intervention, it is important to know the thoughts of stakeholders on the use of oxo-degradable plastic. In general, 53% of respondents believe in the prohibition of these products. About 33% think they should not be promoted. Only 1% of stakeholders support the promotion. The figure below illustrates the result.

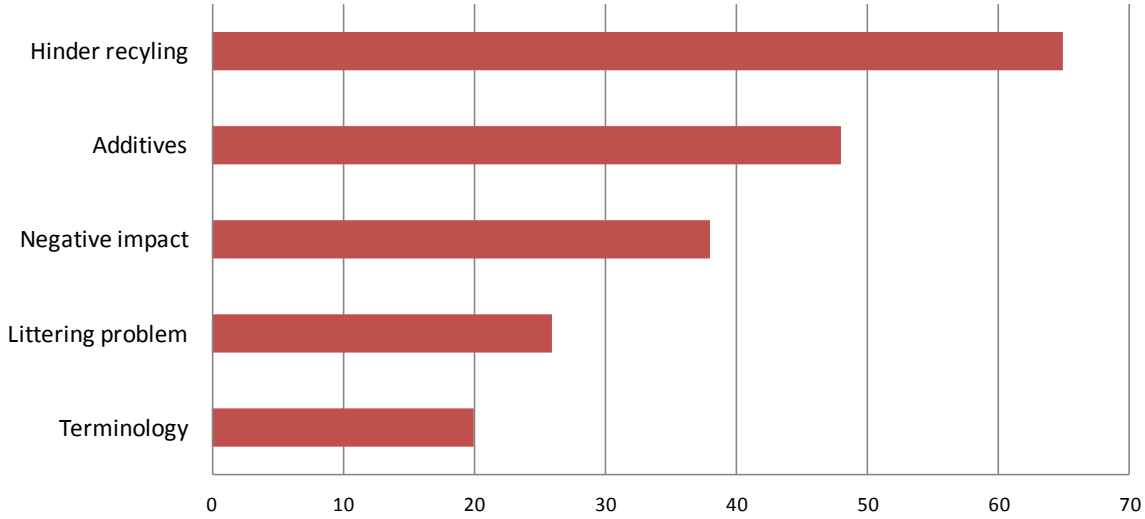
Figure 58: Question 21 – Proportion of respondents for or against the use of oxo-degradable plastic



The use of oxo-degradable plastics is not very advisable (prohibition or no promotion) according to almost all respondents. Several reasons are given but the main comment is about hindering recycling and the use of additives. Indeed, intervention is advised on the question of recycling oxo-degradable products. Stakeholders recommend limiting the scope of application in order not to interfere with mechanical recycling. Another comment is to implement a system of identification to facilitate easy separation.

Description of relevant/most important comments

Figure 59: Question 21 – Type and number of answers concerning oxo-degradable plastic



The main problem lies in the incompatibility of oxo-degradable plastic and **recycling**: "*Oxo-degradable products can hinder recycling of post -consumer plastics*" (39). For 11 stakeholders, oxo- products are not compatible with mechanical recycling. The problem stems from the use of oxo-biodegradable additives, preventing recycling (8).

The question of **additives** in oxo-degradable plastic could be dealt with by a ban according to 20 stakeholders. Otherwise, "*The use of additives capable of inducing the oxo-fragmentation of the plastics should be clearly prohibited*" (28).

According to stakeholders, the use of oxo-degradable plastic can create a **negative impact**. It represents a danger to any option at end of life, the additives and residues of oxo-fragmentation having negative impacts on the production of new items if they enter the flow of materials to be recycled mechanically (33).

Concerning the question of "**litter**" for example, "*Oxo-fragmentable plastic is not in any way an environmental solution to the general problem of "littering" or a solution on uncontrolled disposal of plastic packaging on land or marine environment*." (24)

To avoid problems, a **terminology** of these products has to be put in place by an information campaign: "*A clear and official communication to clarify that oxo-fragmentable plastics are not a biodegradable alternative and they are totally different to 'biocoms' would be essential*" (10).

Among the 13% of stakeholders who chose "Others", the main answer provided concerns the strengthening of separate collection models to deal with oxo-degradable plastic (6). A system to identify oxo- plastics for separation should be put in place to facilitate separation (4). Another recommendation is to require LCA before allow these products (4).

National and regional ministries of the environment

For three ministries, oxo-fragmentable plastics represent a high risk for the environment. Therefore, intervention is appropriate for a regulation on the use of these materials according to ministries such as France.

Three ministries (NL, CZ, AT) think these materials can hinder recycling due to the presence of additives. A clear and official communication to clarify that oxo-fragmentable plastics are not a biodegradable alternative would be necessary. One ministry (EE) asks for an LCA on these materials for the end of life. It would be helpful to know the impact on the environment. "*A scientific LCA study is needed on oxo-biodegradable plastics: if landfilled or incinerated, those are no better, then usual plastics"*.

Bio-based plastics

(22) *(a) How should bio-based plastics be considered in relation to plastic waste management and resource conservation?*

For 25 stakeholders, the bio-based versions of PE, PET or PVC are physically identical to the widely used fossil counterparts and thus can make use of established waste management schemes. Bio-based plastics are identical to their counterparts without the use of petrol, thus helping reduce its depletion, and avoiding CO_2 emissions as part of their LCA according to nine respondents.

Concerning the subject of waste management, plastic waste can also be recovered by means of incineration to create heat and energy (electricity). The high calorific value of plastics makes them a good replacement for other fuels. Whether they are bio-based or from fossil resources makes no technical difference to recovery. However, in the case of bio-based plastics, renewable energy can be obtained and the evolved CO_2 is biogenic (13). Also, "*bio-based plastics that are biodegradable are compostable*" (13).

National and regional ministries of the environment

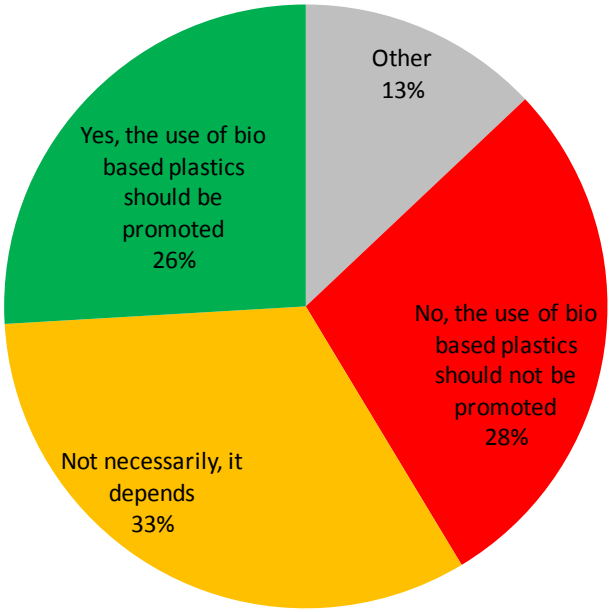
French authorities think biomass with no food competition has environmental, economic and social benefits by decreasing CO_2 emissions or replacement of fossil materials. Development of bio-sourced plastics has to be in coherence with efficiency policy and a circular economy.

No other comment was made for bio-based plastic in relation to plastic waste management. Other answers are given for the next question.

(22) *(b) Should the use of bio based plastics be promoted?*

Answers to this question were provided by **162** respondents. Three types of answer are given roughly in the same proportions. 26% of stakeholders think bio-based plastics should be promoted but 28% are opposed. For 33% of respondents, it has to be discussed first.

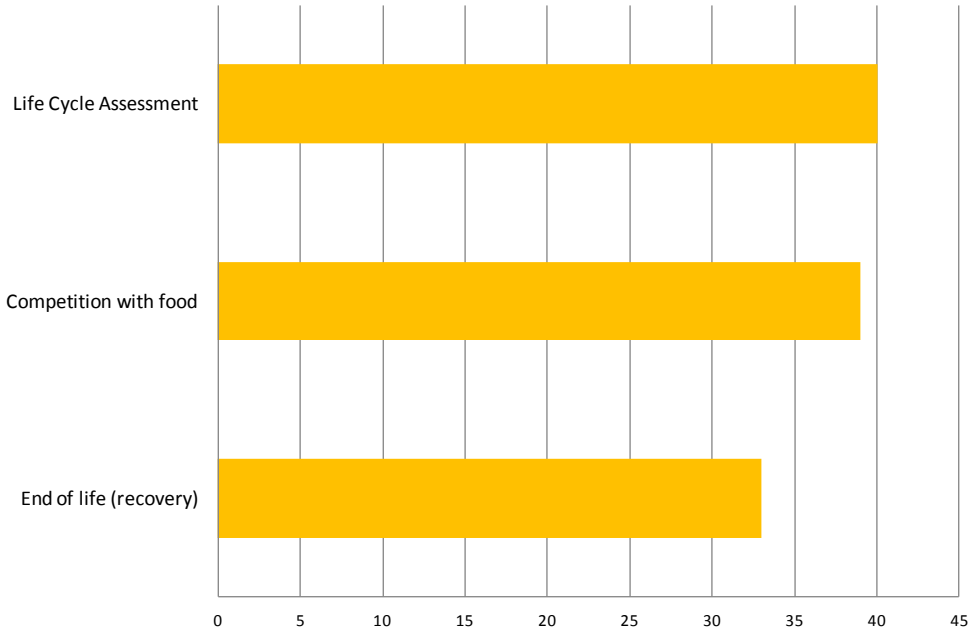
Figure 60: Question 22 – Proportion of respondents for or against promotion of bio-based plastics



Description of relevant/most important comments

The majority of stakeholders want to promote bio-based plastics only if the result of LCA is positive or if there is no competition with food. The figure below shows various topics to discuss before promoting bio-based plastics.

Figure 61: Question 22 – Type and number of answers to discuss before promoting bio-based plastics



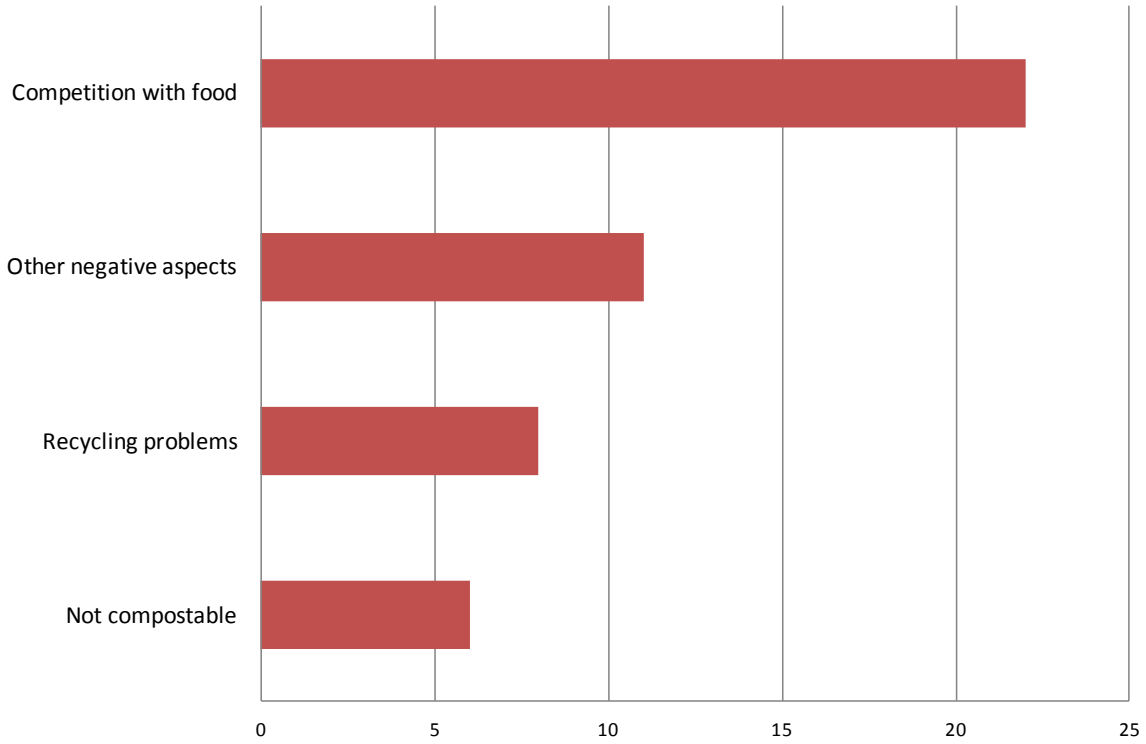
To promote bio-based plastics, it is necessary to perform a **life-cycle assessment** first. If the result of this LCA is more favourable than the product they are replacing, bio-based plastics can be promoted (29). Another comment on this subject concerns sustainability more generally; any promotion of materials should be done according to their sustainability (18).

Concerning the theme of **competition with food**, measures should be established to prevent future competition with food (16). Bio-based plastics are to be promoted if the product is not made with food crops (12) but only made of waste (12). For eight stakeholders, the nature of waste has to be agricultural.

The next theme concerns the end of life of bio-based plastics. Indeed, stakeholders are in favour of bio-based plastics if they meet the technical requirements, the expected features and they can enter in a way of recovery (21).

Among respondents who think the use of bio-based plastics should not be promoted, the reasons are diverse and concern competition with food, market distortion, marine litter problems, etc. The figure below shows different reasons why the promotion of bio-based plastics may not be effective.

Figure 62: Question 22 – Type and number of answers why bio-based plastics are not to be promoted



The main concern is the **competition with food**. For 22 stakeholders, there is competition with bio-based plastics for the use of soil. Those resources should be used to produce food for people in the world who do not have enough to eat.

In the category **other negative aspects**, promotion of bio-based plastics is likely to lead to considerable market distortions (4). In addition, bio-based plastics do not solve the marine litter problem and increase littering (7).

The theme of **recycling** is treated in many comments. Bio-based plastics have not to be allowed in recycling (4) and are a source of contaminating ordinary plastic waste (2).

Then, "*bio-versions of PE, PV have a chemical structure and properties on durability or recyclability indistinguishable from the same plastics derived from fossil fuels and are therefore* ***not compostable*** *plastics*" (5).

National and regional ministries of the environment

For five ministries of environment (CZ, AT, DK, NL, FR), bio-based plastics are not necessarily to be promoted, it depends on "*the results given by a life cycle assessment between bio-based and fossil plastics"* (4) or "*the non-utilisation of food crops for bio-based plastics"* (3). These products should be made "*only by waste*" (3).

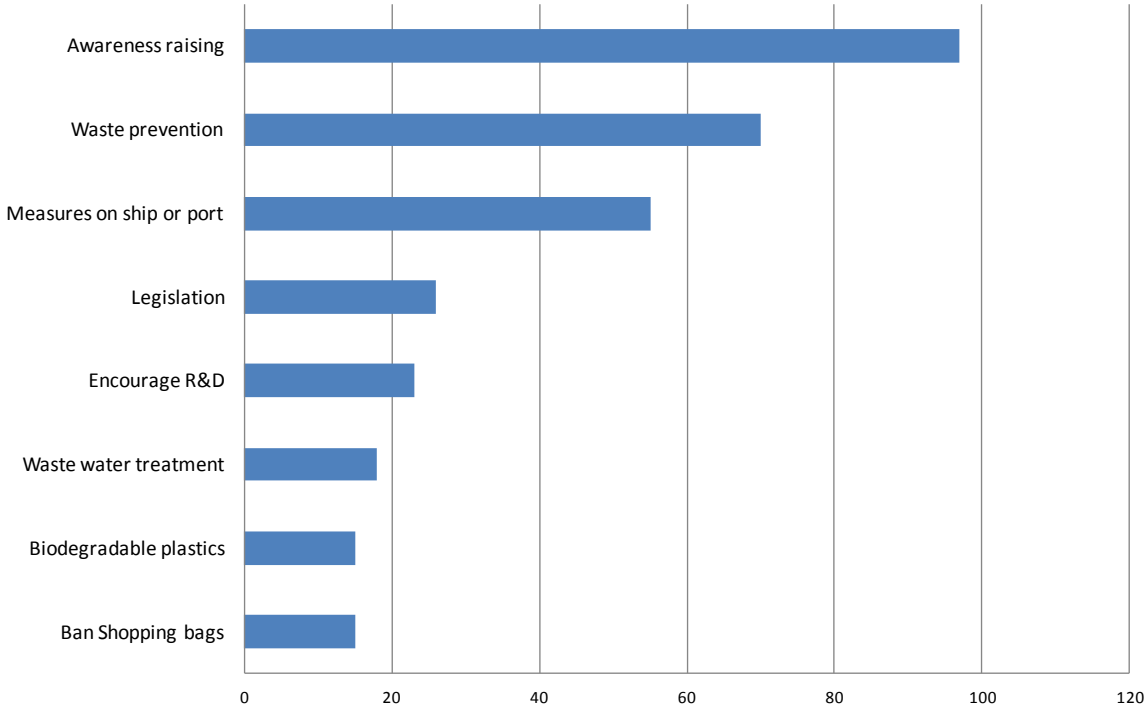
Three ministries are against the promotion of bio-based plastics (Niedersachsen, Thüringen and Defra (UK)). For a further three ministries, food production has to remain the primary goal of agricultural production. Therefore, bio-based plastics compete with food.

7. EU initiatives dealing with marine litter including plastic waste (Questions 23-24)

(23) *(a) What actions other than those described in this Green Paper could be envisaged to reduce marine litter?*

Comments on this question were made by **162** respondents. The issue raised many different comments on diverse topics. To reduce marine litter, it is essential to raise the awareness of citizens and take better action on waste prevention. Also, several measures focused on ports or ships should be taken to improve waste management. The figure below shows various actions to reduce marine litter.

Figure 63: Question 23a – Number of responses by type of action to reduce marine litter



The most common answer concerns "**awareness raising**" among citizens. For 51 stakeholders, establishing a European Coastal Clean-up Day allows the importance of marine litter to be emphasised. Another suggestion is to introduce the subject into schools, to increase the sense of responsibility (43). It is also considered necessary by some to educate citizens to sort and to enable proper sorting (16).

For 62 stakeholders, the fight against marine litter will be most effective if **waste prevention** is highlighted. Then, the collection of waste before becoming waste litter is considered necessary by 17 stakeholders.

Concerning "**measures on ships or ports**", controls on ships' waste disposal need to be improved via better enforcement of existing legislation (MARPOL Annex V) "*Port reception facilities need to be improved to ensure that all ships remove their waste at port and do not dump at sea, and existing legislation of MARPOL Annex V must be properly enforced*" (28). Another recommendation illustrates the model of fishing for litter "*Fishing boats are directly provided with large bags to deposit marine sourced litter. When full, these bags are deposited safely on the quayside to then be collected for disposal*" (18). Then, according to seven stakeholders, an important action would be enforced weighting of what is loaded onto ships and then weighting of how much waste material is brought back into port.

Another action to fight marine litter is the improvement and enforcement of **legislation**: "*Full implementation and enforcement of EU waste legislation in the EU-27 Member States will help tackle the marine litter issue, notably by phasing out uncontrolled dumping and illegal landfills*" (22).

R&D is still needed to eliminate the roots of the problem (18). Concerning "**biodegradable plastics**", these products are promoted once their biodegradability is effective (21).

National and regional ministries of the environment

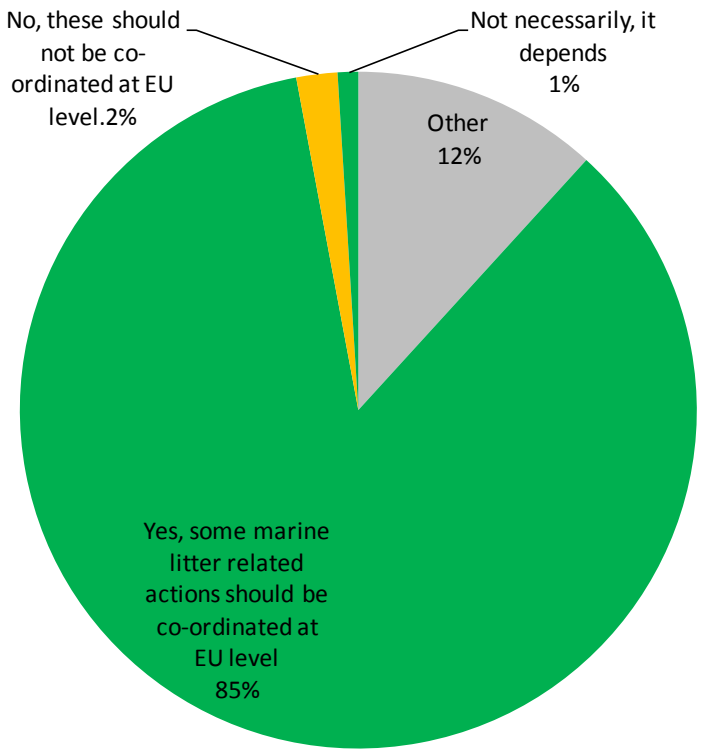
Most ministries consider it important to make citizens responsible and raise awareness of marine litter because the main sources of marine litter are terrestrial. Another recommendation against marine litter is to implement the Marine Strategy Directive (UK Defra) or to have strict legislation (Thüringen).

For four ministries, it is necessary to implement waste prevention and to have better waste management. For example, controls on ships for removal of waste and the model of fishing for litter need to be improved.

(23) *(b) Should some marine litter related actions be coordinated at EU level (e.g. by setting up a coordinated European Coastal Clean-up Day to raise awareness)?*

For this question, **101** respondents have given specific answers. The majority (85%) approve the initiative of establishing a day of "**European Costal Clean-up**".

Figure 64: Question 23b – Proportion of respondents for or against actions co-ordinated at EU level



National and regional ministries of the environment

In general, ministries are in favour of the establishment of a European Coastal Clean-up Day to raise awareness. Indeed, cleaning actions are positive to create more visibility and awareness among individual citizens of the problem of marine litter.

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

Setting such a target needs to be clearly quantified, realistic and requires enforcement measures (37). A unified target requires ongoing reporting on the state of waters in the sea and rivers (11). For five stakeholders, local targets are better than an EU-wide target. It is also important to identify trends for waste and to know the sources of marine waste. However, this target needs to be complemented with measures like waste prevention or management in urban or coastal areas.

A significant number of respondents are **against a target** because "*It is difficult to see whether it is possible to set realistic and undistorted targets given the current state of knowledge*" (16). The second argument given is that "*quantitative reduction target for marine litter will be of low effect as long as countries outside Europe have poor waste management policies and infrastructures that are not properly implemented*" (3).

National and regional ministries of the environment

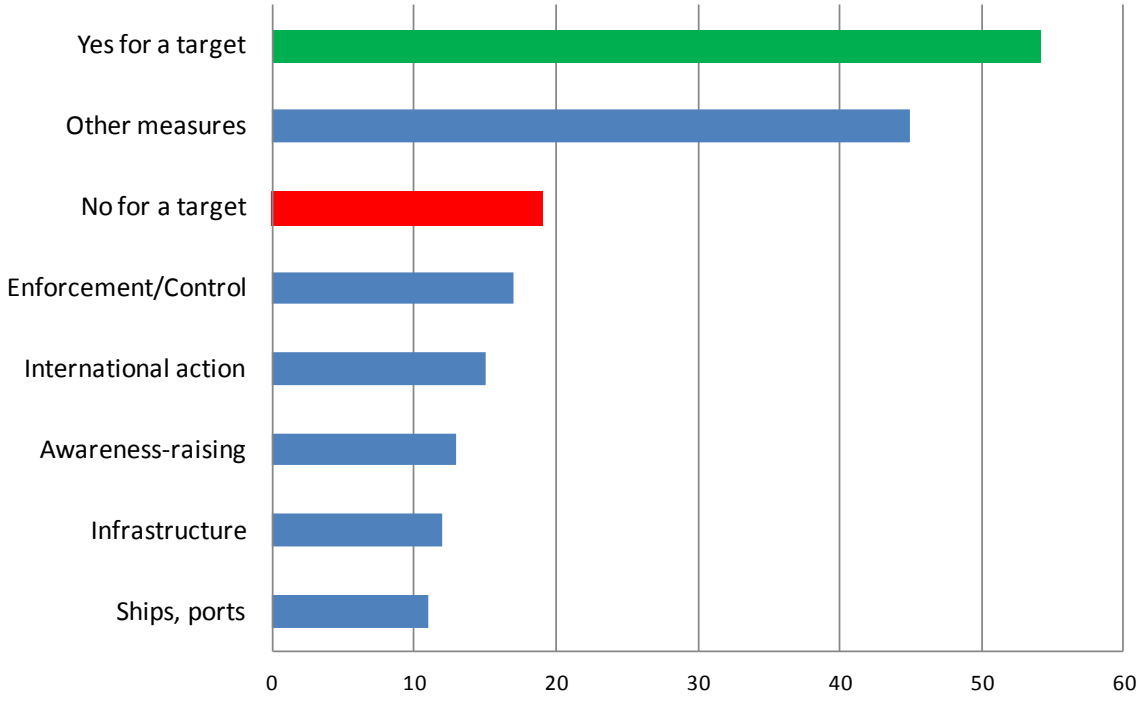
For five ministries (AT, Schleswig-Holstein, Niedersachen, UK Defra, NL), it is necessary to set a target. But it has to be clearly quantified and to have a unified target.

For three ministries (DK, FR, CZ), setting a target will be useless because knowledge is sparse about the exact sources of the marine waste found in offshore areas, and in part because it is unclear which discharges individual countries can be held accountable for.

(24) *(b) How could such a target be developed?*

Comments on this question were made by 120 respondents. Most stakeholders believe that setting a target is very important to have a goal on reducing marine litter.

Figure 65: Question 24b – Type and number of proposals on a quantitative reduction target for marine litter



Description of relevant/most important comments

Concerning the category "**target**", NGOs advocate a 50% marine litter reduction target by 2020 as a stepping stone towards achieving Good Environmental Status.

Other measures are said to be necessary to accompany targets. The first is to "*improve plastic waste management in urban/coastal areas and beaches and rivers to avoid litter entering the oceans*" (15). The second type of measure recommended is preventive (14). It is also necessary to improve wastewater treatment (7). A target can be accompanied by better **enforcement and control** of authorities concerning waste at port and dumping at sea (15).

International action is necessary to reduce marine litter worldwide by the promotion of preventive measures as otherwise this would only affect competition within the EU (11).

National and regional ministries of the environment

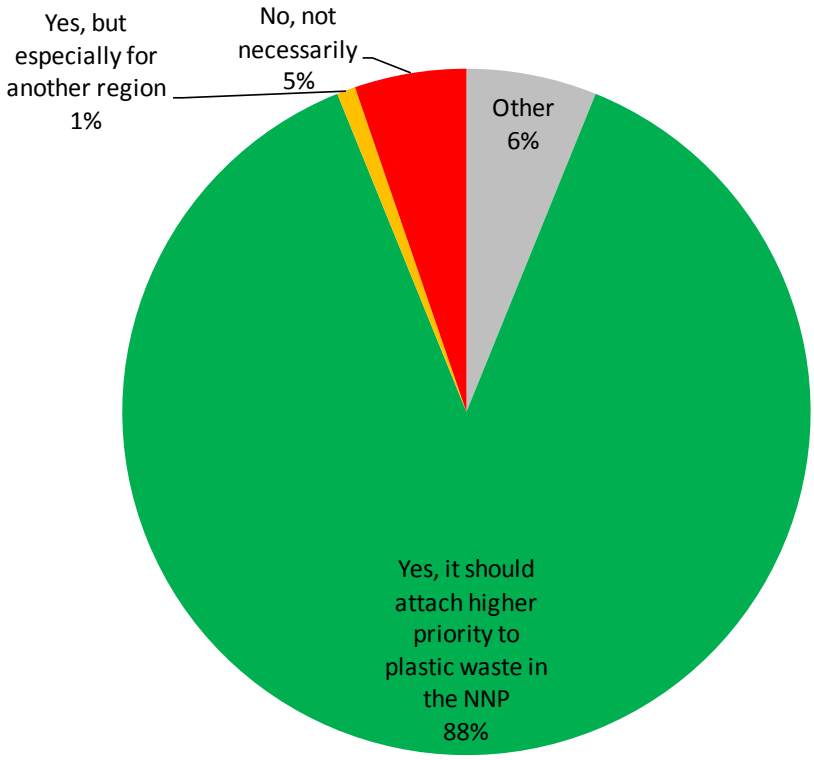
For two ministries (AT, Schleswig-Holstein), to achieve a target it is necessary to control and to avoid plastic waste in marine litter. Efficient enforcement of international regulation on waste management systems for both waste generated on land and waste from ships would be helpful.

8. International action (Questions 25-26)

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

Answers to this question were provided by 114 respondents. The majority (88%) agree with the EU attaching a higher priority to plastic waste in the framework of its "New Neighbourhood Policy".

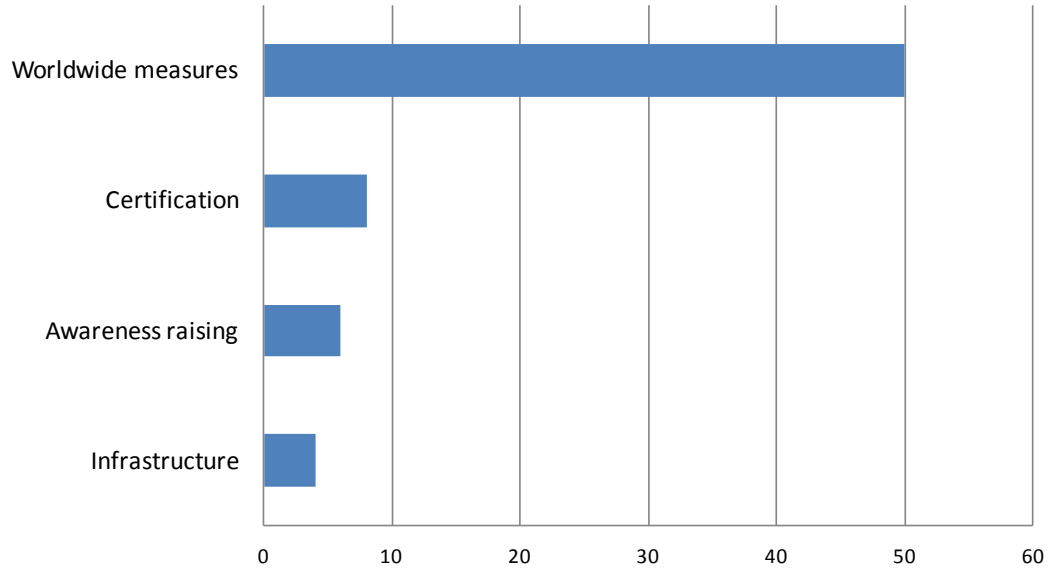
Figure 66: Question 25 – Proportion of respondents for or against the implementation of new neighbourhood policy



Description of relevant/most important comments

60 respondents gave more detailed comments on the subject. The different factors concern waste management, certification or awareness raising. The figure below shows the main themes covered.

Figure 67: Question 25 – Number of detailed comments concerning EU neighbourhood policy by type



In the category "**Worldwide measures**", 25 stakeholders believe it is important to "*Improve initiative for the management of waste in neighbourhood policy"*. Others say the EU should promote marine litter prevention worldwide (12). There should be exchange of best practices in waste management in the EU (9), while another recommendation is to improve the responsibility of countries by prohibiting certain benefits granted by the EU: "*Countries responsible for plastics arriving into the Mediterranean or black sea, should not be allowed to certain benefits given by the EU"* (3).

A system of **certification** for the EU could be put in place: "*Establishing a certification scheme to assess facilities in neighbouring countries is therefore necessary*" (9). The EU "New neighbourhood policy" could also focus on **awareness raising**: "*Do not forget to perform awareness raising and communication with the public*" (6). Finally, for four stakeholders the issue of infrastructure has to become a priority "*Collection and recycling infrastructure should be a priority*".

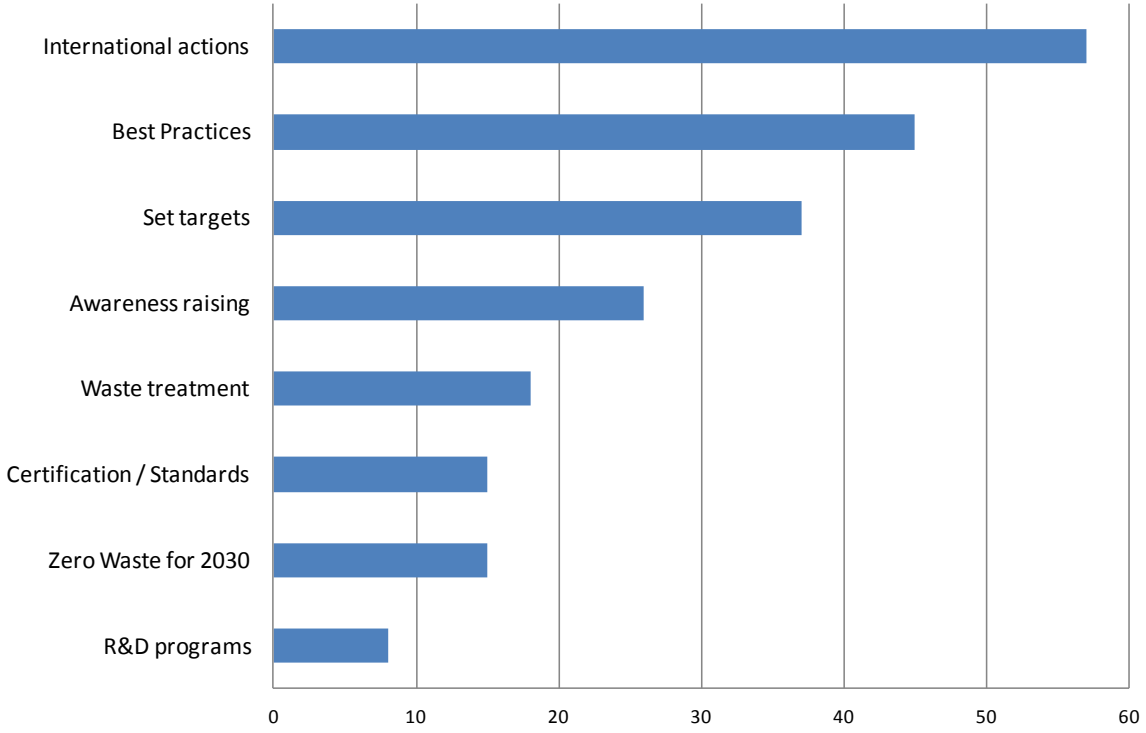
National and regional ministries of the environment

For four ministries (CZ, AT, Niedersachen, UK Defra), the EU should attach a higher priority to its new neighbourhood policy. In terms of detailed comments, the Dutch ministry supports "*water management programmes which seek to reduce pollution in international rivers*". An exchange of best practices across the EU is recommended by the ministry response from Niedersachsen.

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

Comments on this question were made by 129 respondents. Several types of proposals were made, including some international actions, the promotion of best practices, the focus on setting targets, etc. The figure below shows the numbers of responses for each.

Figure 68: Question 26 – Type and number of answers concerning the promotion of international action



Description of relevant/most important comments

The first proposal for "**international action"** is to have worldwide co-ordination for management waste conducted by the EU (42). A related comment concerns policy: it would be beneficial if international action is integrated in foreign policy (6).

The second type of recommendation is to share "**best practices"** or to publish best practices examples (33). Another comment on that is to develop co-operation among municipalities by exchanging experiences (15). The EU could also learn from best practices in non-European countries such as Canada, Australia and some American States (2).

The third category of comment emphasises "**targets**", focusing on prevention and reuse targets (23) and recommending the EU "*to act as an example by establishing ambitious targets, legislating these and achieve them*" (9).

The fourth answer focuses on "**awareness raising**" programmes (conferences, stakeholder meetings) (11). For 13 stakeholders, international action should promote a circular economy. Financial assistance may be necessary for environmental education at local level. This education can be assigned to the political authorities that will do best practice (4).

The fifth type of proposal deals with **waste treatment** by strengthening methods in EU municipalities (9). The second answer is to progressively end incineration of recyclable plastic around the world (10).

Concerning the subject of **certification**, it is necessary to develop certification schemes and a register of facilities where sending waste would be authorised for international action (9). For

15 stakeholders, it would be beneficial if the EU embraced a goal of "**Zero Waste for 2030**" in line with the goals of the Resource Efficiency Strategy.

An effective international action would be **research and the development** into new materials that have less impact by establishing R&D programmes worldwide (9).

National and regional ministries of the environment

Answers are diverse for ministries. Concerning "**international action**", worldwide co-ordination with the EU for managing waste is important for two ministries (CZ, EE). Another response is to publish examples of best practices in the EU for ministries (UK Defra, Niedersachen). The "*EU should continue its active involvement in the issues of waste management through existing international forum*" according to the Czech ministry. In the end, "*by promoting systems to reduce the consumption of plastics, and to ensure that any plastics waste is managed sustainability, EU has the opportunity to influence global markets to act more sustainably"*, the EU has to act as an example.

Chapter 4: Summary and conclusions

4.1 Introduction

Each issue in the Green Paper consultation has elicited a variety of answers and many types (Association, Public, Private, Citizen, etc.) of respondents from countries across the EU have contributed. A minimum of 100 stakeholders answered each question. This result could be interpreted as giving legitimacy to the Green Paper consultation process and encourages the EU to draw on it in the development of a strategy on plastic waste.

Through the responses of stakeholders to the 26 questions of the consultation, several important topics emerge:

- Waste management;
- Waste prevention;
- Legislation;
- Market and Market-based instruments;
- Awareness raising;
- Communication;

These six topics encompass all the questions and responses given by stakeholders and offer **important messages for the strategy on plastic waste in the environment**. A summary of the main elements for each is given below.

4.2 Waste management

Waste management should consider the full life cycle of products (production of raw material to plastic waste). Each step of the life cycle is important because each stakeholder at each step can improve waste management.

- Design of plastic products

Product design should consider the principle of ecodesign by focusing more on reuse, recycling, making products repairable and longer lasting. Rates of recycled content should be increased in new production.

In addition, sustainable ecodesign has to be achieved by the gradual phasing out of hazardous additives and the avoidance of substances that make recycling more difficult. Another recommendation would be the use of a single type of polymer and the avoidance of multi-layer plastics where possible.

The promotion of new materials is appropriate only if the product is sustainable and if LCA is better than conventional plastic (biodegradable, bio-based plastics). This recommendation is applicable to the use of nano-particles or micro plastics. For the moment based on the

consultation, these products should be limited or tested for nano-particles, limited or prohibited for micro plastics. The proposal for micro plastic is the same as for oxo-degradable plastic.

- Sorting and Collection

Citizens have a role in improving sorting (see section on awareness raising) but improvements have to be made in implementing separate waste collection systems to avoid or reduce contamination. Some stakeholders recommend adding a code or a mark that allows for automatic separation of plastic types.

Separate doorstep collection is a measure to be taken into account but if separation of materials is effective there is no contamination of waste. Deposit systems work well when it comes to specific products such as single-use products like PET bottles or cans but it is important to be aware of the costs of deposit in terms of infrastructure logistics or the transportation of single waste fractions.

- End of life

Plastic waste has to follow the waste hierarchy (see section on legislation). Stakeholders support gradual phasing out of sending plastic waste to landfill throughout the EU.

Concerning energy recovery, sometimes it is not possible to mechanically recycle plastics, due to contamination with other materials or due to the presence of multi-layer plastics. In these cases, energy recovery is advised in order to avoid landfill.

Recycling is the best way to handle plastic waste but it is necessary to ensure the quality of recycling. Indeed, secondary material is more attractive when the quality is similar or identical to raw material. Many stakeholders think improve closed-loop recycling would provide high quality material.

- International action

The EU should participate in worldwide co-ordination actions to manage waste by organising conferences or publishing best practice examples in the EU. An international research programme on new materials would be an effective proposal.

- Other measures

Stakeholders believe that voluntary initiatives are very useful (PET bottles, PVC windows, etc.) and should be further encouraged and supported at EU level. Voluntary initiatives would be more valued if producers and retailers participated together.

4.3 Waste prevention

European strategy on plastic waste in the environment has to take into account waste prevention. Indeed, reduction of plastic waste needs a specific focus.

- Single-use short-life products

Promoting waste prevention means improving research and development into new materials that are more sustainable and more reusable. In addition, waste prevention is important for short-lived and single-use products like plastic bags by gradual phasing out or prohibition. It is

very advisable to use plastic products with an extended product life. Indeed, most stakeholders think the EU should tackle planned obsolescence with a policy on the duration of product life.

- Marine litter

Waste prevention is very important to fight marine litter. Indeed, it is important to collect waste before it enters seas or beaches. The more waste is treated or reduced upstream on land, the more marine litter will be reduced.

- Financial incentive

For many stakeholders, pay-as-you-throw schemes are the easiest and quickest method of reducing waste arising and should be introduced across Europe, albeit with adaptations to each local situation. Most ministries are against such a law but have the same view concerning adaptations to each local situation.

4.4 Legislation

In general, stakeholders mention two approaches for legislation: improvement and effective implementation. Indeed, current legislation is lacking checks and is not always applied. At the same time, new measures (waste hierarchy, recycling rate) are also necessary.

- Current legislation

Many stakeholders believe that full implementation and enforcement of the Waste Framework Directive and other regulation in the EU will further enhance recovery and recycling. In addition, it is advisable to have harmonisation of legislation in the EU.

Full implementation and enforcement are also needed for landfill legislation (more recovery instead of landfill), for plastic waste exported to non-EU countries (plastic waste should be recycled in facilities complying with standards equivalent to those applied in the EU) and for waste legislation on the marine litter issue (phasing out of uncontrolled dumping and illegal landfill).

- Lack of legislation

The main action area for legislation is with respect to the waste hierarchy. Indeed, the EU should promote the top of the waste hierarchy (prevention, reuse) because current recycling targets are simply too low both in the Waste Framework Directive and the Packaging Directive. In addition, a review of legislation is needed to increase the recycling rate and rate of recycled materials in products. Stakeholders mention recycling targets by type of product (WEEE, ELV, etc.). Then, to minimise stream contamination and ensure high quality recycling, the Waste Framework Directive should make segregation of materials at source the norm across the EU.

To deal with plastic waste, legislation needs to be adapted in order to consider plastic waste as a resource and not waste. In addition, a Biowaste Directive is proposed to oversee the development of bio-based and biodegradable plastics.

The Landfill Directive is not sufficient legislation for many stakeholders. An improvement would be an implementation of landfill diversion targets with a ban on untreated recyclable and energy

recoverable waste.

Concerning design, it is important for legislation to set a target for modular and reusable design and this should be made mandatory. Next, the Ecodesign Directive should introduce measures to ensure that products can be easily disassembled and can be more reusable, recyclable and longer lasting.

4.5 Markets and market-based instruments

This section concerns the development of markets for recycled plastics and the introduction of market-based instruments.

- Recycling issue for market

Recycled plastic in products is not the main priority for manufacturers because there is no price incentive. It is necessary to encourage the market for recycled plastics. The reduction of value added tax for products containing recycled content could be one measure to counter that. Some kind of discount could be applied for producers that use recycled plastics or that use their own recycling facilities. These or other incentives for recycling should serve to develop and strengthen the recycling industry.

- Market-based instruments

In general, market-based instruments are welcomed by stakeholders under certain conditions. It is necessary to include total life-cycle cost and to analyse costs and benefits. The main proposal in favour of this instrument is to influence the pricing of waste treatment and disposal activities via taxes, charges or fees. For example, a landfill tax is necessary to improve recycling. At the same time, a tax for energy recovery is not desired. Many stakeholders think it is not a solution and incineration with energy recovery is needed.

Another measure concerns the problem of single-use plastics. To change the consumer mentality, it is necessary to raise prices through systematic taxation reflecting true environmental costs, in order to encourage consumers to buy alternative, long lasting, durable substitutes.

- Other instruments

Extended Producer Responsibility schemes already reflect environmental costs in their fees, which provides an incentive to industry. EPR allows the reduction of material use, and obliges producers to ensure recyclability and the value of the material. This scheme promotes the polluter-pays principle.

4.6 Awareness raising

The majority of stakeholders think that EU strategy on plastic waste has to involve citizens. The behaviour of consumers needs to be changed by awareness raising measures.

- Education

The first recommendation about awareness is to educate consumers and in particular children. Indeed, waste prevention can begin with the introduction of the topic in schools. It is important to make children aware of how they discard waste and to increase the feeling of responsibility among citizens in general. Awareness raising is also needed to educate and enable citizens to sort properly.

- Raise awareness

Concerning single-use products, citizens have to be aware of the environmental consequences and costs of plastic waste, e.g. the problem of marine litter. Indeed, stakeholders are in favour of a European Coastal Clean-up Day to clean beaches and to raise the awareness of citizens. This day would allow citizens to participate and take action for the environment. Another action at international level could be to support conferences or stakeholder meetings.

Awareness raising needs to be complemented by effective communication for all stakeholders on the life cycle of plastic.

4.7 Communication

Communication is an effective instrument to make people aware of waste management but also to give reliable information for consumers. Information can be given on products in multiple ways (logo, label, symbol, etc.).

- Consumers

To improve waste management among consumers, it is necessary to make good communication by advertising campaigns or general information on sorting and separate collection. In addition, consumers need to be informed precisely on where to put which plastic for collection and what are the recycling options. "Greenwashing" with confusing environmental claims has to be avoided.

Many stakeholders state that information has to be clear, simple and accessible. It is advisable to know the plastic used in products, the recyclability and the rate of recycled material. Labelling plastics in a unified way is an option that allows plastics to be easily identified. Environmental footprint and information on harmful substances should be provided on packaging products to inform the consumer.

Communication measures should be established to distinguish terms such as oxo-degradable and biodegradable plastic. This is necessary for consumer understanding.

- Manufacturers / Recyclers

To have valuable information in the chain from manufacturers to those involved at the end of life, it is necessary to use material safety data sheets or to create a plastic registry. Material safety data sheets give the composition of plastic with chemical content. Then, plastic registries can make a list of dangerous and toxic additives. REACH can also play a role in providing this information.

Communication between manufacturers and recyclers needs to be improved to avoid contamination of plastic and to have better separation of plastic. For example, the creation of a symbol for biodegradable or conventional plastic could be useful for automatic separation. This symbol also allows traceability of the product throughout its life.

Concerning bio-based plastic, recyclers need to know what are the different bio-based plastics in the market because they do not have the same behaviour at end of life (recyclability and compostable). In addition, a clear distinction is needed between biodegradable and compostable products by a mandatory and clear labelling.

4.8 Conclusions

The six topics above represent the mainstream of proposals by stakeholders. The main messages are:

Concerning "**waste management**", it is important to put more emphasis on ecodesign by focusing more on reuse, recycling, making products reparable and longer lasting. The waste hierarchy has to be followed and implemented at end of life. To have efficient international action, the EU should participate in worldwide co-ordination actions to manage waste by organising conferences or publishing best practice examples in the EU.

Concerning "**legislation",** it is recommended to have better implementation and enforcement of current legislation and to harmonise within the EU. A review is needed based on the waste hierarchy and the consideration of plastic waste as a resource. Legislation has to be focused on recycling targets and on the implementation of a ban on untreated recyclable and energy recoverable waste for landfill.

Integrating recycled plastics into products can be very difficult for manufacturers because there is no strong **market** for these materials. Measures like price incentives (e.g. reduced VAT) are recommended to develop the market for secondary materials. **Market-based instruments** are also effective, to influence the pricing of waste treatment and disposal activities via taxes, charges or fees. For example, taxation is needed for single-use products. Stakeholders encourage the implementation of extended producer responsibility.

Plastic waste can be reduced by raising the awareness of citizens through education about sorting and collection. Citizens also have to be aware of the environmental consequences and costs of plastic waste, e.g. the problem of marine litter for example.

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