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COUNTRY REPORT ESTONIA

Views,
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in Europe on Science

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1. Introduction

1.1   The VOICES project

VOICES (Views, Opinions and Ideas of Citizens in Europe on Science) is a year-long, Europe-wide citizen consultation exploring the concept of waste as a resource. It represents an innovative method of integrating public opinion into the 'Climate action, resource efficiency, raw materials' dimension of the Horizon 2020 Work Programmes beginning in 2014.

Funded by the European Commission and led by Ecsite, the European network of science centres and museums, the VOICES project is a response to the Science in Society 2013.1.2.1-1 call on citizen participation in science and technology policy. Citizens are invited to give input to the Consolidation Group that will define the priorities for the next work programme on 'Urban Waste' (call SiS.2013.1.2.1-2).

The main aim of VOICES is to yield valuable insight on methods and procedure for engaging citizen participation to help set the research agenda for Europe's Responsible Research and Innovation framework. The knowledge gained through VOICES will be put to use in similar participatory actions across Horizon 2020.

1.2 Citizen participation in social innovation

A national and European capacity-building initiative, VOICES unites science communication practitioners and academics, and, as such, will result in an effective method through which to consult the public on science and technology related issues.

Compared to many other consultation initiatives, VOICES represents a breakthrough because of its scale (covering all of Europe) and because of the methodological approach used on this wide scale: an approach which makes use of a qualitative methodology, which allows a harvesting and deep understanding of citizens' views, fostering real governance processes and social innovation.

VOICES is also very innovative in its commitment to formally include the results of the citizens' consultations in the main policy document that will shape the priorities of European research. Another unique element is that the knowledge gained with this pilot, in terms of methodology, infrastructure and results, can be used to organise similar participatory actions across Horizon 2020.

1.3 The process

One thousand European citizens participated in focus group discussions about 'Waste as a resource' using a structured VOICES methodology which spans training, implementation and analysis. The methods, infrastructure and results of VOICES are fully documented on an open access portal (www.voicesforinnovation.eu) designed for similar participatory actions occurring throughout Horizon 2020.

VOICES engaged citizens in 33 locations covering 27 EU countries. 28 Ecsite network institutions make up the Third Party task force which organised the 100 focus groups, with approximately ten citizens each, in their respective countries.

Ecsite Project Managers and researchers from the Athena Institute, VU University Amsterdam, were responsible for conducting the focus groups, analyzing public consultations, writing the country and synthesis reports and disseminating their outcomes at public events.

1.4 Structure of the report

In this country report on the VOICES outcomes from Estonia, the VOICES research methodology is further detailed in the following chapter. In Chapter 3, some specific data is provided on the country's population, on national urban waste figures and on specificities of the participants of the focus groups. Chapter 4 presents the results of the citizens' consultation on waste management at household level, barriers and concerns experienced in prevention and management of waste, and ideas for research and innovation, policy, management and communication. The report ends with a summary and discussion of the findings.

2. Methodology

This section provides general information about the focus group method, and in particular about the VOICES approach. It also describes the structure of the VOICES focus groups and the process of data analysis.

As a qualitative research method, the focus group is increasingly used in political and social sciences, and can be defined as "a carefully planned discussion designed to obtain perceptions on a defined area of interest in a permissive, non-threatening environment".[1] An important advantage of focus groups in comparison to other research methods is that participants can respond to and build on the views expressed by the other participants. Because of this interaction, focus groups generate a large variety of opinions and ideas which provide insightful information, while maintaining a specific focus during the discussion. The method provides the opportunity to gain in-depth insight into ideas, values, wishes and concerns of participants and stimulates shared creative thinking. A specific characteristic of the focus group method is that it seeks understanding of a research topic from a particular perspective; in the case of the VOICES project, the perspective of European citizens.

2.1 The VOICES focus group approach

In the VOICES project, a total of 100 focus groups were held, each of them with approximately 10 citizens. Participants were selected by local recruitment agencies, according to predefined selection criteria. The selection criteria were applied in order to obtain diversity in focus group participants, and to represent society at large. General selection criteria with respect to demographic information included: sex (50% men and 50% women), education (low, medium and high levels of education)[2] and employment (employed, unemployed, retired and student). The focus groups were stratified by age using the following categories: 18 to 35 years of age, 36 to 50 years of age and 50+. Other criteria addressed elements relevant to the VOICES project's specific topic, including: participants from urban and non-urban areas[3], diversity of types of municipality (at least five different municipalities, including bigger towns and smaller villages), and diversity of housing situation (flat or house). These selection criteria were applied in all EU member states. Because of the local context and the availability of participants there are minor differences between member states in the resulting composition of focus groups.

In most EU member states, three focus groups were conducted, all in one location. However, all member states with a population of above 25 million (Germany, France, Spain, Poland, Italy and the UK) had two sets of three focus groups each in two different locations, resulting in six focus groups in total in these countries.

The focus groups lasted 3 hours and followed a semi-structured script consisting of an introduction, four main exercises and an evaluation part (see box 2.1). During the focus groups, specific attention was paid to keeping the environment noise-free and providing enough space to relax, walk around and engage in the conversation. Each focus group was led by a moderator, who was in charge of stimulating and guiding the discussion. The moderator's role was also to maintain the focus of the discussion by ensuring that key themes were covered, while managing group dynamics.

Moderators facilitated the discussion by following the focus group script, which was provided to them in advance and contained questions and exercises to guide their work and ensure equal individual input as well as group discussion. Because of their crucial role in the focus groups, all moderators involved in the VOICES project followed a specific 2.5 day training course. The training focused on specificities of the VOICES focus group script as well as on refining important competencies of the moderators' role, including interpersonal communication, process management and understanding of the topic addressed.

In order to capture the data generated during the process, audio and/or video recordings were made of all focus groups. A note taker was also required to be present for the entire duration of the focus groups, in order to record additional data and to assist the moderator. All visual data generated by the participants, for example, individual drawings or collective mind maps, were collected at the end of each focus group and photographed.

BOX 2.1 SUMMARY OF VOICES FOCUS GROUP SCRIPT

INTRODUCTION
The moderator introduces himself/herself, the note taker and any observers and asks the participants to introduce themselves. The moderator then explains the aims and topic of the focus group using a PowerPoint presentation.

EXERCISE 1
The goal of Exercise 1 is to raise the focus group participants' awareness of household waste and related waste management systems. It also identifies what people know and do with respect to their household waste. Participants are asked to draw on an A3 sheet of white paper how they think the waste streams are managed around their house. When they have finished, the papers are collected and taped to the wall. The moderator then asks the participants to explain their drawings and encourages them to elaborate.

EXERCISE 2

Exercise 2 aims to identify barriers and concerns of the participants with respect to current urban waste pathways (including prevention) and to go into more depth on the causes and underlying reasons for the reported barriers and concerns. The moderator shows the participants PowerPoint slides about the four most common pathways of waste and prevention. After this, participants are asked to think about barriers and concerns they experience regarding waste, waste management and prevention of waste and to write two examples of these barriers or concerns down on Post-Its. The Post-Its are collected and for each, the moderator asks the participants to explain what they wrote down and why.

EXERCISE 3

The objective of Exercise 3 is to stimulate creative ideas for improvement and solutions for problems and possibly to translate ideas and solutions into research topics or questions. The moderator introduces the concept of a 'zero waste society' to the participants using PowerPoint slides. The participants are then asked to work in groups and brainstorm about ideas for achieving the aims of a 'zero waste society', focusing especially on what research and innovation would be needed for this. Participants are then asked to present their ideas to the entire group, while the moderator uses a flip chart to list all concrete ideas for research and innovation suggested by the participants. The moderator then asks the participants to reflect further on possible futuristic technical solutions and 'wild' ideas regarding waste management and prevention.

EXERCISE 4

The aim of Exercise 4 is to attribute a level of priority to the research topics formulated in Exercise 3.
Participants are given three stickers, which represent money (1 million each) that they can spend on ideas written down during Exercise 3. They are asked to assign one or more stickers to the ideas that they feel should be prioritised because of the importance of the problem it addresses and/or the quality of the solution it provides. Once the participants have assigned their stickers, a plenary discussion is held to talk about which ideas got the most stickers and why.

EVALUATION

The moderator ends the sessions and asks the participants to share feedback on their experience taking part in the VOICES focus group. Participants are also asked to fill in an evaluation questionnaire.

2.2   The VOICES approach to urban waste

In the focus groups, citizens of Europe were consulted on the topic 'Waste as a resource'. Urban waste is defined as solid waste collected by or on behalf of municipal authorities and disposed of through the waste management system. Most of this waste is produced by households, although similar waste from sources such as commerce, offices and public institutions are included. Consumer products disposed of by citizens, like clothes, electronics and furniture etcetera, are also considered urban waste. Industrial waste is not considered urban waste and is outside the scope of this project. On average, each of the 500 million people living in the EU throws away around half a tonne of household rubbish every year.[4] This amounts to 70 million truckloads of household rubbish for the EU as a whole every year (one truckload is considered to be 3500 kg, the maximum weight for a truck). All this waste has a huge impact on the environment, resulting in pollution and greenhouse gas emissions that contribute to climate change, as well as significant loss of materials - a particular problem for the EU, which is highly dependent on imported raw materials. Current EU policy aims to reduce both the environmental impact of waste and the use of raw materials needed for production processes. Nowadays, the challenge of urban waste is approached from two perspectives; the waste hierarchy and the life-cycle approach. These combined approaches are the building blocks of the current thematic strategy on waste.[5]

In order for the results of the focus groups to be translated into outcomes which are relevant and beneficial for European research, the VOICES focus group design explicitly uses these same two approaches in presenting the topic of urban waste and in structuring the exercises. The vision of a 'zero waste society' is used as a

focus for the participants while thinking about possible innovations and the techniques and knowledge necessary to develop them.

The waste hierarchy is initially depicted as a pyramid with a wide base representing disposal in a landfill, a second layer representing recovery of energy through incineration, a third layer representing recycling, a fourth representing reuse and the top (and smallest one) representing prevention. This reflects the current situation of waste management in Europe. In order to achieve a 'zero waste society', this pyramid should be turned around and its top, prevention, should become very wide while its base, landfill, very narrow.

The five-step waste hierarchy can be used as a rule of thumb when choosing between options of waste management, with prevention as the most preferred and disposal in landfill as a last resort. However, all products and services have environmental impacts in various stages of their existence. To avoid shifting negative impact from one stage to another, the life-cycle approach is also considered. Life-cycle thinking involves looking at all stages of a product's life - from the extraction of raw materials for their production to their manufacture, distribution, use and disposal - to find out where improvements can be made to reduce environmental impacts and use of resources.

2.3   Analysis of the focus groups

After each focus group, a summary report was written by the moderators based on the note taker's notes and the information on the flip charts. A draft of this summary report was sent to the focus group participants who were asked to comment on it. Moderators collected any feedback and included it in the final version of the summary report as an annex. The audio recording of each focus group was transcribed word-for-word and translated into English for analysis. The translated transcripts were coded and analysed using MaxQDA, a programme for qualitative data analysis. For the analysis of the data, both structured analysis as well as open coding were used. Structured analysis was carried out by using a predesigned coding sheet based on preliminary research. This type of analysis allows for all relevant outcomes to be extracted from the raw data. Open coding runs parallel to the structured analysis and allows for insights unforeseen by preliminary research to emerge. The summary reports of the individual focus groups have been used to validate and complement the analysis.

2.4   Ethical issues

At the beginning of the focus groups, all participants were asked to sign an informed consent form providing information on the topic and aims of the focus group. It was explained that participation was voluntary and participants were free to withdraw at any time, without giving reason. The form obtained participants' approval for audio and video-recording of the focus group, for the use of the resulting data for research purposes, including the use of anonymous quotes, and for data storage for five years. All data were processed anonymously.

[1]Krueger R.A. (1994). Focus Groups: A Practical Guide for Applied Research. Sage: Thousand Oaks, California

[2]The typology of low, medium and high education level is based on the International Standard Classification of Education (http://en.wikipedia.org/wiki/International_Standard_Classification_of_Education)

[3]The urban-rural typology is based on the new urban/rural typology developed by the European Commission (http://epp.euro stat.ec.europa.eu/statistics_explained/index.php/Urban-rural_typology)

[4]Questions and Answers, Thematic Strategy on the prevention and recycling of waste and the proposal for the revision of the Waste Framework Directive (Available at: http://ec.europa.eu/environment/waste/pdf/faq.pdf)

[5]Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee of the Regions on the Thematic Strategy on the Prevention and Recycling of Waste, Brussels, 19.1.2011, COM (2011) 13 final; EU Waste Policy - The Story behind the strategy, 2006

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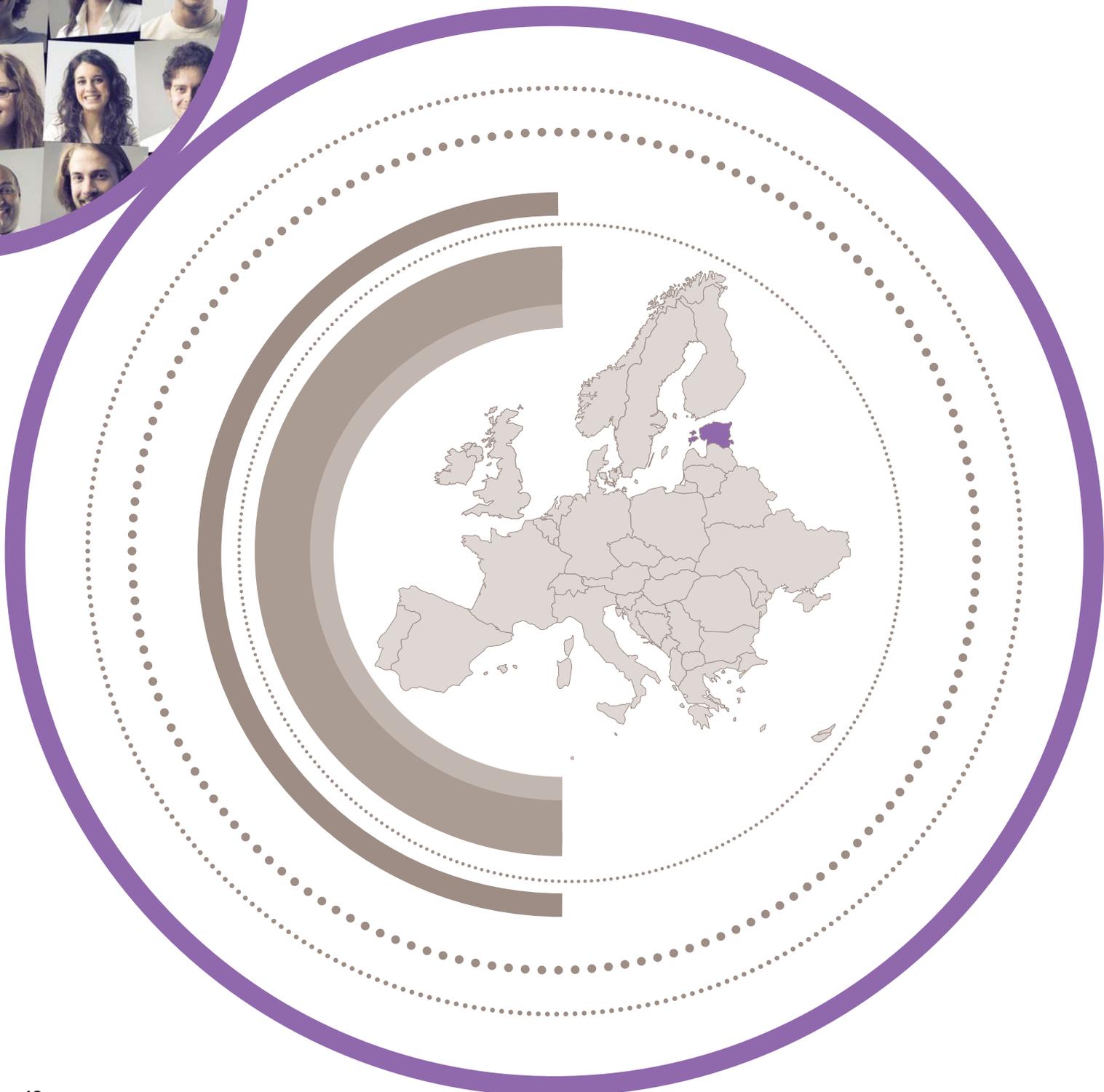
3. Country relevant data - Estonia

This chapter of the report presents relevant data about the country and local focus groups. This includes demographic data, data related specifically to local waste management and information concerning the setting of the local focus groups.

3.1 Demographic country data

In terms of population, Estonia is one of the smaller EU countries with approximately 1.3 million inhabitants. Inhabitants live in urban areas (48%) or intermediate areas (52%).

Table. 3.1 Population Data[6,7,8]

		2011	
Population at 1 January		1 340 194	
Population as percentage of EU27		0.3%	
Gross Domestic Product (PPP)		16 900 Euro	
Population urban-rural typology	Urban	644 000	48%
	Intermediate	696 000	52%
	Rural		

3.2 Factsheet on waste

The amount of municipal waste generated and treated in Estonia is considerably lower than the average amount of waste treated in the EU27. Estonia ranks 17th on the EU27 ranking list on Municipal Solid Waste Recycling (MSW). An extraordinary effort is required to meet the EU Waste Framework Directive's target to recycle 50% of MSW by 2020.[9]

Table 3.2 Municipal Waste[10,11]

		Estonia		EU27 average	
Municipal waste generated (kg per person)		311 kg		502 kg	
Municipal waste treated (kg per person)		261 kg		486 kg	
	Landfilled	201 kg	77%	185 kg	38%
	Incinerated	0 kg	0%	107 kg	22%
	Recycled (material recycling)	37 kg	14%	122 kg	25%
	Composted (organic recycling)	23 kg	9%	73 kg	15%

3.3 Composition of the focus groups

In Estonia three focus groups (FGs) took place on the weekend of 16th March 2013. They were held at the Science Centre AHHAA, in Tartu, moderated by Paula Lepind.

In total, 30 people (14 male and 16 female) participated in the three FGs. The age of the participants ranged from 24 to 76: 10 participants were aged between 18 and 35; 10 between 36 and 50 and 10 were aged 51 or over. 11 participants had a high level of education, 15 had a middle level, while 4 others had a low level of education. 16 participants were working, while 7 were unemployed, 3 were students and 4 were retired. 10 participants live in a house and 20 in a flat. Details of the composition of these focus groups are presented in the table below.

Table 3.3   Composition of the Focus Groups

		FG1	FG2	FG3	TOTAL
Participants	Total	10	10	10	30
Gender	Male	4	5	5	14
	Female	6	5	5	16
Age	18 - 35	0	10	0	10
	36 - 50	10	0	0	10
	50+	0	0	10	10
Education	High	4	3	4	11
	Medium	4	5	6	15
	Low	2	2	0	4
Employment	Unemployed	4	2	1	7
	Employed	6	5	5	16
	Retired	0	0	4	4
	Student	0	3	0	3
Housing	Flat	5	7	8	20
	House	5	3	2	10

6   Eurostat Statistics Database Online (http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database)
7   Eurostat Newsrelease (http://europa.eu/rapid/press-release_STAT-12-51_en.pdf)
8   The urban-rural typology is based on the new urban/rural typology developed by the European Commission
    (http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Urban-rural_typology)
9   European Environment Agency (2013). "Managing municipal solid waste - a review of achievements in 32 European countries"
    EEA Report No 2/2013 (http://www.eea.europa.eu/publications/managing-municipal-solid-waste)
10 Eurostat Newsrelease (http://europa.eu/rapid/press-release_STAT-12-48_en.pdf)
11 The reported quantities of waste *generated* and *treated* do not always match exactly due to one (or more) of the following reasons:
    Estimates for the population not covered by collection schemes; Weight losses due to dehydration; Double counts of waste un-
    dergoing two or more treatment steps; Exports and imports of waste; Time lags between generation and treatment (temporary
    storage)

4.   Results

This chapter describes the overall results of all focus groups held in Estonia. The chapter includes three sections, which are structured according to the exercises of the focus groups. The first section provides insight into what people think and do with respect to waste management at the household level. The second section provides an overview of barriers and concerns of the participants about current urban waste prevention and management, and identifies underlying reasons for the reported barriers and concerns. The third section presents participants' ideas for research and innovation needed in order to achieve a 'zero waste society' including concrete information on the research category, the aim of the research, the proposed target group and the perceived priority of the research idea. Participants' ideas for policy, management and communication are included as well. Throughout the results, quotes of focus group participants are provided for illustrative purposes.[12]

4.1   How is waste managed at household level?

This section describes what people know and do with respect to household waste. It includes four parts. First, an overview is given of the types of waste that are generally collected separately and those that go in the general bin. The second part provides insight into how the waste is collected, while the third part describes what participants think happens to the waste after it is collected. The fourth part describes whether people deal with waste as they are supposed to and to what extent they think waste management is conveniently organised.

4.1.1   Waste separation

The participants generally separate only a small proportion of their waste. Most waste goes in one general container, including items like clothing and food waste. Participants who live in houses, rather than flats, are better positioned for sorting as they have the option to compost organic waste and burn some of their other waste, such as old clothing and paper.

Most participants do sort paper and cardboard: there is a container for paper in front of most apartment buildings and paper can be burned in private homes. Bottles which can be returned for a deposit are usually sorted from other glass. Other glass is also sorted but to a lesser extent. Batteries and construction waste are also sorted separately. Many apartment buildings have no other sorting options as there are not enough public containers. Plastic is sorted by some participants, but this again very much depends on the disposal options in the neighbourhood.

Organic waste is generally sorted by participants living in houses. A domestic compost heap makes it easier to sort waste. Participants who live in apartments generally throw food waste in a general waste bin, or they take it to their allotment if they have one. Participants from one focus group considered that not having a field or garden is a substantial problem because there is nowhere to deposit ash from the stove, furnace or fireplace.

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[12] Abbreviations used in quotes: FG# = number of focus group, P# = number of specific focus group participant, PX = number of focus group participant unknown, M = Moderator.

4.1.2 Waste collection

General waste disposal is organised quite conveniently, according to most participants. Most apartment buildings are serviced by a waste management company, paid for by the people who live in that building. Depending on the volume of the container, waste is collected frequently (for some participants once a week, for some twice a month) by a waste management company. The municipality has a contract with the waste management company to collect waste from houses, although this was implied rather than explicitly stated by the participants.

Paper and cardboard are generally brought to containers directly in front of an apartment complex. Households in individual houses need to use a public container, which is not always close by. Bottles with deposits have to be handed in. The collection points for these items are generally spread across town and quite accessible for most people.

Old batteries are either taken to a waste centre or to suitable collection points located in shops or other public places. Old appliances and furniture are generally also taken to separate collection points but, for these items, a fee usually needs to be paid. When such items are collected from home, transport has to be paid for. However, some participants mentioned that scrap metal is bought at collection points so, for this waste, they can earn some money.

In the case of construction waste, participants have to order a container and pay for it. If there is any hazardous waste (like asbestos) involved, there is an additional charge. Some participants mentioned that a large container is placed at a convenient location occasionally, for example twice a year, for disposal of additional waste.

4.1.3 Knowledge about waste pathways

What happens to waste after it is collected or disposed of is generally not known and there is little information available. It is generally thought that glass is recycled but only if it has been separated. Participants were more confident that glass and plastic are recycled than other waste streams.

There is a widespread belief that all sorted waste is put together again in the garbage truck. Participants hoped that this was not the case but this doubt does make them question whether their sorting is useful. Participants also question the usefulness of separate containers because they are suspicious that waste management companies dump it all together with possibly some re-sorting again later on.

4.1.4 Waste management behaviour and convenience

Participants mostly try to combine taking waste (like batteries) to collection points with other activities they need to do in their daily lives, like shopping or taking their children to school. In general, they feel that the system is organised quite conveniently, apart from certain waste streams like the ash mentioned earlier.

The participants feel it is generally a personal choice whether or not to separate waste. For example, some participants mentioned that they had seen sorted waste being dumped together in the same truck and this had a definite effect on their behaviour. One used to be happy to sort, but then became dispirited after seeing the waste being collected together and stopped putting in the effort.

Participants considered that people in general find ways to circumvent the system if it is not convenient for them. However, when this is the case, getting rid of their waste is usually more important than putting it in the correct bin. For example, one participant related what happens when people see the collection container at home is full:

"If he sees that it doesn't fit into the container near his home, then he takes his kid to the kindergarten

in the morning and before he takes the kid through the gate, he throws his bag of trash from the trunk into this stranger's bin, right. And that's it and it is a bin for packaging. The kindergarten's container is locked, the store's is locked, the only one that is open is this container for packaging which is public and all the trash goes there." (Estonia FG 1, P2)

4.2 Barriers and concerns regarding urban waste

This section provides an overview of the participants' barriers and concerns with respect to current urban waste and identifies underlying reasons for the reported barriers and concerns. The section consists of four parts. The first part, 'Waste prevention and production', focuses on barriers and concerns related to goods in the phase before they enter the household including both waste prevention and production. The second part, 'Waste management in the household', addresses goods and waste in the phase while they are in the household. The third part, 'Waste disposal and pathways', describes barriers and concerns related to the phase in which waste is disposed. Relevant issues related to urban waste management that could not specifically be related to the three parts mentioned before are described in the fourth section, 'Other urban waste issues'.

4.2.1 Waste prevention and production

Participants are predominantly concerned that there is so much packaging material. They feel that there is simply too much packaging and everything is packed multiple times; one layer is probably for hygiene, for other requirements or transport, while another is purely for advertisement or commercial value because a neatly packaged item is more appealing than one without packaging. Some participants considered that a great deal of packaging is encouraged by European Union (EU) requirements and that even if a person wants to buy a product that is not packaged, it is often not possible. The participants expressed strong feelings about the fact that absolutely everything is packed these days, even things that do not necessarily need packing, such as peppers. This generated discussion about EU requirements and hygiene requirements in general; most participants agreed that these are necessary but have gone rather too far. They were of the opinion that the packaging industry has grown substantially since the Republic of Estonia regained its independence after the fall of the Soviet Union in 1991.

> *"About comfort and sterility, we have gotten there ourselves. Those who remember the end of the Soviet era and come from that time know. If you went to the shop, the loaves of bread were not packed. They were stacked, anyone could grab them, see if it's soft, and grab that one - people would freak out if that happened today." (Estonia FG2, P 10)*

Apart from packaging, the participants felt shopping habits are also a very important obstacle to waste prevention. Everything is organised to make it easy for the consumer to buy things and this encourages buying more rather than less, and does not raise awareness about the consequences. Free plastic carrier bags in shops are a good example.

> *"I'd say that it has been made pretty comfortable for people. It's like, I never take the old plastic, I just go to the shop and grab a new plastic bag. It's been made so comfortable that I won't even think about grabbing an old bag and using that for my shopping." (Estonia FG3, P 10)*
>
> *"I wrote down 'excitement' - people really go crazy over free stuff, so they grab a load. I've seen like... pensioners, they just roll up a huge pile of plastic bags, if they can have them, then why not?" (Estonia FG2, P2)*

4.2.2 Waste management in the household

Virtually all participants mentioned lack of space in apartments as a main barrier to sorting waste at home. For participants with larger houses or a garden, this is less of a problem, but they all agreed very readily that it

is very difficult to cope with several bins when there is less space. A garden also allows for home composting, as some participants pointed out, but without a garden, organic waste has to be kept indoors. In general, the participants agreed that this can become a dirty business.

> "[P9] Comfort comes first, well, what I do, if I have potatoes that have gone bad, I don't take the trash out at once after binning something so then it's pretty horrid when potatoes and bread pile up and there is something else next to them, etc…
> [P10] If you eat 2kg of shrimp with friends in the evening, for example, you don't just leave it [in the house]." (Estonia FG2)

Apart from a lack of space for sorting, the participants felt that lack of knowledge is also as an important barrier to waste management in the household. People who want to sort need to know what to sort and how to sort it; for example, how to take an item apart, whether they need to clean it, and where to dispose of it afterwards. From the various discussions about this subject it appears that, when one or more of these types of knowledge is lacking, participants felt people will be less and less inclined to sort. One participant pointed out that certain concepts seem self-evident, but in practice this is not always the case.

> "Of course you don't know everything because once it was said what packaging is, when they started to say that we have to collect packaging separately, then now when enterprises came in… Those bulletins from waste companies, then there is this concept of packaging which is not at all the same that … we had thought packaging was." (Estonia FG 1, P9)

4.2.3   Waste disposal and pathways

Limited knowledge about the proper disposal of waste, particularly packaging, was considered to make waste disposal difficult. Lack of awareness about the problem of waste also makes people quite careless about their behaviour in relation to waste. The participants generally agreed that there is too little information about the importance of the problem and very little consistency when educating people on the subject.

> "But the other thing is that, this assumption that everything goes into one container and if I'm sure that plastic and glass go into one container, although they separately can be wholly recycled and we actually don't know what happens with them, then I finally put them together. But the more people, like, develop their knowledge and they are helped to do this – if I know what that plastic is made of, then of course I take plastic only there, where it's meant to be." (Estonia FG 1, P5)

Organisation of waste collection and disposal is also seen as an obstacle for waste management by the participants. Many places lack containers for various waste types and it can be problematic to have certain types of waste removed. The participants generally agreed that if containers were directly in front of the house, as is not currently the case, people probably would sort. Even when there are containers available, many participants said they are not emptied at the designated time and sometimes not at all, greatly hampering their waste disposal efforts. A participant mentioned that this is especially problematic in the winter when the garbage truck does not enter snowbound roads, in spite of the municipal responsibility to clear roads. The waste management company still charges for the trip, even though they did not take the waste away.

> "[P7] The problems emerge because the town or collectors don't bother to empty them on time.
> [M] So they get too full?
> [P7] Too full, and it gets pretty costly to look the town through to find where this empty container is.
> [P6] Or then large districts maybe have only one single container and it gets like full." (Estonia FG 1)

Another problem area that was highlighted is the financial aspect of refuse collection. It has developed into a profitable business for companies, but the difficulty lies in the remoteness of waste centres, and hence the costs of transport, and the high price of disposal (for example of construction waste). The participants observed that, in order to avoid these costs, people take their rubbish to dump it in the forest.

A last observation that was forwarded as an obstacle in two out of three focus groups is that waste processing

technology is not as developed as the system of waste collection. The participants were of the opinion that current reuse and recycling technology is not developed enough to turn waste to good use, even if waste is sorted. One participant suggested that Estonia has been approaching this issue in the wrong order: people and companies are sorting garbage before knowing what to do with it.

"I just mean that this reuse of waste material has not been developed yet." (Estonia FG3, P4)

4.2.4 Other urban waste issues

Discussions about waste transport, the price and the bureaucracy behind it also generated discussion about the system in general. Several participants in different focus groups made similar observations about the payments involved for consumers. They observed that they purchase a product somewhere, also presumably paying for the packaging, and when they take it to the waste collection point, they need to pay again for its disposal. A number of participants also mentioned the costs of cleaning the sorted waste in terms of water and electricity. One participant mentioned that even if you do not have any rubbish, you still need to pay for the truck to come around once a month. Another participant took this a step further, commenting on the waste pathway of energy recovery through incineration:

"Afterwards you buy it back as electricity or heat and pay again!" (Estonia FG 1, P8)

Another general concern is the human factor in waste management. The participants generally agreed that the largest problems in waste management are laziness and the lack of habit of proper waste disposal. Some participants mentioned that people, in general, are not accustomed to waste management and sorting, and are too comfortable and lazy to start. In general, participants considered that people do not put additional effort into sorting if there are other, easier ways to get rid of waste. Again, certain participants referred to the Soviet period where this was not an issue and there was much less waste. Another human factor that was discussed is the lack of motivation. The participants thought that some people feel that they already do enough, at least more than others, or are put off by neighbours' or other people's lack of compliance. The participants also considered that the quality of life in Estonia is very low so that everyone has more important things to think about and spend time on than sorting waste and putting it in a special bin.

4.3 Citizens' ideas on how to realise a 'zero waste society'

This section presents participants' ideas for achieving a 'zero waste society'. A distinction is made between ideas related to environmental sciences and technology, and ideas related to policy, management and communication. Below, these ideas are described separately in tables. For each idea in the table, the research category is mentioned as well as the aim of the research and the proposed target group. In addition, the priority of the research idea as perceived by the participants is indicated in the tables, using stars to indicate the number of stickers assigned to a specific idea by the participants. Only ideas that were prioritised by the participants are described in this section. Ideas that were not prioritised are included in the full list of research ideas which is provided in Annex 1.

4.3.1 Environmental sciences and technology

In the domain of 'environmental sciences and technology', waste management companies and consumers were the main target groups, although some ideas were targeted at producers as well. The category 'technical, physical, chemical, engineering' had by far the most ideas assigned as priority, with the category 'material' not even reaching one third of that number. The categories of 'bio(techno)logical' and 'ICT' both had only one idea assigned priority. Important aims in this domain are to improve recycling, increase domestic convenience and reduce the impact on the environment.

The category 'technical, physical, chemical, engineering' concerns ideas that require research or development in these fields. In this category, fifteen ideas were proposed, of which eight were assigned priority (see table 4.3.1). These ideas generally require the development of a certain machine, robot or other device, involving consumers or waste management companies.

The idea that was ranked as highest priority concerns a domestic robot that can sort and process waste. There could be one robot for each household or one could be shared by several households in an apartment building. The participants of the focus group which proposed this idea considered that the robot should process the waste into pellets of different kinds (metal, plastic, glass, etcetera) for sale in selected shops and for use in various production processes.

> *"[P4] Well, they might just be sortable granules. Like, some metallic or non-metallic or chemical elements and non-chemical elements, or well, biological… like granules that can be sorted easily. By their purpose.*
> *[M] Yeah, sortable. Excellent.*
> *[P9] One of these robots could be in the basement of each stairway." (Estonia FG3)*

The second highest priority idea is that of generating biogas from landfills. This was proposed several times in different forms. It could be a communal landfill producing biogas for local buses or a private rubbish dump producing gas for its owner's car or for heating. This would be an effective use of waste that is otherwise not used.

> *"And then a garbage dump that would produce biogas, a personal one for everyone, like they have in Finland. You can deposit your garbage somehow under the building, or something like that. But so that people would have their personal dumps at home." (Estonia FG2, P2)*

Two more ideas rank third in this category. The first is the widespread introduction of sectioned bins for waste sorting, both in public spaces and at home. At home, the sections could be adjusted according to the amount of a certain waste type generated in that household. The participants considered that these sorting bins should be widely accessible and that they would help the general public to effectively sort waste.

The second idea that ranks third place is the idea to blast waste into outer space. This would be a good location to send waste because there is a lot of space and the rubbish would be out of sight. However, the idea received negative feedback too because there is a lot of space waste already and it could pollute the atmosphere. One participant also considered that some types of waste should be kept on earth for reuse, so it would not apply to all waste.

The next idea, which was allocated three priority stickers, focused on improving current technologies and developing new ones for reuse. At the moment, the public has to sort waste and dispose of each type separately. However, most participants agreed that current technologies for processing are not able to handle the different waste streams, so it all ends up together in the end.

> *"[P9] And how to sort the garbage…? The scientists would also figure out, that if we sort everything goes to the same dump, but it should be taken to recycling, where glass is taken… Glass can be recycled, paper can be recycled…*
> *[P8] Packaging that has been washed… But if I toss them in the same bin, there is no point…" (Estonia FG3)*

The next idea received two priority stickers and comprised a cluster of several ideas that were proposed in the focus groups. Their core feature is direct integration of waste management in buildings, like private houses and apartment blocks, including the effective use of this waste for electricity or heating. Some examples of ideas were a number of waste shredders for various types of waste, one shredder for all waste with a sorting function afterwards, a furnace for waste and various types of pipes and shafts to transport waste to the cellar or another communal waste room.

"[M] And what would this garbage furnace produce? Electricity or heat?
[P2] I think heat, as it…
[P10] …electricity, you can sell it back to Eesti Energia.[13]
[P4] There might be various options, according to what you need." (Estonia FG2)

The last two ideas were allocated one priority sticker each. The first idea is a street cleaning and waste collecting street robot, powered by the waste it collects, to clean areas of the city which a truck cannot reach. The last idea is a device to turn waste back into raw materials that can be put back in nature. This is both a way of getting rid of waste and countering the depletion of resources.

Table 4.3.1   Ideas within the category 'technical, physics, chemical, engineering' that received priority, ranked accordingly

Category	Idea	Aim	Target Group	Priority
Technical/ Physics/ Chemical/ Engineering	Robot at home that sorts and processes your waste into different types of pellets (plastic, metal, etc.) that can be sold by weight in certain shops	Convenience in the home/ Improve recycling	Consumers/ Producers	☆☆☆☆ ☆
	A local (collective or private) landfill producing biogas, for example, to use as fuel for cars or for heating houses (fast, with a catalyser)	Effective use of waste	Waste management companies/ Producers	☆☆☆☆☆
	Sectioned bins everywhere, on the streets and in the house. With the possibility to adjust the sections according to the amount of garbage you produce (at home)	Improve recycling/ Convenience in the home	Consumers/ Waste management companies	☆☆☆☆
	Blast waste into outer space or put it on the moon or Mars, but keep useful materials to recycle/reuse	Eliminate waste	Waste management companies	☆☆☆☆
	Better re-use/recycling technology for sorted waste (don't just dump it all back together)	Improve recycling	Waste management companies	☆☆☆
	Housing design so that every house can "consume" its own trash, for example use it for heating, electricity or biogas	Effective use of waste/ Convenience in the home	Consumers	☆☆
	Street cleaning, garbage collecting robots, powered by the waste they collect	Other	Waste management companies	☆
	A machine to turn waste back into raw materials that can be put back in nature	Effect on planet	Waste management companies	☆

MATERIALS

The category 'material' groups ideas that are concerned with research and development focused on materials. In this category, seven ideas were mentioned and three of them were ranked as priority (see table 4.3.2). These ideas concern both producers and consumers, as they require changes in the production system and some change in behaviour from consumers once these new materials are introduced. These ideas aim to respond to environmental concerns.

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[13] Estonian electricity company (https://www.energia.ee/et/avaleht)

Packaging material was proposed as both a barrier and a concern for various reasons. The idea of making packaging material reusable was highly favoured by the participants, receiving seven stickers, and was mentioned in all three focus groups. The actual use for this plastic was not discussed, but reuse in general was mentioned several times. Participants knew that certain plastic items are being reused and they want to see more items entering that waste pathway.

> "But it is, those plastic bottles went to reuse. So, all the other plastic should be reused as well... Why just bottles?" (Estonia FG3, P9)

Another cluster of ideas focuses on biodegradable materials. Again, packaging is mentioned, but also other items such as clothing. The participants would like to see research into a more rapid process of decomposition, although decomposition would not start while the item was in use. Biodegradable packaging could conveniently be put with food waste and it would be less harmful to the environment or in landfill. Participants considered that it would probably be more easy to recycle, reuse or otherwise process this kind of material.

> "Let's say, if... if we send it to energy production somewhere, maybe material that decomposes, creating humus. We can then use it like, as fertiliser for plants or agriculture or... which is a value in itself. Let's say you plant flowers or potatoes." (Estonia FG3, P 1)

The last idea in this category proposes almost the opposite of the previous idea, namely that products should be made from everlasting materials that do not break down. These items should keep functioning and their material should not deteriorate. This idea itself was not further elaborated on but it was also mentioned that increasing the lifespan of products would already be a great improvement, having a definite effect on waste generation and resource use.

> "Companies count on the fact that there's a certain length of time that [products last]... I had a personal encounter with one mascara and its lifetime is exactly three months and then you can't, like, dye your eyelashes with it any more. Then you go to a store because you are addicted to it because it's so good and you..." (Estonia FG 1, P5)

Table 4.3.2   Ideas within the category 'material' that received priority, ranked accordingly

Category	Idea	Aim	Target Group	Priority
Material	Packaging of reusable material	Less use of resources	Consumers/ Producers	☆☆☆☆☆ ☆☆
	Biodegradable items, packaging, other waste and clothing	Less plastic/ Effect on planet	Producers/ Consumers	☆☆
	Items made from everlasting materials that do not break down	Less waste production/ Less use of resources	Producers/ Consumers	☆

BIO(TECHNO)LOGY

The category 'bio(techno)logical' groups ideas that require some research and development in the fields of biology or biotechnology. In this category, only two ideas were mentioned and assigned priority (see table 4.3.3).

It was proposed that research was needed into how to make food out of waste. It was not specified if this should only relate to a specific type of waste, for example organic waste, or if all waste should be considered as a nutritional resource. The participants were not all positive about the idea, questioning its desirability and feasibility.

> "[P2] It's not realistic.
> [P8] You eat sausages right now and already have no idea what they are made of. It did not use to be 1.5 months until the BB[14] date. Yes, there's something in there already.
> [P7] Full of preservatives." (Estonia FG3)

The second idea is a home composting kit that allows for easy composting at home, and does not emit foul smells or fluids. People could use the compost themselves if they have a garden or plants, or they could use the device primarily to process their organic waste, either giving it away or bartering with it if they have no use for it themselves.

Table 4.3.3   Ideas within the category 'bio(techno)logical' that received priority, ranked accordingly

Category	Idea	Aim	Target Group	Priority
Bio(techno)-logical	Research into how to make food for people or feed for animals from garbage	Effective use of waste	Producers/ Consumers	☆
	A home composting kit that allows for easy composting of all waste for own use or to sell or barter	Convenience in the home/ Effective use of waste	Consumers	☆

ICT

The category of 'ICT' groups ideas that require some research and development in the domain of information and communication technology. In this category, four ideas were mentioned and two were assigned priority (see table 4.3.4).

The first idea was not elaborated upon in the focus group, only briefly mentioned. It consists of an app (a software application), which improves convenience and provides useful information on your mobile device when you are disposing of waste in bins outside your house.

The second idea that also received two priority stickers was the idea of a self-sorting rubbish bin, using barcodes to identify waste streams. It is not clear if this bin would be used at home or if the system would be used for public bins.

Table 4.3.4   Ideas within the category 'ICT' that received priority, ranked accordingly

Category	Idea	Aim	Target Group	Priority
ICT	App for sorting garbage, take a picture and it tells you what kind of garbage it is and where it should go	Convenience/ Improve recycling	Consumers	☆☆
	Self-sorting garbage bin, based on barcodes	Convenience in the home/ Improve recycling	Consumers	☆☆

4.3.2   Policy, management and communication

The domain of 'policy, management and communication' generated more ideas than the domain of 'environmental sciences and technology', but, in general, these ideas were assigned fewer priority stickers. The main target group for ideas in this domain is consumers, although producers are also quite often targeted and some ideas focus on waste management companies and the government. The ideas in this domain mainly aim to reduce (plastic) packaging, reduce use of resources and raise awareness.

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[14] Best Before

The category of 'policy' deals mainly with ideas that involve providing financial incentives and disincentives or putting mandatory procedures in place for certain practices. In this category, fifteen ideas were proposed, of which five were assigned priority (see table 4.3.5).

The idea that received the most priority stickers by far in all domains (fifteen stickers) is, again, a cluster of several ideas that are variations on the same theme. The core of the idea is to provide financial benefits for sorting waste and disposing of it separately. People would get money for properly disposing of all types of waste. The participants strongly believed that providing a refund of a deposit on recyclable waste would motivate people to sort. In addition, several participants considered that people who do not sort correctly should be fined.

The second idea in this category is to ban non-degradable packaging. An official ban would force producers and retailers to substitute their packaging materials for a degradable alternative, something participants considered that they would not do voluntarily. The main argument for banning non-biodegradable packaging is that there is too much waste, particularly plastic waste, which pollutes the environment.

The third idea is slightly related to the first, in that it proposes more deposits on packaging. Currently plastic bottles and some glass packaging, for example beer bottles, are sold with a deposit, which is refunded on return, but this could be extended to many more types of packaging. This idea was mentioned in all focus groups and was well-received by all participants.

> *"[P2] You could get paid for the other bottles as well, I still don't understand, why for some... like vodka and wine and similar bottles, cannot be returned for money.*
> *[P1] Milk bottles.*
> *[P3] And the same goes for some wine bottles.*
> *[P4] And champagne bottles.*
> *[P7] And packages like buttermilk and milk and yoghurt, you wash them and you don't need to bin them, take them to a collection point instead." (Estonia FG2)*

The last two ideas received one priority sticker each. The first is to put legal restrictions on advertising, or even ban it completely. This will save on paper, but the participants were more concerned with the consumer behaviour these advertisements induce, especially when they are targeted at children.

> *"[P9] It's not cool and it's certainly not new, but still this, this enormous provocation to consume.*
> *[M] Models.*
> *[P9] Yes... and again a new collection and all this must be bought all the time, this, well... it's palmed off, right... we here probably don't buy, but it is produced.*
> *[P10] People fall victim to advertising.*
> *[P7] And at the same time, children would not be used like...*
> *[P5] Child labour?*
> *[P7] Um, no, wouldn't be used. They put Spiderman on it and immediately [the child] wants it, right.*
> *[P9] Commercials are aimed at children." (Estonia FG1)*

The last idea in this category yet again deals with packaging. It was suggested to put quotas on packaging. It was not further explained or discussed how these quotas should be set.

Table 4.3.5   Ideas within the category 'policy' that received priority, ranked accordingly

Category	Idea	Aim	Target Group	Priority
Policy	Provide financial benefits (e.g. discounts, pension plan) for sorting waste and fine people that do not sort	Improve recycling	Consumers	☆☆☆☆☆ ☆☆☆☆☆ ☆☆☆☆☆

Ban non-degradable packaging	Effect on planet	Producers/ Retailers	☆☆☆☆☆
Designate more items for refunds on packaging with a deposit system, currently applied to certain bottles only	Improve recycling	Consumers/ Producers	☆☆
Legal restrictions on (or banning) advertising, especially when it is targeted at children	Behaviour change/ Reducing consumption	Consumers	☆
Put quota on packaging	Less packaging	Producers	☆

MANAGEMENT AND LOGISTICS

The category 'management and logistics' deals with ideas focused on networks, transport and process management. In this category, seven ideas were mentioned and three were assigned priority (see table 4.3.6).

The idea that received the highest priority was to arrange win-win contracts between waste management companies and other companies that might have a good use for certain types of waste. The participants suggested electricity companies, heating companies, construction companies or companies that could use materials for composting.

> *"Because then they might start thinking differently, the waste management companies or recyclers, they would also immediately get the obligation to sell some to a combined heat and power supply plant, let's say X amount of flammable material... to sell to some recycling factory and X amount of plastic, wood or whatever to some composting company - they'd buy it all." (Estonia FG2, P2)*

The second idea in this category concerned the organisation of waste separation in communal rooms that can be locked. Such a room could be located on the ground floor of an apartment building. All households would have a key to get in. This idea was put forward as a solution to the many problems people encounter when they want to use the public bins on the street.

> *"And that all these bins, they are open, and the crows, the bins are overflowing at times, the crows and seagulls do their thing, the entire street in front of the building is full of it as soon as the bins are a bit too full, so... and in the summer or autumn, the wind just blows it all around." (Estonia FG3, P9)*

The last idea that was assigned priority in this category concerned the use of large, underground containers for the storage of waste. These are used already in some places but not in others. The participants considered them a very good idea for the same reasons as the previous idea. Due to the large volume of waste in these containers, collection could be less frequent.

Table 4.3.6   Ideas within the category 'management and logistics' that received priority, ranked accordingly

Category	Idea	Aim	Target Group	Priority
Management/ Logistics	Arrange win-win contracts between waste management companies and other companies	Effective use of waste	Waste management companies/ Producers	☆☆☆☆☆
	Set up private, but communal, rooms for waste management, e.g. at ground floor of apartment building, each apartment has a key	Convenience	Waste management companies/ Consumers	☆☆
	Large underground containers for waste	Convenience	Waste management companies	☆

The category of 'communication and education' deals with ideas that relate to informing the public, educating people and raising awareness. In this category, four ideas were proposed and two received priority stickers (see table 4.3.7).

Participants agreed that children should be taught about waste management and environmental matters from an early age.

"We wrote down that everything starts from nursery. We must start with nursery, teach this behaviour to kids and youth... for example you may be fined in some places around the world for dropping a candy wrapper, you must be a responsible consumer, you should not buy too much, etcetera." (Estonia FG3, P9)

The ideas on how to organise this varied slightly, from mandatory lessons as an integrated part of the curriculum or as separate projects or lessons. However, all agreed that schools should be involved. The participants also saw extra benefits beyond the effect on the children themselves, as they expected the children to influence their parents too.

The second idea was a code system on packaging to inform consumers how and where the item should be disposed of. This could be done by colour coding, but most importantly it should be clearly visible.

"[P4] Yes, we also had that idea, it should say on the package how it should be sorted. And in large print, not in some tiny print that needs a magnifying glass to be readable.
[P2] For example some colour-coded system.
[P10] In colours maybe, like it is on deposits for bottles.
[P4] Well, yes, some marking, packaging classifications or something." (Estonia FG2)

Table 4.3.7   Ideas within the category 'communication and education' that received priority, ranked accordingly

Category	Idea	Aim	Target Group	Priority
Communication and education	Educate children at school from a young age about waste management and consumption	Awareness/ Behaviour change	Consumers	☆☆☆☆☆ ☆☆
	Markings on packaging about how items should be disposed of properly, possibly with a colour code system	Improve recycling/ Awareness of possibilities	Consumers	☆☆☆☆

The category 'local initiatives' groups ideas that focus on possibilities for people in a certain community, neighbourhood or sometimes region, and most often involve some sharing of knowledge, resources or food produce. In this category, five ideas were proposed and one was assigned priority (see table 4.3.8). The idea concerned a local exchange system for waste. An individual might have some type of waste for which he or she has no use but someone else might be able to use it. If these people were joined in an exchange network, this waste could be put to effective use without a middleman.

"Or do it like this - plastic that can be burned, some different material with a burning value of, say compressed peat. I'm interested, I have a heating system... my neighbour does not, I get it from my neighbour, burn it in my furnace." (Estonia FG3, P1)

Table 4.3.8 Ideas within the category 'local initiatives' that received priority, ranked accordingly

Category	Idea	Aim	Target Group	Priority
Local initiatives	Local exchange system for waste, for example material for burning	Effective use of waste	Consumers	☆☆

OTHER

The category 'other' is concerned with ideas that deal with issues that are outside the scope of 'municipal solid waste'. Three ideas were proposed in this category and two were prioritised (see table 4.3.9). The first comprises the introduction of a government subsidy for using environmentally-friendly building methods and materials, and the second is the use of water as fuel for cars.

Table 4.3.9 Ideas within the category 'other' that received priority, ranked accordingly

Category	Idea	Aim	Target Group	Priority
Other	Government subsidy for environmentally-friendly building methods and materials	Effect on planet	Producers	☆☆☆☆☆ ☆☆
	Water as fuel for cars	Other	Producers/ Consumers	☆☆

5.   Conclusion, discussion and evaluation

This country report presents country-specific findings from citizen focus groups in Estonia. It is part of a wider consultation process called VOICES, which involves almost one thousand European citizens across 27 EU member states in discussing the European research priorities for the theme 'Waste as a resource'. In most member states, three focus groups were conducted. The bigger member states had six focus groups in two different locations. In Estonia three focus groups were held.

The overall aim of the VOICES project is to identify citizens' preferences, values, needs and expectations with respect to research priorities for the theme 'Waste as a resource'. This provides input for the Consolidation Group that will define the actual priorities for the next work programme on 'Urban Waste' (call SiS.2013.1.2.1-2). In addition, it provides the methodology, the tools, the know-how and recommendations that can be adapted and used in coming years for similar initiatives.

Below, we present the main findings of the focus groups in Estonia. First, we focus on waste management, barriers and concerns. Next, we go into the ideas identified and prioritised by the focus group participants. We close with a short reflection on the methodology of the study.

5.1 Waste management, barriers and concerns

Estonia ranks 17th on the EU27 ranking list on Municipal Solid Waste Recycling (MSW). Since 2001, the recycling rate of MSW in Estonia has increased from 5% to 20% in 2010. Even if this favourable trend continues, it would require an exceptional effort to fulfil the EU's 50% recycling target by 2020.[15] A ban on land filling of non-pre-treated MSW, an increased landfill tax and active national waste management planning have been important policy initiatives in diverting biodegradable municipal waste away from landfills. Findings from the Flash Eurobarometer survey 'Attitudes of Europeans towards resource efficiency'[16] indicate that 84% of all respondents from Estonia said they separate at least some waste (see Annex 2), against an average of 89% for the EU27. The results of the Eurobarometer also indicate that 75% of the respondents in Estonia thought that more and better drop-off points for recyclable and compostable waste would convince them to separate (EU27 average 76%) and 81% thought that better waste collection services would improve waste management in their community (EU27 average 70%).

These figures are reflected in the barriers and concerns that were voiced by the participants during the focus groups. All focus groups voiced concerns related to production and prevention: about the amount of plastic packaging, the ever-present plastic carrier bags in shops, and shopping habits in today's society. Concerning management of waste in the household, the practicalities involved pose some barriers. Separating waste is perceived as quite a challenge due to a lack of space and the effort involved in cleaning and sorting with only limited support from the municipality or waste management company. In addition to these practical considerations, a lack of financial incentives to sort at home is also mentioned as a barrier by many participants.

Related to waste disposal and pathways, participants mainly focused on barriers and concerns with public collection bins and services by the waste management company. Sometimes bins are absent, too far away, too small or misused, and not always properly serviced, making it difficult for participants to get into a waste management routine. Related to recycling in particular, participants mentioned a lack of information, both practical and regarding the importance of the practice, and a lack of financial incentives. Moreover, most participants mistrust the waste management company and think either that their sorted waste ends up together or that the company makes money out of their work sorting the waste.

In general, participants agreed that the current organisation of waste management involves a lot of costs for consumers, when the complete lifespan of a product is taken into account. They considered that this is disproportionate and they would welcome certain financial incentives (for example refunds or discounts) for sorting waste and separate disposal. Another concern about the waste management system and society as a whole is the careless attitude of the general public. In general, people show little sense of urgency or willingness to put extra effort into waste management. Many participants felt this attitude could be explained by the fact that sorted waste appears to end up together after collection or is sorted again at the location of processing, or because separate waste processing technology has not kept up with the separate collection system.

5.2 Ideas for achieving a 'zero waste society'

The results are divided into two main research domains, 'environmental sciences and technology' and 'policy, management and communication'. From the overall results, the three ideas ranked as highest priority were: providing financial incentives for sorting waste and disincentives (fines) for people that do not sort packaging or reusable material; educating children at school from a young age about waste management and consumption; and developing a domestic robot that processes waste into different types of pellets (plastic, metal, etc.) that can be sold by weight in certain shops.

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[15] European Environment Agency (2013). "Managing municipal solid waste - a review of achievements in 32 European countries" EEA Report No 2/2013
[16] Flash Eurobarometer No. 316 - The Gallup Organisation (2011)

In the domain of 'environmental sciences and technology', ideas focus mainly on technology (machines and processes) to make waste management more convenient, to improve recycling and to reduce the impact on the environment. Most suggestions are concerned with a more effective way of dealing with waste and gaining extra benefits from waste. Waste management companies and consumers are the main target groups, with producers following close behind.

In this domain, many ideas relate directly to waste management. The proposed technologies help to sort, process, disintegrate/decompose or reconstitute waste with an emphasis on increasing recycling, reuse or generating energy. Other ideas relate to the original product (before it becomes waste) and aim to reduce waste by making the packaging material recyclable or biodegradable or introducing new products that reduce waste by replacing others.

Ideas in the domain of 'policy, management and communication' were mainly concerned with regulations, incentives and communication to reduce waste, particularly from packaging and the use of natural resources; and to foster awareness and change behaviour. These ideas are generally stimulated by a perceived need to reduce the environmental impact and increase the practice of recycling. Consumers are the main target group, producers follow second, while some ideas are targeted at waste management companies or focus on government.

Central regulation through diverse mechanisms seems to be a core feature of most solutions in this domain. It is generally felt that better regulation related to products, packaging and waste management will stimulate both consumers and producers to change their behaviour. Educational programmes, public campaigns and more readily available information on recycling and reuse, especially for young people, are also thought to be of great important in this respect.

When looking at the three highest prioritised ideas, the first priority is to provide financial benefits (e.g. discounts, pension plan) for sorting waste and fine people that do not sort (15 stickers). The second priority is shared between two ideas that received the same number of priority stickers: packaging of reusable material; educate children at school from a young age about waste management and consumption (7 stickers).

5.3   Reflection

The general assessment of the discussion was positive. Participants felt positive about the group dynamics and took the exercises seriously. They considered that the moderator also did a good job. The chance to participate in an open discussion was very well received by the participants and was considered to be far preferable to listening to a dry lecture. The participants considered that the discussion made them think about the topic in greater depth and gave them new insights and ideas. They were pleased to learn that there are still people who are interested in the topic and care about it. Most participants' comments reflected their hope that they would actually have an influence on EU policy and provide input for change. They also mentioned that single opinions do not really count for much because waste management practices are largely determined by what happens at state level.

Annex

Annex 1: Full list of ideas for research and innovation, policy, management and communication

This table includes all ideas for research and innovation, policy, management and communication that emerged from the focus groups. For each research idea the research category is mentioned, as well as the aim of the research and the proposed target group. In addition, the priority of the research idea as perceived by the participants is indicated in the tables, using stars to indicate the number of stickers assigned to a specific idea by the participants.

ENVIRONMENTAL SCIENCES AND TECHNOLOGY

Category	Idea	Aim	Target Group	Priority
Technical/ Physics/ Chemical/ Engineering	Robot at home that processes your waste into different types of pellets (plastic, metal, etc.) that can be sold by weight in certain shops	Convenience in the home/ Improve recycling	Consumers/ Producers	☆☆☆☆☆ ☆
	A local (collective or private) landfill producing biogas, for example, to use as fuel for cars or for heating houses (fast, with a catalyser)	Effective use of waste	Waste management companies/ Producers	☆☆☆☆☆
	Blast waste into outer space or put it on the moon or Mars, but keep useful materials to recycle/reuse	Eliminate waste	Waste management companies	☆☆☆☆
	Sectioned bins everywhere, on the streets and in the house. With the possibility to adjust the sections according to the amount of garbage you produce (at home)	Improve recycling/ Convenience in the home	Consumers/ Waste management companies	☆☆☆☆
	Better reuse/recycling technology for sorted waste (don't just dump it all back together)	Improve recycling	Waste management companies	☆☆☆
	Housing design so that every house can "consume" its own trash, for example use it for heating, electricity or biogas	Effective use of waste/ Convenience in the home	Consumers	☆☆
	Street cleaning, garbage collecting robots, powered by the waste they collect	Other	Waste management companies	☆
	A machine to turn waste back into raw materials that can be put back in nature	Effect on planet	Waste management companies	☆
	Use anti-gravity to get rid of waste (open the window, it will fly away)	Convenience in the home/ Eliminate waste	Consumers	
	Direct processing of waste into fuel or electricity for the car: drive on packaging material or roadside litter	Effective use of waste	Consumers	
	A home garbage shredder that turns waste into material for heating	Effective use of waste	Consumers	
	Get waste all the way to the inner core of the earth	Eliminate waste	Waste management companies	
	Use waste to heat roads or power streetlights	Effective use of waste	Waste management companies/ Other	
	"Food super-hyper hygiene steriliser", to sterilise food using healthy radiation when it is not sold in a package	Less packaging	Consumers	

	A compacter to compact garbage into briquettes for fuel	Effective use of waste	Consumers	
	Some special device to collect ashes from stoves and furnaces	Convenience in the home	Consumers	
Material	Packaging of reusable material	Less use of resources	Consumers/ Producers	☆☆☆☆☆ ☆☆
	Biodegradable items, packaging, other waste and clothing	Less plastic/ Effect on planet	Producers/ Consumers	☆☆
	Items made from everlasting materials that do not break down	Less waste production	Producers/ Consumers	☆
	Edible packaging	Effective use of waste	Consumers	
	Speed up the process of biodegradation of materials	Other	Other	
	Reusable plastics	Less use of resources	Producers	
	Material that decomposes into fertiliser	Effective use of waste	Consumers/ Producers	
Bio(techno)-logical	Research into how to make food for people or feed for animals from garbage	Effective use of waste	Producers/ Consumers	☆
	A home composting kit that allows for easy composting of all organic waste for own use or to sell or barter	Convenience in the home/ Effective use of waste	Consumers	☆
ICT	App for sorting garbage, take a picture and it tells you what kind of garbage it is and where it should go	Convenience/ Improve recycling	Consumers	☆☆
	Self-sorting garbage bin, based on barcodes	Convenience in the home/ Improve recycling	Consumers	☆☆
	A sorting app that earns you credits/points for good practice to compete with your friends	Improve recycling/ Behaviour change	Consumers	
	Develop an interactive database to match supply and demand of certain types of waste	Improve recycling/ Effective use of waste	Consumers/ Producers	
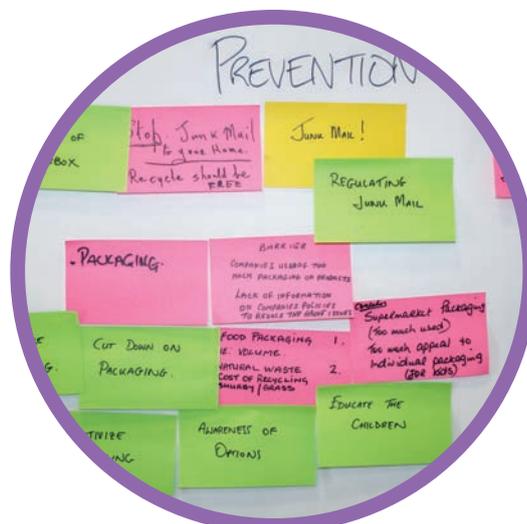
POLICY, MANAGEMENT AND COMMUNICATION

Category	Idea	Aim	Target Group	Priority
Policy	Provide financial benefits (e.g. discounts, pension plan) for sorting waste and fine people that do not sort	Improve recycling	Consumers	☆☆☆☆☆ ☆☆☆☆☆ ☆☆☆☆☆
	Ban non-degradable packaging	Effect on planet	Producers/ Retailers	☆☆☆☆☆
	Designate more items for refunds on packaging with a deposit system, currently applied to certain bottles only	Improve recycling	Consumers/ Producers	☆☆
	Legal restrictions (or a ban) on advertising, especially when it is targeted at children	Behaviour change Reducing consumption	Consumers	☆
	Put quotas on packaging	Less packaging	Producers	☆
	Arrange competition between waste management companies so they need to pay people for their waste	Behaviour change/ Other	Waste management companies	
	Regulation to put responsibility for packaging (more) on the producers	Less packaging	Producers	
	Financial support for home gardening	Less packaging/ Local production	Consumers	
	Obligatory tests for people on their knowledge about waste management before they can buy certain items	Behaviour change	Consumers	
	Make products without packaging cheaper	Less packaging/ Behaviour change	Consumers/ Producers	
	Regulations about the life-time of products they should last longer, be more durable	Less waste production	Producers	
	Create artificial demand for certain waste types, for example plastic	Other	Consumers/ Producers	
	Finance research into making everything bio-degradable	Effect on planet	Other	
	(Increased) cooperation between scientists related to the topic of waste and natural resources	Other	Other	
	Put waste management higher on the agenda of government	Other	Government	
Management/ Logistics	Arrange win-win contacts between waste management companies and other companies	Effective use of waste	Waste management companies/ Producers	☆☆☆☆☆
	Set up private, but communal, rooms for waste management, e.g. at ground floor of apartment building, each apartment has a key	Convenience	Waste management companies/ Consumers	☆☆
	Large underground containers for waste	Convenience	Waste management companies	☆

	Transport waste to the Bermuda triangle	Eliminate waste	Waste management companies	
	People to take own container/ packaging to purchase products, e.g. milk	Less packaging/ Behaviour change	Consumers/ Producers	
	Set up a system with different coloured bags provided by the municipality with information on when they are picked up (also for medicines for example)	Improve recycling/ Awareness of possibilities	Consumers/ Government/ Waste management companies	
	Arrange for packaging to be left in or taken back by the store	Improve recycling/ Convenience in the home	Producers	
Communication and education	Educate children at school from a young age about waste management and consumption	Awareness/ Behaviour change	Consumers	☆☆☆☆☆ ☆☆
	Marking on packaging about how items should be disposed of properly, possibly with a colour code system	Improve recycling/ Awareness of possibilities	Consumers	☆☆☆☆
	Education through computer games featuring waste, aimed at different age groups	Awareness/ Behaviour change	Consumers	
	Gradual introduction of information about waste management in the media, for example TV programmes about the environment	Awareness/ Behaviour change	Consumers	
Local initiatives	Local exchange system for waste, for example material for burning	Effective use of waste	Consumers	☆☆
	Organise barter trade related to home production, for both products and possibly compost	Less packaging/ Local production	Consumers	
	Home/city gardening, for example on rooftops	Less packaging/ Local production	Consumers	
	Stimulate people to eat out more, create a feeling it is for free maybe related to credits for sorting waste	Less packaging/ Behaviour change	Consumers	
	Local collection campaigns (for children) to earn for example an excursion or books	Improve recycling/ Behaviour change	Consumers	
Other	Government subsidy for environmentally-friendly building methods and materials	Effect on planet	Producers	☆☆☆☆☆ ☆☆
	Water as fuel for cars	Other	Producers/ Consumers	☆☆
	Financial incentives for private persons to invest in sustainable energy	Effect on planet	Consumers	

Annex 2: Attitudes of citizens from Estonia towards resource efficiency

The data in this annex is based on the Flash Eurobarometer No. 316 - The Gallup Organisation (2011). The primary objective of the Flash Eurobarometer survey 'Attitudes of Europeans towards resource efficiency' (Flash No. 316) was to gauge EU citizens' perceptions, attitudes and practices concerning resource efficiency, waste management and recycling. In detail, the survey examined:

- citizens' perceptions of Europe's efficiency in its use of natural resources
- the amount of waste EU households produce and whether they separate that waste for recycling or composting
- preferred actions to improve EU households' and communities' waste management
- citizens' views on how to pay for waste management
- EU households' food waste production and preferred ways of decreasing that waste
- citizens' perceptions of the importance of a product's environmental impact when making purchasing decisions
- citizens' willingness to buy second-hand products and products that are made of recycled materials.

The survey obtained interviews - fixed-line, mobile phone and face-to-face - with nationally representative samples of EU citizens (aged 15 and older) living in 27 Member States. The target sample size in all countries was 1,000 interviews. Below we give the results from Estonia.

Question	Answer	%	EU27 Average
Do you think Europe could be more efficient in its use of natural resources?	Yes	77%	87%
	No	6%	5%
	DK/NA*	17%	8%
Do you think that your household is producing too much waste or not?	Yes	33%	41%
	No	65%	58%
	DK/NA*	2%	1%
Do you separate at least some of your waste for recycling or composting?	Yes	84%	89%
	No	16%	11%
	DK/NA*	0%	0%
What initiatives would convince you to separate (more) waste?	More and better drop-off points for recyclable and compostable waste	75%	76%
	Improve separate waste collection at your home	64%	67%
	More information on how and where to separate waste	58%	65%
	Legal obligation to separate waste	55%	59%
	Taxes for waste management	43%	39%
What initiatives would improve waste management in your community?	Better waste collection services	81%	70%
	Stronger law enforcement on waste management	63%	65%
	Make producers pay for collection and recycling of waste	64%	63%
	Make households pay for the waste they produce	42%	38%
Which one would you prefer: to pay taxes for waste management or to pay an amount related to the quantity of waste your household generates?	To pay taxes for waste management	13%	14%
	To pay proportionally to the quantity of waste you generate	77%	75%
	DK/NA*	10%	11%

Which one would you prefer: to pay taxes for waste management or to include the cost of waste management in the price of the products you buy?	To pay taxes for waste management	20%	25%
	Include the cost of waste management in the price of the products you buy	61%	59%
	DK/NA*	19%	16%
Can you estimate what percentage of the food you buy goes to waste?	None	23%	11%
	15% or less	62%	71%
	16% to 30%	10%	13%
	More than 30%	4%	4%
	DK/NA*	1%	1%
What would help you to waste less food?	Better estimate portion sizes (how much food you cook) to avoid excess food	63%	62%
	Better information on food product labels, e.g. how to interpret "best before" dates, information on storage and preparation	57%	61%
	Better shopping planning by my household	69%	58%
	Smaller portion sizes available in shops	56%	58%
How important for you is a product's environmental impact - e.g. whether the product is reusable or recyclable - when making a decision on what products to buy?	Very important	17%	39%
	Rather important	43%	41%
	Rather not important	22%	12%
	Not at all important	14%	6%
	DK/NA*	4%	2%
Are you willing to buy second-hand products? Base: all respondents, % of yes	Yes	75%	68%
Would you buy the following products second hand? Base: all respondents, % of yes	Furniture	54%	56%
	Electronic equipment	37%	45%
	Textiles (clothing, bedding, curtains, etc)	60%	36%
What reasons prevent you from buying second-hand products?	Quality/usability of the product	65%	58%
	Health and safety concerns	45%	50%
	Less appealing look of the product	38%	25%
	Afraid of what others might think	7%	5%
Would you buy products made of recycled materials?	Yes	71%	86%
	No	20%	11%
	DK/NA*	9%	3%
What would be the most important factors in your decision to buy products made of recycled materials?	Quality/usability of the product	58%	51%
	Environmental impact of the product	15%	26%
	Price of the product	23%	18%
	Brand/brand name of the product	4%	2%
	DK/NA*	0%	3%
What prevents you from buying recycled products or products containing recycled materials?	Health and safety concerns	44%	44%
	Quality/usability of the product	41%	42%
	No clear consumer information on the recycled product	46%	32%
	Less appealing look of the product	30%	17%
	Afraid of what others might think	8%	5%

*Abbreviation DK/NA = Don't know / No Answer

NOTES

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VOICES, CITIZEN PARTICIPATION IN SOCIAL INNOVATION

VOICES is a Europe-wide citizen consultation process, led by Ecsite, the European network of science centres and museums, which helps set the agenda for the environmental research dimension of Horizon 2020 - the European Union's strategy to advance research and innovation.

VOICES represents a valuable insight on methods and procedure for engaging citizen participation to inform Europe's Responsible Research and Innovation framework. Focus groups, academic analyses of public consultations and dissemination of results will lead to an effective method through which to consult the public on science and technology related issues.

VOICES is engaging citizens in 27 EU countries through science centres and museums - all of which are expert, impartial and powerful partners in public engagement with science as members of Ecsite.

One thousand European citizens have joined VOICES focus group discussions on innovative uses and solutions for urban waste. The outcomes of this European consultation process are presented in the VOICES Reports Collection.