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COUNTRY REPORT GERMANY

Views, Opinions and Ideas of Citizens in Europe on Science

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For more information on the report, the results of the VOICES project, please contact Marzia Mazzonetto (mmazzonetto@ecsite.eu).

CONTENTS

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, analysing 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 Germany, 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.eurostat.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 - Germany

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, Germany is the biggest EU country with almost 82 million inhabitants. Many inhabitants live in urban areas (43%), or intermediate areas (40%), while others live in rural areas (17%).

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

		2011	
Population at 1 January		81 751 602	
Population as percentage of EU27		16.3%	
Gross Domestic Product (PPP)		30 300 Euro	
Population urban-rural typology	Urban	35 006 000	43%
	Intermediate	32 750 000	40%
	Rural	13 996 000	17%

3.2 Factsheet on waste

The amount of municipal waste generated and treated in Germany is higher than the average amount of waste treated in the EU27. Germany ranks 2nd on the EU27 ranking list on Municipal Solid Waste Recycling (MSW). Recycling has increased from 48% of MSW generated in 2001 to 62% in 2010. The EU Waste Framework Directive's target to recycle 50% of MSW by 2020 has therefore already been met.[9]

Table 3.2 Municipal Waste[10,11]

		Germany		EU27 average	
Municipal waste generated (kg per person)		583 kg		502 kg	
Municipal waste treated (kg per person)		583 kg		486 kg	
Municipal waste treated	Landfilled	0 kg	0%	185 kg	38%
	Incinerated	222 kg	38%	107 kg	22%
	Recycled (material recycling)	262 kg	45%	122 kg	25%
	Composted (organic recycling)	99 kg	17%	73 kg	15%

3.3 Composition of the focus groups

In Germany, six focus groups (FGs) took place on the weekend of 23rd March 2013. Three FGs were held at the Deutsches Museum in Munich, moderated by Sarah Kellberg, Curatorial trainee. Three other FGs were held at Universum® in Bremen, moderated by Christine Schorr, Head of the Education Department at Universum Managementges. mbH.

In total, 60 people (30 male and 30 female) participated in the six FGs. The age of the participants ranged from 18 to 74: 20 participants were aged between 18 and 35; 21 between 36 and 50 and 19 were aged 51 or over. Most participants had a high level of education (n = 30), or a middle level (n = 26), while 4 had a low level of education. 39 participants were working, while 4 were unemployed, 9 were students and 8 were retired. 24 participants live in a house and 36 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[12]

		M FG1	M FG2	M FG3	B FG1	B FG2	B FG3	TOTAL
Participants	Total	10	10	10	10	10	10	60
Gender	Male	5	5	5	5	5	5	30
	Female	5	5	5	5	5	5	30
Age	18 - 35	0	0	10	0	0	10	20
	36 - 50	1	10	0	0	10	0	21
	50+	9	0	0	10	0	0	19
Education	High	3	6	5	4	3	9	30
	Medium	5	2	5	6	7	1	26
	Low	2	2	0	0	0	0	4
Employment	Unemployed	1	2	0	1	0	0	4
	Employed	5	8	7	6	9	4	39
	Retired	4	0	0	3	1	0	8
	Student	0	0	3	0	0	6	9
Housing	Flat	8	7	6	4	4	7	36
	House	2	3	4	6	6	3	24

[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 undergoing two or more treatment steps; Exports and imports of waste; Time lags between generation and treatment (temporary storage)
[12] M = Munich, B = Bremen

4. Results

This chapter describes the overall results of all focus groups held in Germany. 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.[13]

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

Almost all participants said they have access to facilities for separating their waste. They typically described five waste streams (a waste stream is defined as one type of waste that is collected separately covering the majority of their household waste): paper, glass, plastic, organic waste and residual waste. The exact organisation varies from one household to the next. Residents of flats generally have shared separation facilities downstairs, while family houses are normally allocated a certain amount of bins. Most participants have access to a 'three-bin system' of different colours: one for paper, one for organic waste and one for general or residual waste. Many participants, particularly those from the focus groups in Bremen, also have access to yellow bags or bins for collecting packaging made from plastic, metal or layered materials. In a few cases, the bin system varied from the norm. One participant indicated that he only has one bin available for general waste and a bag for collecting organic waste. For various reasons, some participants do not have bins for paper or organic waste. Reasons include not needing it because of having one's own compost heap or a lack of space in the apartment building.

Many participants also separate glass, metal and plastic waste in order to bring it to waste recycling points. Some participants also compost organic waste in their garden themselves, while another participant collects organic waste to be given to a farm near his house. One participant burns old wood in his own stove. Almost all participants separate clothes that are fit to be worn again with various purposes such as selling them, making cleaning rags from them, giving them away directly or for charity donation. Many participants also dispose of chemical waste (e.g. paint and medicines), used batteries, old furniture and electrical appliances separately in various ways.

[13] 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

The bins for a specific waste stream are regularly collected from the house, usually once a week or fortnightly. For some bins, people have to pay a fee, while others are free of charge, although this varies according to the municipality. Glass, plastic and metal is mostly collected together first and then taken either to local containers or civic amenity centres. Returnable glass or plastic bottles are brought back to the supermarket. One participant from the outskirts of Munich however, can put glass and paper waste on the street bi-monthly to have it collected. A few participants from the focus groups in Bremen also mentioned that they can put their paper or glass waste on the side of the street (weekly or bi-weekly) to have it collected.

Participants deal with bulky waste items, like old furniture, household appliances or electrical equipment, in several ways. Unwanted items in relatively good shape might be given away or sold on. In some instances, participants can put their bulky waste outside the house on specific days to be picked up by the local council or the Red Cross. In other cases, participants take large items to central recycling centres themselves, where they generally have to pay a fee for disposal. Old electrical appliances can also be returned to the shop when buying a new one. Chemical waste such as paint or medicines can also be deposited there. Some participants mentioned they can return old medicines to the pharmacy or the vet. A few others, however, found that pharmacies do not want to take it back and recommend that consumers dispose of pharmaceuticals in the general household bin. One participant mentioned that in summer it is also possible to bring garden waste to the larger recycling centres. Used batteries and light bulbs are generally brought to recycling points in shops or supermarkets.

Separated clothes are disposed of in several ways, such as bringing them directly to charity organisations or church communities, selling them on the internet, on flea markets, or giving them to friends or family or second-hand shops. Some participants also bring other unwanted items, including books, toys, crockery and candle wax to charity institutions. Interestingly, many people from the focus groups in Bremen feel reluctant to donate clothing to charity organisations, because they have the impression that the wrong people make money out of it by selling the clothes rather than donating them. Some participants therefore, send clothes with friends or missionaries, who are distributing and giving away the clothes personally. In this way participants have more confidence that the clothes end up in good hands.

Finally, some participants mentioned that they give away unwanted items through special gift groups on the Internet, such as the 'Verschenkmarkt' (German version of the Freecycle website)[14] or the Facebook community 'Give it away'. One of the participants founded this Facebook group himself together with fellow students during his studies.

4.1.3 Knowledge about waste pathways

Most participants assume, or at least hope, that glass, plastic, tins, paper and metal are getting recycled. With respect to residual waste some participants have no idea what happens with it after disposal, while others know or guess that it is incinerated. One participant mentioned that organic waste is used for making compost or manure. Another participant assumed that returnable bottles and tins are reused. A few participants mentioned that batteries and electrical goods are stripped for parts that can be reused or recycled and believe that this is a lucrative business because some of such items contain gold. Moreover it was suggested that Germany imports and processes much waste from other European countries.

Concerning plastic, two participants from Munich indicated that they recently found out that less plastic is actually being recycled than they used to think. One of them explicitly referred to a recent TV broadcast about waste on the 'Südwestfunk' channel, through which he came to know that 30% of the plastic waste gets re-

[14] The Freecycle network is a nonprofit movement of people who give (and request) items for free in their own towns. The network aims to improve reuse of items that are still in good shape

cycled and 70% gets channelled into incineration. Other participants disputed whether recycling actually takes place. They are worried that it gets collected separately, but in the end all gets incinerated in order to generate energy. One participant said he asked his local waste collector whether this presumption is true. The waste collector confirmed this by saying that officially it is being recycled and unofficially it is being incinerated. Two participants from Bremen have visited waste processing plants themselves and could also confirm this story based on what they had seen and heard over there.

4.1.4 Waste management behaviour and convenience

The majority of participants use the bins that are provided for them as part of their daily routine and find this set-up very practical. The group with older participants from Bremen seemed particularly aware of responsible waste management and put much effort into separating their household waste. Other participants, however, indicated that they do not separate organic waste, because they find it too much of an effort, do not have enough space in the house to collect it separately or do not like the smell of food waste spreading through their kitchens. Another participant stopped separating glass when the local waste management company got rid of its bottle banks, due to a lack of motivation to go to the recycling point. Some other participants find it difficult to decide what to put in which bin or bag, and therefore separate incorrectly sometimes. Others put the wrong items in the general waste bin, because there is not enough space left in the bins where they actually belong or simply because of a lazy attitude.

While almost all participants say they dispose of their waste in a proper way, they complain that not everybody does this. Some participants, especially residents of flats, know from experience that their neighbours put the wrong items, such as beer bottles, suitcases or washing stands, in communal bins for household waste or dispose of large waste items "in the open air", which is perceived as extremely annoying. Participants find that it looks untidy and makes waste separation more complicated for other people, as bins becoming full more quickly, and also think it is a shame that many citizens do not seem to bother to deal with waste responsibly.

In Bremen, the yellow bags for separating packaging materials turned out to be rather controversial. Participants indicated various inconveniences: the bags tend to tear too easily, they fly around the streets when it is windy, sometimes cats chew them up and as a result the content is spread all over the streets. Nevertheless, the majority of participants still use the bags because they think it is important that plastic waste is being recycled.

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 three 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.

4.2.1 Waste prevention and production

Concerns about packaging of (food) products were repeatedly mentioned in all focus group discussions. Participants generally acknowledge that, to some extent, packaging is needed in order to guarantee a specific standard of hygiene. However, they think that too many layers of packaging are used, many of which are considered unnecessary. Moreover, it was noted that packaging is often made out of non-recyclable or non-com-

postable materials. According to participants, one of the reasons behind excess packaging is the need for manufacturers and advertisers to make attractive packaging that persuades consumers to buy their products.

> *"First there's paper, then there's something else around it, a carton so the product inside doesn't get broken, and then maybe another layer of foil because it can be made to look attractive if you play around with the design. It's a bit much sometimes." (Bremen FG 1, P9)*

Participants also expressed the concern that producing all the packaging costs a lot of money, which is added to the price of the product, while getting rid of it afterwards costs money as well.

Most participants considered that they feel 'forced' to buy over-packaged products because supermarkets do not offer alternatives for them to be able to prevent waste, such as the opportunity to bring one's own container and buy products loose or from a bulk stock.

> *"I was at the supermarket and took my own container with me because I wanted to put my sliced meat in it. The saleswoman simply said to me: 'I am not allowed to do that for hygiene reasons'. I almost fell over backwards." (Bremen FG2, P4)*

It was mentioned that alternatives for supermarkets are available, for example weekly markets or farmer markets, where people can buy fruits and vegetables without packaging, but making use of those alternatives is considered too time consuming or too expensive and therefore not suitable.

Some participants admitted that it is not only the producers or retailers who are to blame, but that they live in a society with simply too much consumption, where shopping needs to be easy and quick. Participants noticed that shopping while on the move (e.g. coffee-to-go) and online shopping has increased significantly over recent years. This correlates with an excessive amount of packaging for takeaway, transportation and home delivery.

> *"I don't have the time to shop anywhere else so I buy it on the internet. And then I know too that our waste depot is overflowing with tons of Amazon packages." (Munich FG3, P 10)*

Another concern focused on the use of plastic carrier bags. Participants felt that many people use cheap plastic bags when shopping, either out of indifference or because they hadn't thought to bring along a cotton bag. Furthermore, participants had concerns about today's 'disposable' society. They frequently referred to the planned breakdown of electrical appliances, meaning that products are designed with a limited lifespan, so that they are no longer functional after a certain period of time. Often it is almost impossible to repair the product, so it has to be thrown away, as the following example illustrates:

> *"Like with these electric toothbrushes. If the battery is no longer there, one can't open it. It's sealed up. You have to throw it away." (Munich FG 1, P 7)*

It was considered to be in the interest of companies if consumers dispose of objects because companies will make more money.

4.2.2 Waste management in the household

Although many participants indicated that they separate and recycle their waste correctly, they still face several barriers and concerns with respect to managing their waste properly. First, participants came across several practical barriers. Many find that separating waste at home takes up a lot of space, requires considerable effort and can be quite complicated, particularly when packaging is made from mixed materials:

> *"[P4] There's packaging now that's made of paper and also partly made of cellophane, and so I wonder, should I throw it in the paper bin or in the yellow bin?*
> *[M] Why don't you separate it, then?*
> *[P4] To be honest, I feel a bit silly, taking the cellophane off, then throwing the paper away separately, then going to another bin, I don't know, it's a bit... well, too silly or too inconvenient, to be honest." (Bremen FG3)*

Concerns and barriers about the yellow bags for separating packaging materials were repeatedly mentioned. Participants indicated that the plastic sack is so thin and fragile that it is difficult to fill without tearing. Others think it is a hassle to clean all the items before putting them in.

Another important barrier for separating and recycling waste is the limited knowledge participants have about what kind of materials they should put in the yellow bags and what should not. There are symbols for this (known as the Green Dot system), but these are often unclear or absent, as the following participant explains:

> *"I've often had that problem of always having to check, right, where the things got to go. The Green Dot symbol used to be on the stuff until just recently, but I can't find it anymore." (Bremen FG 1, P2)*

Participants from the focus groups in Bremen also mentioned issues concerning organic waste and composting. A personal compost heap is not very appealing to participants because it is known to attract rats. In summer, organic bins are also rather inconvenient because they spread a foul smell.

Finally, according to many participants, people's 'plain ignorance' and laziness might play a role in them not separating and recycling waste. Participants considered that there are many people in Germany, but also elsewhere in Europe, that do not have the motivation to recycle and just put all their waste in the same bin. Some even question whether it makes sense to make so much effort to separate waste, while many other people in society do not.

4.2.3 Waste disposal and pathways

Participants mentioned several barriers related to bringing waste items to recycling centres or bottle banks. First of all, this often takes a lot of effort, especially for people without a car. Second, the location of these facilities was sometimes seen as problematic. One participant did not know where such facilities were located locally, while for others they were not easily accessible. For participants in certain areas, the facilities are simply too far away, discouraging them from dealing with waste responsibly:

> *"I always have to walk or drive so far to even, dispose of [green waste and shoes]. That is a minimum, for me, over ten kilometres that I drive one way. And I think those are hurdles for me." (Bremen FG2, P2)*

Finally participants complained about the high charges for disposal of bulky waste items and garden waste that is too large to fit in the organic waste bin (e.g. tree cuttings). This is a particular concern for participants with big gardens, who regard the disproportionally high fees as a real 'rip-off'.
In addition, it was mentioned that there are too few depots for the disposal of 'special' waste, such as paint, batteries or electronics. Some participants found that these waste items were not always accepted at general recycling centres.

Some concerns were raised about the fact that a large proportion of plastic bottles do not carry a deposit and thus end up in the general waste bin. Participants see this as a missed opportunity to improve recycling. Others think that the returnable fee on beer bottles is too low to incentivise consumers to take it back to the shop:

> *"I think, if [the returnable deposit on beer bottles] was also twenty-five cents, then I think the people in my house wouldn't put it in the rubbish any more at least." (Munich FG3, PX)*

In almost all focus groups, concerns were frequently raised about what happens to waste after collection or disposal, and the need for adequate and transparent information was particularly emphasised. Participants feel that the public should be provided with much more information about the consequences and environmental impact of not separating waste, to encourage people to separate more consistently. On the other hand, the low recycling rate makes participants question whether it makes sense to separate waste strictly. Many participants guessed or heard (either through acquaintances or the media) that much of the recyclable waste is actually being incinerated, in order to achieve the required heating volume in the incineration plants.

"I asked around [at the Waste Incineration Plant Bremen] and it was made very clear to me that it is a huge problem for the waste incineration plants, that the residual waste has so little plastic in it. Because everyone sorts, there is no more heating value and thus the waste incineration plants can't work effectively anymore. Therefore, they are dependent upon basically incinerating yellow waste as well in order to work effectively again. And since that day, I don't pay 100% attention to [the yellow bag] now I have to admit. This system has actually made itself outdated." (Bremen FG2, P4)

While some participants see this situation as proof that there is no point in meticulously separating their waste, others feel that, as long as a part of it is recycled somewhere along the line, it is worth doing it and thus they comply with the system.

Finally, some participants were critical of the fact that waste management systems are largely economically driven. They referred to it as the 'rubbish mafia': a million-euro business with people filling their pockets at the expense of consumers' separation.

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

TECHNICAL, PHYSICAL, CHEMICAL, ENGINEERING

The first category in the domain of 'environmental sciences and technology' groups 'technical, chemical, physical and engineering' ideas together (see table 4.3.1). The suggestion to eliminate the planned breakdown of (electrical) products was mentioned in almost all focus groups and received highest priority within this category. Participants came up with the idea of developing electrical goods with a longer useful life. This includes the ability and flexibility to repair them, so that the product will not need to be thrown away immediately once one part is broken. Some participants think it would also be a good idea to develop standardised product components that are compatible with different brands. For example, mobile phone chargers that fit every type or brand of mobile phone, so the charger never needs to be replaced. This would give the charger a longer lifespan and thus reduce the use of new resources.

Technical innovations for the effective use of waste also received high priority. Across the focus groups, several versions of a personal waste transformer were proposed. This is a kind of machine that fits in the home, processes waste and creates something useful from it. Its output might be ready-made items or energy in the form of heat or fuel.

"[P 1] I think every household should have a replicator. Anyone who's ever seen Star Trek or Star Trek Voyager will know what it is. It's, like, a machine that collects old energy and charges it up again and you can use it to make whatever you want. A drink, or a jumper. Whatever.
[M] So it transforms waste.
[P 1] Yes. Exactly. It transforms waste and energy." (Munich FG2)

In another focus group, a somewhat comparable machine was suggested to compact and grind up all

household waste and transform it into organic dust that can be blown back into the atmosphere. The participant who came up with this idea thought it would be very convenient because it eliminates the need for any external party to take care of your waste. In another focus group, this idea was taken one step further with the suggestion to develop a device that would be able to send waste up into the sun.

In two focus groups, the reduction of food waste received special attention from the participants. Related to technical innovations, a device to check the quality of food (the so-called 'throwaway inspector') and a real-time, on-demand supply system were put forward:

> *"I mean, a supply system like I am imagining, I enter in, then the pound of spaghetti comes out, whatever. It could be anything. […] You have your screen, oh, spaghetti, ice cream, boom and then it comes out of a shoot, then it is in your kitchen […] And that it then can't come to some kind of rubbish heaps that I amass in my refrigerator and then dispose of sometime because the expiration date has passed." (Bremen FG2, P8)*

Lastly, in one of the focus groups, some participants had the idea of making products or packaging out of potato starch, so once the product is broken or finished, it can be eaten instead of thrown away.

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	Decrease planned obsolescence: develop electrical goods with a longer useful life, this includes promoting the flexibility and ability to repair them	Less use of resources	Producers	☆☆☆☆☆☆☆
	Develop a recycling machine for a household that is able to transform waste into new products. Excess should be usable for others or storable	Improve recycling/ Effective use of waste	Consumers	☆☆☆☆☆
	Development of 'oil machine' that uses high pressure or nuclear fusion technology to transform plastic into oil	Effective use of waste	Consumers/ Producers	☆☆☆☆
	Development of a high efficiency waste-to-energy transformer: transforms waste directly into clean energy	Effective use of waste/ Effect on planet	Consumers / Producers	☆☆☆
	Development of a home supply system that fulfils consumers' need for 'on-demand'. At the push of a button you get what you need and only what you need	Less waste production/ Convenience in the home	Consumers	☆☆
	Standardise product components so that they are all compatible	Less use of resources	Producers/Consumers	☆☆

Technical/ Physics/ Chemical/ Engineering	Make mobile phones out of potato starch so that it is edible	Less waste production	Consumers/ Producers	☆
	Development of a 'throwaway inspector' that determines whether a particular (food) product may be used again	Less waste production/ Convenience in the home	Consumers	☆
	Develop a projector that would send waste up to the sun	Eliminate waste	Consumers	☆
	Developing a household system that can compact all the waste and transforms it into organic dust that consequently can be blown into the atmosphere. So you do not need anyone external anymore to take care of your waste	Convenience in the home/ Eliminate waste	Consumers	☆

MATERIALS

A second category in the domain of 'environmental sciences and technology' groups together ideas that focus on the 'material' dimension (see table 4.3.2). These ideas generally involve research into or development of new materials with certain characteristics that are thought to reduce waste production or reduce the use of new resources.

In half of the focus groups, packaging material surfaced as an area of concern. Ideas to encourage the reuse of packaging were often mentioned. This might include the design of packaging with additional uses, for example, a mustard jar that can be used as a drinking glass once it is finished. Research into totally new packaging materials were also fairly popular, including packaging material that will not get contaminated and therefore can be used repeatedly or a material that is universally transformable:

> *"We want to introduce a new production material that is universally transformable [...] well, because I just see the necessity or we see the necessity that of course, certainly a lot of different packaging is necessary to somehow package the diverse products that exist. And to stay flexible, there is this production material that can be shaped into any form but can be one hundred percent reused." (Bremen FG2, P3)*

Another solution to excessive packaging that was ranked as high priority by participants was the use of edible or compostable packaging. To a certain extent this already exists; one participant mentioned decomposable take-away chip trays made from maize meal as an example. He suggested that such innovative packaging concepts should be applied at larger scale for various products, but should stay affordable for consumers.

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

Category	Idea	Aim	Target Group	Priority
Material	Design/produce packaging that is reusable or packaging with additional uses. Manufacturers should be promoted to develop this	Less use of resources / Effective use of waste	Producers	☆☆☆☆☆☆☆☆☆☆☆☆☆

Innovation in packaging concepts e.g. compostable bags, edible packaging, take-away chip trays made of maize meal. These should also remain affordable for all	Less waste production	Producers	☆☆☆☆☆☆☆☆
Development of new (packaging) material that can be universally transformed, meaning that it can be transformed into any shape	Less use of resources	Producers	☆☆☆☆☆☆☆
Develop packaging material based on the lotus effect: it will not get contaminated and thus meets current hygienic rules and therefore can be repeatedly used	Less use of resources	Consumers/ Producers	☆☆☆☆☆☆☆

BIO(TECHNO)LOGY

The third category in the domain of 'environmental sciences and technology' is concerned with 'bio(techno)logical' ideas (see table 4.3.3). Prioritised ideas in this category focused on the use of rubbish-eating bacteria to eliminate rubbish tips. In a somewhat similar idea, one group of participants suggested the creation of bacteria that can remove individual atoms from waste materials followed by a nano-process that puts them together into new products:

> *"Yes, based on the atomisation, that's to say based on the breaking up of compounds at the atomic level, and then you have the production of new objects created from the atoms released. For example you could create artificial meat or artificial food from it." (Bremen FG 1, P 10)*

The concept of artificial food was not warmly received by other participants, though they did not explain why they disliked it.

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	Promotion and further development of bacterial strains that are able to eat rubbish	Eliminate waste	Waste management companies/ Consumers	☆☆☆
	Biological-technical atomisation: create bacteria that can remove individual atoms from waste materials followed by a nano process that puts them together into new products. For example production of artificial meat	Effective use of waste	Consumers/ Producers/ Waste management companies	☆

ICT

The notion of developing a waste scanner was the only idea ranked as high priority in the category of ICT (see table 4.3.4). This scanner would be able to read barcodes on different products and automatically put the waste item in the bin where it belongs. Participants think this might be a very helpful tool in an era where waste separation has become rather complex. With such a device, incorrect separation due to a lack of knowledge can be avoided.

"An auxiliary scanner would maybe be nice, that barcodes are entered on all of the different materials, like they do it today. If you use bar codes on different materials, if you work them into the material, then you basically hold the rubbish under these scanners and then a device somehow rotates inside, like with the packing station, something comes down and what comes down is then thrown in the right bin where that all goes." (Munich FG3, PX)

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

Category	Idea	Aim	Target Group	Priority
ICT	Develop a waste scanner (barcodes): waste automatically goes to where it is supposed to, you don't have to think about separating yourself anymore	Improve recycling/ Convenience in the home	Consumers	☆☆☆☆

4.3.2 Policy, management and communication

POLICY

Ideas related to regulations and financial incentives were abundant in all focus groups. These are grouped in the category 'policy' (see Table 4.3.5). Several ideas in this category aimed to reduce the amount of (plastic) packaging. Participants wanted to promote eco-packaging and encourage stricter attention for the seasonality of food. They also mentioned a ban on plastic shopping bags and plastic packaging in general. One of the focus groups suggested grants or stipends for companies that develop new packaging concepts, including companies that manufacture biodegradable polymers. Participants believe that this would encourage producers to replace plastic with more environmentally-friendly alternatives. Others felt stricter measures were needed, such as taxes on plastic and aluminium packaging or strategies to coerce producers to switch to new packaging concepts by a certain date:

"And maybe there could be withdrawal, like with nuclear energy, so you say, 'From 2015 we only want to have that... we want plastic to...' because if you just say, 'Hmm, we'll support that', then the others will try to fight against it. So you really need to say, 'for the sake of the environment, that's the only real alternative for us, the number one and everything else will just slowly disappear from the market'..." (Bremen FG3, P3)

Finally, with regard to reducing packaging one participant suggested that certain regulations on packaging should be relaxed, for example the packaging rules around transporting food. It was acknowledged that to some extent packaging is needed to guarantee a specific standard of hygiene, but the idea was that with less packaging this can also be accomplished.

Another proposed policy measure that targets producers was a regulation to force manufacturers to only produce products that are 100% recyclable or reusable; otherwise they will not get permission to produce it in the first place:

"I'm for the utopia if it's at least Europe-wide, I'd prefer it to be worldwide, so that everybody producing something, every firm, every industry has to prove that it's producing no waste. They produce

something, whatever, for a product, but must submit a concept where everything can be later returned one hundred percent into circulation. That's my utopia." (Bremen FG 1, P 1)

Some participants were in favour of a complete ban on direct mail advertising coming through the letterbox, since there are alternatives available, like radio commercials or newspaper advertisements, that result in less or no waste production.

The planned breakdown of electrical goods was a real concern for many participants. Two focus groups came up with some ideas to encourage producers to increase the lifespan of their products. First, it was suggested to legally extend the warranty period from 2 years to at least 3 years, in order to make manufacturers design products that last longer. Second, it was mentioned that manufacturers of electronic items should be obliged to repair broken parts in electrical goods rather than forcing consumers to buy a new one. Some participants suggested making producers responsible for the disposal of broken products, which they felt would lead to an increased lifespan of those products:

"[...] and that might encourage the manufacturers to manufacture their products in such a way that they last longer... like, have a longer lifespan, because they're the ones who'd have to pay for their disposal." (Bremen FG3, P6)

Furthermore, it was suggested to introduce financial incentives for initiatives that may help reduce waste production or promote the effective use of waste, including financial support for 'repair cafés' or stipends for scientists that work in new research areas related to waste reduction or the use of waste as a resource.

In one of the focus groups in Munich, the idea of encouraging action groups to fight lobbying in the food industry was fairly popular. Many participants held the belief that legislative proposals introducing taxes on plastic or aluminium packaging, for example, would have no chance since they would immediately be halted by lobbyists from the food industry:

"And what's the use of the best intentions and the best upbringing, if the lobbying from above controls everything. I'm saying and you, ah, it must come from above, but as long as there's so much lobbying nothing will change." (Munich FG 1, PX)

In line with this, one idea was to ban speculation on food, since this was seen as a source of malpractice in the food industry that leads to significant overproduction and waste of food.

In another focus group, participants indicated that waste management companies should become non-profit, meaning that the money they earn out of processing waste should be invested back into society.

A final idea targeted at both producers and consumers is making a bottle deposit system obligatory. This would ultimately stop the production and use of disposable bottles, thereby promoting recycling and reuse.

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

Category	Idea	Aim	Target Group	Priority
Policy	Fund biodegradable biopolymers so companies become stimulated to replace plastic with biopolymers. Competitive advantages for biopolymers should be created. 'Withdrawal scenarios' were also suggested	Less plastic	Producers	☆☆☆☆☆☆☆☆☆☆☆☆
	Encourage action groups to fight lobbying in the (food) industry	Other	Producers/ Consumers	☆☆☆☆☆☆☆☆

Policy	Legal extension of the warranty period, for example 3-5 years. So that the products are designed to last longer and consumers are more likely to use them longer	Less use of resources	Producers/ Consumers	☆☆☆☆☆
	Product manufacturers must prove before the production of new products that the product is in keeping with the 'zero waste society', otherwise there will be no production approval	Less waste production/ Effect on planet	Producers	☆☆☆☆☆
	Introduce taxes on plastic and aluminium packaging and use the revenue from fines to invest in the promotion of alternative materials	Less plastic/ Less packaging	Producers/ Consumers	☆☆☆☆
	Prohibit speculation on food	Less waste production	Other	☆☆☆
	Ban on direct mail advertising (e.g. advertising leaflets) coming through the letter-box. As an alternative make advertisement in the newspapers	Less waste production	Producers	☆☆☆
	The EU should provide stipends or funding for innovative small or large companies that develop new packaging concepts	Less packaging	Producers	☆☆☆
	Manufacturers of electronic items should bear the costs for disposing of broken products: this will lead to increased product life spans and environmentally-friendly products	Less use of resources/ Effect on planet	Producers/ Consumers	☆☆☆
	General ban on plastic packaging	Less plastic	Producers	☆☆
	Make the glass bottle deposit system obligatory (manufacturers take it back), including refunds for customers	Improve recycling	Producers/ Consumers	☆☆
	Tax funding of craftsperson's that can repair broken goods, e.g. support for repair cafés	Less use of resources	Producers/ Consumers	☆

Stipends for researchers that work in new research areas with regard to waste avoidance/utilisation (e.g. material technology)	Less waste production/ Effective use of waste/ Other	Government/ Other	☆
Obligations for manufacturers to repair broken parts in electrical goods rather than forcing consumers to buy a new one	Less use of resources	Producers	☆
Modify EU (and other) regulations regarding packaging so that less packaging accrues	Less packaging	Producers	☆
Re-communalisation of waste management: Money can no longer be made out of waste, potential profit must be used for the community	Other	Government/ Waste management companies	☆
Ban on plastic bags in shops. This should stimulate consumers to bring their own reusable bag	Less plastic/ Behaviour change	Consumers	☆
Seasonality (of food) must be more strictly observed	Less use of resources	Consumers/Producers	☆
Promote eco-packaging	Improve recycling	Producers	☆

MANAGEMENT AND LOGISTICS

Packaging was a recurrent topic in all focus groups. In the group 'management and logistics' (see table 4.3.6), participants assigned highest priority to an idea about restructuring the packaging industry, by replacing current packaging materials with recyclable and reusable ones. Some other ideas aimed at improved recycling and increased convenience in the home.

Participants from two different focus groups felt that the networks and infrastructure for waste disposal should be improved. To accomplish this, they suggest increasing the availability of disposal options but also moving responsibility for waste separation towards waste management companies. This implies that consumers can just put all their waste in one bin, that will be collected from their home and will subsequently be sorted and separated at the tip by machines:

> *"Build appropriate facilities, where I can stick everything in a bin and away it goes. The devil may care. Then everything's collected on site, nothing's separated anymore but it's all collected and then it goes on the right conveyor belts. And it's all sorted and separated by machine before going back to production." (Bremen FG 1, P 1)*

According to participants, such a system would make waste management at household level much more convenient and more effective at the same time, because human errors, due to a lack of knowledge on how to separate, are avoided.

Another popular idea that requires some sort of managerial or logistical changes aims at shortening the transport routes of food. Participants indicated that this would increase the shelf-life of products which would consequently lead to less waste production and less use of new resources.

Participants repeatedly mentioned that they are bothered by the limited opportunities to have any broken parts of electronic devices repaired by the producer. One participant therefore suggested creating the possibility to manufacture replacement parts oneself by means of a 3D printer:

> *"And then the point that P4 just said, with, I have an electronic device and a one-cent piece breaks. These 3D printers are becoming more popular and I can really manufacture the things myself, from a motor block to a tissue for instance. Even if something is pushed more and not just so it stays in industrial sectors, but also comes into private households... and, I mean, not everyone has to have one. Sharing would be useful, that people say, okay, you can go there and there's one available." (Munich FG3, PY)*

According to participants, this is not yet possible, because industry holds the license for these 3D printers, though for the near future, it would be an appealing idea.

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

Category	Idea	Aim	Target Group	Priority
Management/ Logistics	Restructuring of the packaging industry, by replacing current packaging materials with new ones that are recyclable and/or reusable	Less use of resources	Producers	☆☆☆☆☆☆☆
	Restructuring of the waste management system: no separation in the home anymore but instead separation and recycling at large central sites	Convenience in the home/ Improve recycling	Consumers/ Waste management companies	☆☆☆
	Shorter transport routes: longer shelf-life of food via shorter transport routes and better logistics	Less waste production/ Less use of resources	Consumers/ Producers	☆☆☆
	Improved networks/ infrastructure for waste disposal and recycling, including availability of disposal options	Convenience in the home/ Improve recycling	Consumers	☆☆☆
	Use 3D printers to manufacture replacement parts. Available in the household or in the neighbourhood (like in a copy shop)	Less use of resources	Consumers/ Producers	☆☆

COMMUNICATION AND EDUCATION

Several ideas focused on providing information for consumers. These ideas have been grouped in the category 'communication and education' (see Table 4.3.7). Raising awareness is the most common aim in this category. Quite some change is expected when the public at large is better informed and educated about different issues related to the topic of waste management.

Ideas for educational programs, targeting the general public or a specific group, were frequently put forward. Many participants were of the opinion that waste as a topic should be anchored in education through all ages, but they agreed that it would ideally start at an early age, so that people can act accordingly later on. Several focus groups suggested introducing environmental awareness lessons at primary and secondary schools, possibly incorporated within geography or biology classes. Another suggestion was to include practical components in children's educational programmes. Ideas included organising field trips to recycling plants, and giving workshops on how to grow your own vegetables or how to repair broken items:

> *"[PX] And then also, for instance, taking field trips, for instance, look at clarification plants. That we awaken the interest of the children for environmental awareness. And already teaching them requirements and fundamentals.*
> *[PY] And that it is perhaps practically oriented instead of just a classroom teaching style.*
> *[PX] And at secondary school that we learn in classes things like sewing on a button so we don't throw it away. Also such practical activities... or, how could I repair something or build it, so in class, we would have that too, or that instead of going hiking going along the Isar and picking up rubbish." (Munich FG3)*

In one focus group, participants indicated that such educational programs should also pay attention to the reduction of food waste, for example, by providing cooking classes in which children learn to cook dishes from leftovers. Another participant indicated that people should be encouraged to tolerate certain products by teaching children that imperfectly shaped food, like bent cucumbers, are still edible and tasty.
Other ideas that were ranked as priority several times concerned the development of general information or awareness campaigns, mostly through the media. According to participants, these should not only focus on current problems and their consequences, but also highlight the benefits of more environmentally-friendly waste management approaches. Campaigns with a more specific message were also thought useful and were generally aimed at increasing reuse and reducing consumption. One participant, for example, suggested launching a public campaign to improve the image of second-hand products, as she explains:

> *"I also suggested a campaign for the overall awareness of the general population in second hand and isn't ugh! I was raised like this: You are my daughter, you don't get anything used, that's how I was raised. I changed. But I know so many people who would never in their lives buy something used. And this is the EU's responsibility, since you are sitting here, such as, here, AIDS, everyone use rubbers and whatnot. That there are already posters in the U-9, 'my first choice' here second hand and then he is wearing a super cool jacket or cool leather bag." (Munich FG3, PX)*

Finally in two focus groups it was suggested to inform the public about 'conscious consuming' so people become more aware of their own behaviour as a consumer and start asking themselves: "do I really need all the stuff that advertisers make me believe I do?" This idea was suggested to promote a cultural shift in our current consumerist society.

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	Anchor the waste topic in education through all ages (including university and education for adults). Educational programs should include lessons in environmental awareness, probably anchored within geography or biology lessons, field trips to clarification plants etc and workshops around do it yourself and repair your own stuff	Awareness of possibilities	Consumers	☆☆☆☆☆☆☆☆☆☆☆☆

Communication and education	Courses on environmental awareness, including enhancement of product tolerance	Awareness of values/ of possibilities	Consumers	☆☆☆
	Multimedia advertising campaign for increased environmental awareness/collective social awareness, both among consumers and manufacturers	Awareness	Consumers/ Producers	☆☆☆
	Public campaigns to improve the image of second hand products	Awareness of values/ Less use of resources	Consumers	☆
	Create awareness about the consumerist society. So people start asking themselves: do I really need all the stuff I would like to buy? - as early as kindergarten	Awareness of values	Consumers	☆
	Promote self-sufficiency, e.g. grow your own vegetables	Local production	Consumers	☆

LOCAL INITIATIVES

Some ideas that were proposed in the focus groups would not need much innovation or research, but merely some organisation and someone to start it. The category 'local initiatives' captures these ideas (see table 4.3.8). In general, these ideas focus on mobilising people to take part in local production or reusing. One such idea concerns a local initiative to set up or strengthen neighbourhood networks where people can buy second-hand products, share various items (e.g. cars) and have items repaired. Some participants know that such initiatives already exist and they think it is an appealing idea to implement them more broadly.

> *"[P5] In Berlin there's now a range of 'lending shops' where people bring things they don't need and then someone else can take it if they need it.*
> *[P3] Yes, there's already sort of internet cafes and places where people bring their stuff and then there are proper specialists who repair, or try to repair it. Toasters and televisions and if they can't fix it, then you've got to buy a new one of course. But at least the idea's come back. And I think that's great, much better than nowadays when you can't fix it yourself, or when the electrician says, no, I haven't got the part for that, you know, or it's not worth it, chuck it away, you know, and then there's still people who say they'll give it another go." (Bremen FG 1)*

Two other ideas that were ranked as priority aimed to increase local production and consumption. One focus group briefly mentioned increasing the number of farm shops where consumers can buy local products. The final idea in this category concerns the building of urban gardens that would allow participants to grow their own food. Producing one's own vegetables is thought to greatly reduce packaging waste for a household. Other versions of this idea added the possibility to transform the organic waste from these gardens into energy that might be utilised locally for heating houses or other purposes.

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

Category	Idea	Aim	Target Group	Priority
Local Initiatives	Strengthening of neighbourhood networks, for buying second-hand products, lending/sharing of various items (e.g. cars) and for the repair of items	Less use of resources	Consumers	☆☆☆☆
	Introduce urban gardening: "back to our roots" with modern standards	Local production	Consumers	☆
	More farm shops and eco-crates	Local production	Consumers	☆

5. Conclusion, discussion and evaluation

This country report presents country-specific findings from citizen focus groups in Germany. 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, as in Germany, where six 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 Germany. 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

Germany ranks 2nd on the EU27 ranking list on Municipal Solid Waste Recycling (MSW). Recycling has increased from 48% in 2001 to 62% in 2010, meaning that the EU recycling target of 50% by 2020 has already been met.[15] This trend is clearly visible in the management of waste at household level, as described by the participants of the focus groups. Most participants have access to the facilities needed for handling waste according to the regulations. This is consistent with findings from the Flash Eurobarometer survey 'Attitudes of Europeans towards resource efficiency'[16] in which 97% of all respondents from Germany indicated they separate at least some waste for recycling or composting (see Annex 2).

The VOICES focus groups results show that most participants know what is expected from them on the household level. However, knowledge about what happens to waste after collection is limited. Some assume waste is managed appropriately, while others dispute whether recycling actually takes place.

The focus groups highlighted some large clusters of barriers and concerns for managing waste appropriately. With respect to production and prevention, all focus groups repeatedly expressed concerns about the amount of packaging on products and the lack of alternatives for consumers who are obliged to buy over-packaged items. Business strategies, particularly the planned breakdown of products, and the lazy attitude of people in our current society are thought to contribute to the high waste generation.

With respect to dealing with waste in the household, several practical barriers were identified, most of which have to do with the complexity and inconvenience of separating waste at home. Concerns and barriers around the yellow bags and bins were frequently mentioned. This might indicate that the yellow bin system, which has recently been introduced in Germany in order to increase recycling of household plastics and metals, still has some teething troubles. Participants mentioned some major drawbacks of the current set-up including the impractical bags for collection and limited knowledge about what kind of materials should be thrown in the bag. Nevertheless, many of the participants use the bags because they think it is important that plastic waste is recycled.

The disposal of waste faces some further challenges. The availability and accessibility of bottle banks and recycling centres were often seen as problematic. This relates to findings from the Flash Eurobarometer survey showing that more than half of German respondents think that more and better drop-off points for recyclable and compostable waste would convince them to separate more. The majority of participants do not want to pay high charges for the disposal of bulky waste items and garden waste. Many participants would like to receive more reliable information about how the waste is treated, for example, to see whether their efforts really make a difference.

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', which are each further divided into four categories. In the first domain, ideas focus mainly on technologies to increase recycling and to reduce the use of new resources. Technical innovations for the effective use of waste also received high priority. Consumers were the most prominent target group, followed by producers and waste management companies. In this domain, many ideas relate directly to waste management. The proposed (bio)technologies help to sort, process, or eliminate waste at either household or waste plant level. Other ideas relate to the original product (before it becomes waste) and

[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)

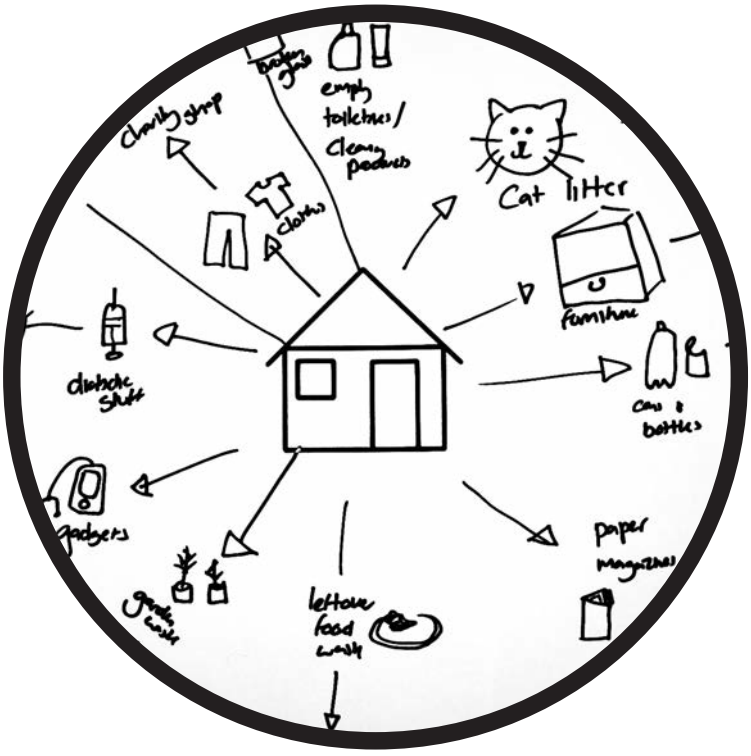
aim to reduce waste production by preventing food waste, promote reusable and biodegradable or compostable packaging, make (electronic) products more durable or make products that are easier to repair.

Ideas in the second domain 'policy, management and communication' focused mainly on regulations, incentives, taxes, information and education to reduce waste, improve recycling, foster awareness and change behaviour. As in the first domain, the main aims were to reduce plastic packaging and lengthen the useful life of (electronic) devices. Producers were perceived as one of the most important actors in achieving a 'zero waste society'. According to participants, producers should be encouraged to replace plastic packaging by more environmentally-friendly alternatives. Likewise, regulations should force manufacturers to produce products that are more durable or easier to repair. Nonetheless, it was acknowledged that consumers will always remain important stakeholders in waste management issues. Opportunities to grow food locally, incentives for recycling, the promotion of second-hand shops, media campaigns and educational programmes are all thought to raise awareness and improve consumer behaviour related to waste.

When looking at the three highest prioritised ideas, the first priority is to design/produce packaging that is reusable or packaging with additional uses; manufacturers should be encouraged to develop this (13 stickers). The second priority involves anchoring the waste topic in education through all ages (including university and education for adults) (12 stickers), followed by funding biodegradable biopolymers so companies become stimulated to replace plastic by biopolymers (10 stickers).

5.3 Reflection

Participants said they enjoyed the group activities and many thought they had learned something new. They were pleased to have discussed such an important topic and were very interested in the other participants' ideas and opinions. Participants felt that they had been able to express themselves and that their voices had been heard. Sometimes they had the feeling that even more time could have been spent on the subject and that such discussions should take place more often. They feel very positive about the EU's interest in citizens' opinions and hope their input will be valuable and that their ideas will be implemented.



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	Decrease planned obsolescence: develop electrical goods with a longer useful life, this includes promoting the flexibility and ability to repair them	Less use of resources	Producers	☆☆☆☆☆ ☆☆
	Develop a recycling machine for households that is able to transform waste into new products. Excess should be usable for others or storable	Improve recycling/ Effective use of waste	Consumers	☆☆☆☆☆
	Development of 'oil machine' that uses high pressure or nuclear fusion technology to transform plastic into oil	Effective use of waste	Consumers/ Producers	☆☆☆☆
	Development of a high efficiency waste-to-energy transformer: transforms waste directly into clean energy	Effective use of waste/ Effect on planet	Consumers / Producers	☆☆☆
	Development of a home supply system that fulfils consumers' need for "on-demand". At the push of a button you get what you need and only what you need	Less waste production/ Convenience in the home	Consumers	☆☆
	Standardise product components so that they are all compatible	Less use of resources	Producers/ Consumers	☆☆
	Make mobile phones out of potato starch so that it's edible	Less waste production	Consumers/ Producers	☆
	Development of a 'throwaway inspector' that determines whether a particular (food) product may be used again	Less waste production/ Convenience in the home	Consumers	☆
	Develop a projector that would send waste up to the sun	Eliminate waste	Consumers	☆
	Developing a household system that can compact all the waste and transforms it into organic dust that consequently can be blown into the atmosphere. So you don't need anyone external anymore to take care of your waste	Convenience in the home/ Eliminate waste	Consumers	☆
	Research into alternatives for non-reusable parts of products. Once a replacement has been found the original product should be prohibited	Less use of resources	Producers	
	Developing the recycling-Tron-3000. It separates all products into their small components	Improve recycling	Consumers	

	Develop a molecular construction system. This makes it possible to break waste up into its molecular components and use these components to produce other items	Effective use of waste	Consumers	
	Development of a machine that transforms waste into clean air or a kind of air that can close up the ozone layer	Effective use of waste	Other	
	Dematerialisation: the human gift of being able to make waste disappear	Eliminate waste	Consumers	
	A waste-powered barbecue that uses waste as a fuel instead of charcoal	Effective use of waste	Consumers	
	Development of a shopping robot that is programmed to buy 'good' products (e.g. natural, unpackaged products)	Less packaging/ Effect on planet	Consumers	
	Develop techniques to use overproduced food for other purposes, instead of throwing it away. For example make biogas or packaging out of potatoes	Effective use of waste	Producers	
	Shoot waste into space to store it over there	Eliminate waste	Others	
	Only consume in the virtual world (like the holodeck from Star Trek). Have fun without using materials, e.g. eat chocolate without getting fat	Less waste production	Consumers	
	Create a parallel universe where we send our waste products. And there our waste can be used as new resources	Eliminate waste/ Effective use of waste	Consumers	
	Hygiene research in order to meet hygiene standards without packaging (e.g. UV-Light for cleaning, quality control)	Less packaging	Producers/ Consumers	
	Develop a waste sewage/pipeline system that transports waste directly from people's homes to a waste sorting plant	Convenience in the home/ Improve recycling	Consumers	
Material	Design/produce packaging that is reusable or packaging with additional uses. Manufacturers should be promoted to develop this	Less use of resources / Effective use of waste	Producers	☆☆☆☆☆ ☆☆☆☆☆ ☆☆☆
	Innovation in packaging concepts e.g. compostable bags, edible packaging, take-away chip trays made of maize meal. These should also remain affordable for all	Less waste production	Producers	☆☆☆☆☆ ☆☆☆
	Development of new (packaging) material that can be universally transformed, meaning that it can be transformed into any shape	Less use of resources	Producers	☆☆☆☆☆ ☆☆
	Develop packaging material based on the lotus effect: it won't get contaminated and thus meets current hygienic rules and therefore can be used over and over again	Less use of resources	Consumers/ Producers	☆☆☆☆☆ ☆☆
	Developing packaging material that can substitute plastic, like compostable toxin-free foil	Less plastic	Producers	
	Create packaging material that is edible. For example put fries in a waffle instead of a cardboard bowl	Less packaging	Consumers	

Bio(techno)-logical	Promotion and further development of bacterial strains that are able to eat rubbish	Eliminate waste	Waste management companies/ Consumers	☆☆☆
	Biological-technical atomisation: create bacteria that can remove individual atoms from waste materials followed by a nano process that puts them together into new products	Effective use of waste	Consumers/ Producers/ Waste management companies	☆
	'Food pill': food in tablet form to cut down on food waste and packaging	Less waste production/ Less packaging	Consumers	
	Use organic waste/compost in biogas systems that are used at farms	Effective use of waste	Consumers	
ICT	Develop a waste scanner (barcodes): waste automatically goes to where it is supposed to, you don't have to think about separating yourself anymore	Improve recycling/ Convenience in the home	Consumers	☆☆☆☆
	Shopping App that gives all kinds of relevant information (e.g. about packaging)	Awareness	Consumers	
	Development of an intelligent refrigerator (e.g. giving consumers recipes about what to cook from what's inside)	Convenience in the home/ Less waste production	Consumers	

POLICY, MANAGEMENT AND COMMUNICATION

Category	Idea	Aim	Target Group	Priority
Policy	Fund biodegradable biopolymers so companies are encouraged to replace plastic with biopolymers. Competitive advantages for biopolymers should be created. 'Withdrawal scenarios' were also suggested (e.g. from 2015 we only want to have biopolymers)	Less plastic	Producers	☆☆☆☆☆ ☆☆☆☆☆
	Encourage action groups to fight lobbying in the (food) industry	Other	Producers/ Consumers	☆☆☆☆☆ ☆☆☆
	Legal extension of the warranty period, for example 3-5 years. So that the products are designed to last longer and consumers are more likely to use them longer	Less use of resources	Producers/ Consumers	☆☆☆☆☆
	Product manufacturers must prove before the production of new products that the product is in keeping with the zero-waste society, otherwise there will be no production approval	Less waste production/ Effect on planet	Producers	☆☆☆☆☆
	Introduce taxes on plastic and aluminium packaging and use the revenue from fines to invest in the promotion of alternative materials	Less plastic/ Less packaging	Producers/ Consumers	☆☆☆☆
	Prohibit speculation on food	Less waste production	Other	☆☆☆
	Ban on direct mail advertising (e.g. advertising leaflets) coming through the letterbox. As an alternative make advertisement in the newspapers	Less waste production	Producers	☆☆☆

The EU should provide stipends or funding for innovative small or large companies that develop new packaging concepts	Less packaging	Producers	☆☆☆
Manufacturers of electronic items should bear the costs for disposing of broken products: this will lead to increased product life spans and environmentally-friendly products	Less use of resources/ Effect on planet	Producers/ Consumers	☆☆☆
General ban on plastic packaging	Less plastic	Producers	☆☆
Make the glass bottle deposit system obligatory (manufacturers take it back), including refunds for customers	Improve recycling	Producers/ Consumers	☆☆
Tax funding of craftworkers that can repair broken goods. E.g. support for repair cafés	Less use of resources	Producers/ Consumers	☆
Stipends for researchers that work in new research areas with regard to waste avoidance/ utilisation (e.g. material technology)	Less waste production/ Effective use of waste/ Other	Government/ Other	☆
Obligations for manufacturers to repair broken parts in electrical goods rather than forcing consumers to buy a new one	Less use of resources	Producers	☆
Modify EU (and other) regulations regarding packaging so that less packaging accrues	Less packaging	Producers	☆
Re-communalisation of waste management: Money can no longer be made out of waste, potential profit must be used for the community	Other	Government/ Waste management companies	☆
Ban on plastic bags in shops. This should stimulate consumers to bring their own reusable bag	Less plastic/ Behaviour change	Retailers/ Consumers	☆
Seasonality (of food) must be more strictly observed	Less use of resources	Consumers/ Producers	☆
Promote eco-packaging	Improve recycling	Producers	☆
Obligation for supermarkets to donate products which are past their expiry date to social institutions	Effective use of waste	Producers	
Government funding of environmental organisations and communities with environmental projects (e.g. sharing platforms)	Effect on planet/ Other	Other	
Introduction of an environmental police to control illegal dumping of waste	Behaviour change	Consumers	
Extend the reusable bottle system and introduce special taxes and sanctions to motivate both consumers and manufacturers to use it	Improve recycling/ Behaviour change	Consumers/ Producers	
Make the glass bottle deposit system obligatory, including refunds for customers	Improved recycling	Producers/ Consumers	
Higher taxes on packaging that can't be reused	Less use of resources/ Less packaging	Consumers/ Producers	

Policy	Incentives for consumers to produce less waste, e.g. motivate consumers to bring their own reusable packaging to the shop	Behaviour change/ Less waste production	Consumers	
	Price setting, e.g. make disposable coffee cups or disposable nappies more expensive to discourage people to buy disposables	Behaviour change/ Less waste production	Consumers	
	Funding to promote regional shopping from farmers. Funding is necessary for farmers to maintain their prices	Local production	Producers	
	EU funding of businesses that use waste as resource to produce everyday objects. For example making bags out of plastic bottles or making furniture out of old car tyres	Effective use of waste	Producers	
	Introduce regulations to set maximum permitted amounts of packaging, depending on the type and size of the product. Government will carry out inspection visits to see whether companies adhere to the rules	Less packaging	Producers	
	Extend guarantee periods, particularly for electronic devices	Less use of resources	Producers/ consumers	
	Ban on bulk packaging	Less waste production	Producers	
Management/ Logistics	Restructuring of the packaging industry, by replacing current packaging materials with new ones that are recyclable and/or reusable	Less use of resources	Producers	☆☆☆☆☆ ☆☆
	Restructuring of the waste management system: no separation in the home anymore but instead separation and recycling at large central sites	Convenience in the home/ Improve recycling	Consumers/ Waste management companies	☆☆☆
	Shorter transport routes: longer shelf-life of food via shorter transport routes and better logistics	Less waste production/ Less use of resources	Consumers/ Producers	☆☆☆
	Improved networks/ infrastructure for waste disposal and recycling, including availability of disposal options. Also look at good practices in other countries (e.g. Scandinavian countries)	Convenience in the home/ Improve recycling	Consumers	☆☆☆
	Use 3D printers to manufacture replacement parts. Available in the household or in the neighbourhood (like in a copy shop)	Less use of resources	Consumers/ Producers	☆☆
	Introduction of an aluminium deposit so it can be recycled. For example for coffee capsules	Improve recycling	Consumers	
	Introduce alternatives for disposable plastic bags, such as bags made from reused or reusable materials	Less plastic	Consumers	
	Introduction of exchange system: food is delivered to people's homes (demands limited amounts of packaging) and at delivery their domestic waste is collected and taken away	Less packaging/ Convenience in the home	Consumers	

	Encourage nappy bins that are collected by firms to recycle the nappies, so that cloth nappies become more practical and cheaper than (plastic) disposable nappies. Plus medical research to confirm the benefits of cloth nappies	Less waste production/ Behaviour change	Consumers/ Producers	
	Global logistics and planned manufacturing to prevent overproduction	Less waste production	Producers	
	Promote buying electronical versions of products, such as DVD downloads or e-books	Less use of resources	Consumers	
	Introduce returnable boxes for fruits and vegetables instead of wrapping it in plastic	Less plastic	Producers/ Consumers	
	Introduce disposal system for glass jars, including return fee	Improve recycling/ Behaviour change	Consumers/ Producers	
	Introduce deposits for packaging, for example plastic, with an incentive scheme	Improve recycling/ Behaviour change	Consumers/ Producers	
	Introduce a deposit system to guarantee the disposal of (electronic) devices. This would offer consumers an incentive to send in broken devices - then their deposit would be returned and manufacturers dispose of the items, after extraction of parts that can be reused	Improve recycling/ Less use of resources/ Behaviour change	Producers/ Consumers	
	Promote the development of multifunctional packaging i.e. use it as packaging first and then for another purpose	Less use of resources	Consumers	
Communication and education	Anchor the waste topic in education through all ages (including university and education for adults). Educational programs should include lessons in environmental awareness, probably within geography or biology lessons, field trips to clarification plants etc and workshops around do it yourself and repair your own stuff	Awareness of possibilities	Consumers	☆☆☆☆☆ ☆☆☆☆☆ ☆☆
	Courses on environmental awareness, including enhancement of product tolerance	Awareness of values/of possibilities	Consumers	☆☆☆
	Multimedia advertising campaign for increased environmental awareness/collective social awareness, both among consumers and manufacturers	Awareness	Consumers/ Producers	☆☆☆
	Public campaigns to improve the image of second hand products	Awareness of values/ Less use of resources	Consumers	☆
	Create awareness about the consumerist society. So people start asking themselves: do I really need all the stuff I would like to buy? - as early as kindergarten	Awareness of values	Consumers	☆
	Promote self-sufficiency, e.g. grow your own vegetables	Local production	Consumers	☆

Communication and education	Introduce a traffic-light label for packaging. A colour system to label products according to recycling/reuse and the costs of the packaging	Awareness	Consumers	
	Promotion/marketing of traditional, environmentally-friendly materials, such as waxed paper	Less plastic/ Behaviour change/ Effect on planet	Producers/ Consumers	
	Launch of a campaign (TV) for promoting environmentally friendlier packaging	Behaviour change/ Effect on planet	Consumers	
	Sensible and reliable product information instead of advertising, in order to make consumers aware of what they are really buying	Awareness	Consumers	
	Clear communication, for instance labels on packaging, about the recycling rules so people don't get confused and recycle incorrectly	Improve recycling/ Behavior change	Consumers	
	A public shock campaign (TV commercials, posters in public spaces) about the effects of waste	Awareness of negative effects	Consumers	
	Inform people about what use-by dates actually mean: they should be used to prevent people from throwing away immediately things that passed the expiration date, which are often still edible	Awareness/ Less waste production	Consumers	
	Promotion of swap shops/flea markets so things are being reused plus communication about the existence of such shops. Many people are not acquainted with it	Less use of resources/ Awareness of possibilities	Consumers	
Local Initiatives	Strengthening of neighbourhood networks, for buying second-hand products, lending/sharing of various items (e.g. cars) and for the repair of items	Less use of resources	Consumers	☆☆☆☆
	Introduce urban gardening: "back to our roots" with modern standards	Local production	Consumers	☆
	More farm shops and eco-crates	Local production	Consumers	☆
	Odds and ends, second hand shops: generates components from the waste that anyone can take as they need them. Including advice/ inspiration about how different components can be reused	Effective use of waste/ Less use of resources	Consumers	
	Bring back old traditions and values. For example drink milk from your own cow	Local production	Consumers	
Other	Develop intelligent traffic systems: "on-demand" taxis without drivers. No more personal cars - less car manufacturing and disposal of cars required	Less use of resources	Consumers	

Annex 2: Attitudes of citizens from Germany 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 Germany.

Question	Answer	%	EU27 Average
Do you think Europe could be more efficient in its use of natural resources?	Yes	85%	87%
	No	6%	5%
	DK/NA*	9%	8%
Do you think that your household is producing too much waste or not?	Yes	37%	41%
	No	63%	58%
	DK/NA*	0%	1%
Do you separate at least some of your waste for recycling or composting?	Yes	97%	89%
	No	3%	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	59%	76%
	Improve separate waste collection at your home	37%	67%
	More information on how and where to separate waste	43%	65%
	Legal obligation to separate waste	45%	59%
	Taxes for waste management	23%	39%
What initiatives would improve waste management in your community?	Better waste collection services	32%	70%
	Stronger law enforcement on waste management	51%	65%
	Make producers pay for collection and recycling of waste	54%	63%
	Make households pay for the waste they produce	31%	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	12%	14%
	To pay proportionally to the quantity of waste you generate	77%	75%
	DK/NA*	11%	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	25%	25%
	Include the cost of waste management in the price of the products you buy	59%	59%
	DK/NA*	16%	16%
Can you estimate what percentage of the food you buy goes to waste?	None	5%	11%
	15% or less	81%	71%
	16% to 30%	11%	13%
	More than 30%	3%	4%
	DK/NA*	0%	1%
What would help you to waste less food?	Better estimate portion sizes (how much food you cook) to avoid excess food	47%	62%
	Better information on food product labels, e.g. how to interpret "best before" dates, information on storage and preparation	56%	61%
	Better shopping planning by my household	38%	58%
	Smaller portion sizes available in shops	50%	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	40%	39%
	Rather important	39%	41%
	Rather not important	15%	12%
	Not at all important	4%	6%
	DK/NA*	2%	2%
Are you willing to buy second-hand products?	Yes	70%	68%
Base: all respondents, % of yes			
Would you buy the following products second hand?	Furniture	53%	56%
Base: all respondents, % of yes	Electronic equipment	50%	45%
	Textiles (clothing, bedding, curtains, etc)	35%	36%
What reasons prevent you from buying second-hand products?	Quality/usability of the product	61%	58%
	Health and safety concerns	53%	50%
	Less appealing look of the product	32%	25%
	Afraid of what others might think	4%	5%
Would you buy products made of recycled materials?	Yes	91%	86%
	No	6%	11%
	DK/NA*	3%	3%
What would be the most important factors in your decision to buy products made of recycled materials?	Quality/usability of the product	56%	51%
	Environmental impact of the product	23%	26%
	Price of the product	16%	18%
	Brand/brand name of the product	3%	2%
	DK/NA*	2%	3%
What prevents you from buying recycled products or products containing recycled materials?	Health and safety concerns	53%	44%
	Quality/usability of the product	60%	42%
	No clear consumer information on the recycled product	33%	32%
	Less appealing look of the product	24%	17%
	Afraid of what others might think	9%	5%

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

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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.

VOICES for innovation

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