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

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1. Introduction

1.1 The VOICES project

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

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

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

1.2 Citizen participation in social innovation

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

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

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

1.3 The process

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

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

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

1.4 Structure of the report

In this country report on the VOICES outcomes from the Netherlands, 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

NETHERLANDS

3. Country relevant data - Netherlands

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, the Netherlands is one of the larger EU countries with approximately 16.5 million inhabitants. Most inhabitants live in urban areas (71%), while others live in intermediate areas (28%) and rural areas (1%).

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

		2011	
Population at 1 January		16 655 799	
Population as percentage of EU27		3.3%	
Gross Domestic Product (PPP)		32 900 Euro	
Population urban-rural typology	Urban	11 885 000	71%
	Intermediate	4 665 000	28%
	Rural	107 000	1%

3.2 Factsheet on waste

The amount of municipal waste generated and treated in the Netherlands is higher than the average amount of waste treated in the EU27. The Netherlands ranked 5th on the EU27 ranking list on Municipal Solid Waste Recycling (MSW). The EU Waste Framework Directive's target to recycle 50% of MSW by 2020 was reached by the Netherlands in 2009, eleven years ahead of the deadline.[9]

Table 3.2 Municipal Waste[10,11]

		Netherlands		EU27 average	
Municipal waste generated (kg per person)		596 kg		502 kg	
Municipal waste treated (kg per person)		502 kg		486 kg	
	Landfilled	5 kg	1%	185 kg	38%
	Incinerated	176 kg	35%	107 kg	22%
	Recycled (material recycling)	161 kg	32%	122 kg	25%
	Composted (organic recycling)	141 kg	28%	73 kg	15%

3.3 Composition of the focus groups

In the Netherlands, four focus groups (FGs) were held in total. Three FGs took place on the weekend of 23rd March 2013 in Amsterdam at Science Center NEMO, moderated by Meie van Laar, Senior Project Manager. One additional FG was held on the weekend of 6th April 2013 in Amsterdam at Bureau Fris B.V., moderated by Barbara Tielemans, Researcher at the Athena Institute, VU University Amsterdam.

In total 32 people (17 male and 15 female) participated in the four FGs. The age of the participants ranged from 22 to 72 years: 11 participants were aged between 18 and 35, 11 between 36 and 50 and 10 were aged 51 or over. Most participants (n = 24) had a high level of education, while 8 had a middle level of education. None of the participants had a low level of education. 26 participants were working, while 2 were unemployed, 3 were retired and one was a student. 14 participants live in a house and 18 in a flat. Details of the composition of these focus groups are presented in the table below.

Table 3.3 Composition of the Focus Groups

		FG1	FG2	FG3	FG4	TOTAL
Participants	Total	7	9	10	6	32
Gender	Male	5	4	6	2	17
	Female	2	5	4	4	15
Age	18 - 35	0	9	0	2	11
	36 - 50	7	0	0	4	11
	50+	0	0	10	0	10
Education	High	6	8	8	2	24
	Medium	1	1	2	4	8
	Low	0	0	0	0	0
Employment	Unemployed	1	1	0	0	2
	Employed	6	7	7	6	26
	Retired	0	0	3	0	3
	Student	0	1	0	0	1
Housing	Flat	4	5	6	3	18
	House	3	4	4	3	14

[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)

4. Results

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

4.1 How is waste managed at household level?

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

4.1.1 Waste separation

Many participants mentioned they separate their waste. However, that is not the case for all participants. Various participants separate only part of their waste, and some do not separate it at all. The participants that do separate typically describe five waste streams (a waste stream is defined as one type of waste that is collected separately covering the majority of their household waste), often including: plastic, paper, glass, chemical waste, residual waste, organic waste and bulky waste. Paper and glass seem to be the waste types that are separated the most. Plastic and organic waste seem to be the least separated waste types, although some participants do separate these, depending on opportunities and convenience. The participants that do not separate their waste often mentioned that there is little opportunity to do so in their municipality, and that separating everything is inconvenient and too laborious.

Many participants use bags to separate the different types of waste in their household, and some participants have several personal waste bins in front of their house, mostly used to separate paper, residual waste and organic waste. All participants separate the plastic bottles for which they get a deposit back in shops.

4.1.2 Waste collection

There is variation in the way participants have their waste collected. The manner and frequency with which waste is sorted and collected seems to differ depending on the municipality. According to the participants, the interim period between collections seems to typically be from one week to one month.

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

Some participants have their separated waste collected from neighbourhood containers, particularly those that live in a flat. Others have bins in front of their house. A few do not have waste separation possibilities nearby at all. For instance, paper, glass and sometimes plastic and organic waste is separately collected close to participants' houses, but most participants talk about having to bring this waste to a communal container somewhere in the neighbourhood in order to have it separately collected. Organic, plastic, and chemical waste is often not separately collected.

Another participant pointed out that there used to be a truck that would pass by the houses and collect chemical waste but this service has disappeared. Consumers now have to take their chemical waste to collection sites such as at supermarkets. Supermarkets are often mentioned as central collection points where participants can bring a variety of waste types. Two participants talked about the pharmacy functioning as a central collection point for medicine waste. Bulky waste always seems to be collected close to the participants' homes. Some participants added that they have to make appointments, and sometimes have to pay to have bulky waste collected. Old clothes and furniture are often donated to charity organisations or thrift shops.

Furthermore, if participants are unsure which waste flow to select for a particular item or if they do not want to take it to the collection point themselves, they usually dispose of it with their residual waste which is often collected closer to home.

4.1.3 Knowledge about waste pathways

Overall, participants seemed quite uncertain about the waste pathways after disposal of their waste. Some participants said that they assume that much waste is recycled, but many also expressed uncertainty about this. Many participants explicitly pointed out that they were unaware of what happens to the waste. One participant mentioned that although there are separate containers in his neighbourhood, he had seen a garbage truck throw all the separated waste together during collection. Another participant considered that, given advanced technology of the present time, all waste is eventually sorted automatically. One participant said that he thought most building waste is recycled. Another participant gave the example that toilet paper and coffee filters were made from recycled paper. Another participant claimed that people often flush their medicines down the toilet, and that it would eventually end up in the water.

4.1.4 Waste management behaviour and convenience

Whether or not people separate and dispose of their waste correctly varies greatly among participants. Some participants explained that even though they have many containers for separate waste in the neighbourhood, they still do not dispose of their waste separately and throw all their waste in the same container. Other participants also dispose of their waste in one container when they have no disposal facilities for separate waste in their immediate area or when they have to save the separated waste too long (for weeks) before it is collected.

Conversely, other participants noted that they use separate containers to dispose of their waste even if they have to take it some way. Some participants make use of collection points for plastic in their neighbourhood, while others do not use these at all.

Some participants complained that they do not have the possibility to dispose of plastic and/or organic waste separately. One participant explained that, in her neighbourhood, the communal paper bin is often full, despite the fact that it gets emptied more frequently than before. Some participants admitted that they throw their chemical waste with the residual waste because they do not make the effort to find out what they should do with it. Another participant explicitly pointed out he no longer calls the council before disposing of bulky waste, despite the fact that this is the correct procedure, because it takes too long before they collect it anyway.

4.2 Barriers and concerns regarding urban waste

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

4.2.1 Waste prevention and production

Almost all concerns and barriers that came up when discussing prevention and production were about the excess of packaging that is used in products bought by participants. Many participants recognized that the excess packaging is often used for commercial reasons to make products look more attractive. Many examples of unnecessary waste production and potential prevention were given, such as:

> *"For example you have those trays with biscuits and then they're packed per two or something, and then you think, like, couldn't this be different?" (Netherlands FG 1, P5)*

Participants expressed a variety of concerns about the amount of unnecessary packaging in addition to the amount of waste that is created. For example, excessive packaging creates unnecessary costs. Other participants pointed out that the transport of products for packaging also contributes unnecessarily to the production of waste, and air pollution is caused by the packaging industry. One participant, relating this matter to public health, expressed the concern that it might not be wise to reduce all the packaging:

> *"[...] that is a concern for me and another is public health because I think that the packaging of certain producers, are just made to keep things and products fresh and healthy. And if you start thinking of prevention like: Well, we throw everything in together; I don't know if that is still very healthy for you." (Netherlands FG2, P2)*

Participants also noted that some types of packaging are used that make it hard to recycle:

> *"Everything is plastic. Sometimes I can't even recycle the cardboard boxes anymore because then, there is plastic around it to make it look pretty." (Netherlands FG2, P7)*

Furthermore, one participant explained his concern about the lack of transparency and clarity that profit-driven producers provide about the sustainability and/or waste production of their production processes.

4.2.2 Waste management in the household

Although many participants indicated that they do separate their waste in their household, some of them also mentioned barriers that keep them from separating specific waste types. A common barrier, noted in each of the focus groups, concerned the lack of space in the household:

> *"It takes up too much space because you need lots and lots of containers." (Netherlands FG2, P5)*

One participant mentioned that separating waste is easier for people who live in more spacious areas where people can easily store their waste in three separate bins outside. Various participants explicitly pointed out that they just do not want more bins at their house. One of them explained how people in their street had the opportunity to get an extra bin for separate waste but that they refused because there would have been too many bins.

Another major barrier is the foul smell that comes with storing waste in the household. Many participants, in one way or another, explained that they do not have anywhere to put their rubbish, especially if it is smelly. For example, one participant pointed out that meat packaging made of plastic is not pleasant to have indoors. Various participants also found organic waste to be problematic in this regard. One participant pointed out that, especially in the summer, her organic waste starts to smell bad and she ends up with maggots in her bin.

Another reason for not separating waste is that it is not collected often enough, resulting in too much waste around the house. In some cases, facilities are lacking. Some participants mentioned that they would really like to separate organic waste but that there are no facilities to do this. Other participants find that it is not possible to recycle much plastic so they only sort the plastic bottles on which there is a deposit. Although not supported by other participants, one participant noted that she would like to be provided with her own chemical bin:

> *"[...] I think a bin should also be provided for chemical waste. That's the most scandalous thing... I don't know what I should do with it. [...]" (Netherlands FG4, P6)*

Lack of knowledge was also mentioned as a barrier to separating waste. For example, some participants said it was unclear what to do with chemical waste so they put it in the residual waste.

Lastly, several participants said that they were just too lazy to go through the trouble of separating everything, and indicated that they found it too laborious. Several participants mentioned that people in their neighbourhood are not motivated to separate waste which undermines their own interest in separating waste. Some participants were also concerned that separating waste is not being encouraged properly in their neighbourhood, and another participant explained how he feels that there is no use in separating organic waste if too few people do it. Another concern mentioned by one participant was that people do not care and throw away too much food.

> *"[...] It's mainly about convenience, I think. If it's easy, I think everyone will want to neatly sort their waste immediately. But if it's not possible, then people just mix everything up and throw it away. That's how it is. I think that's the most important thing. [...]" (Netherlands FG4, P3)*

4.2.3 Waste disposal and pathways

Overall, participants pointed out that they want to separate their waste but that various flaws in the waste management system keep them from properly dealing with their waste. These problems are related to inconvenience, waste collection, enforcement and other issues concerning the waste pathways. In this section, these issues will be discussed.

Many participants complained they have to go too far to dispose of some of the separated waste, particularly chemical waste, plastic and old medicines. Various participants considered it to be a barrier if they had to use their car, partly because this is also bad for the environment. Some participants were of the opinion that disposal sites for plastic are particularly far away, impractical and too much of a hassle. They said that there should be more separate bins for plastic. Other participants complained about having to go back to a specific shop to get their deposit return on plastic bottles. The same applies to bringing back old medicines to the pharmacy. One participant was annoyed that chemical waste is no longer collected door-to-door.

Participants also often complained that although some waste is collected close to the house, the period between waste collections is often too long. Participants explained that the bottle bank is sometimes full because it is not emptied often enough and that people then throw their glass with the residual waste or litter the street. Some participants were positive about the separate collection of plastic near their home but complained that collection is too infrequent.

Participants were also dissatisfied with having to pay for disposal of certain types/amounts of waste, and were concerned that this might increase in the near future. Some participants explained that paying for dis-

posal leads to increased litter and illegal dumping of waste:

"[...] to a certain amount it is for free and then you have to pay. So waste you cannot get rid of you just dump in the woods." (Netherlands FG 1, P7)

Many participants expressed concerns about the rules and regulations not being strict enough in the Netherlands, and that dealing with waste is not enforced effectively:

"Well, it's not a concern, it's a must. If you don't enforce this then people just carry on dropping everything on the street." (Netherlands FG3, P7)

Not knowing what eventually happens to waste was also a concern commonly shared among the participants. If one is supposed to bring waste to a collection point and neatly put it in different containers, participants would like to know what happens to it after that. Various participants expressed the concern that people are generally unaware of these things. Not all participants had faith in the system:

"[...] when I very rarely and sporadically see them empty the bins, all three of them go into the same collection container, you know, then in goes the paper, and everything ends up in the same truck..." (Netherlands FG2, P4)

Another concern that was expressed was about where all the waste that cannot be recycled should go:

"In the end, where does it all go, if we run out of space or places?" (Netherlands FG2, P6)

4.2.4 Other urban waste issues

Many participants voiced concerns about air pollution and environmental pollution in general:

"Environmental pollution, if we produce lots and lots of waste, we will incinerate even more which has an impact on the greenhouse effect." (Netherlands FG2, P8)

Some participants' worries about the environment are related to the fact that recycling can also pollute. Other participants indicated that they wanted to know what effect the amount of waste we produce and/or recycle has on the environment.

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

According to the way participants prioritised ideas in these research fields, they were enthusiastic about the development of machines and systems that would somehow help people to separate or recycle waste from their homes. Another important aim for participants seems to be use of fewer resources and such ideas were almost always strongly targeted at producers.

TECHNICAL, PHYSICAL, CHEMICAL, ENGINEERING

The idea in this category that was given the highest priority (see Table 4.3.1) was the creation of a system to reuse household waste for energy within the house. This idea had been thought of and prioritised in two of the four focus groups held in the Netherlands:

> *"[…] And, also, for example, that you can throw your garbage bag in a ditch […] that it is incinerated immediately and that that generates energy." (Netherlands FG2, P8)*
>
> *"And wouldn't it be really nice if that rubbish could be converted [at household level] into heating, energy for the house, fuel for cars […]" (Netherlands FG3, P9)*

Participants prioritised this idea because they thought it would be better for the environment, it would be very easy and convenient not having to deal with waste collection issues at home and it would create self-sufficiency and independence from the government. As well as applying this on the household level, participants also mentioned the more general idea of using waste incineration for energy production.

Another idea with the aim of domestic convenience that scored reasonably highly in terms of priority was use of machines to automatically separate all waste by waste management companies. Participants liked this idea because they would not need to separate anything themselves and they could simply throw everything in one bin, knowing that everything would be separated eventually and that raw materials would be recycled.

Another idea concerning domestic convenience was less highly prioritised but was thought up in two different focus groups, namely a pipe system to take waste out of the house. Participants described how it would be easy to throw everything in a system that takes the waste to a central place to be separated and processed (for example like the conveyor belt for bottles in the supermarket).

> *"Yes, just like at Albert Heijn [Dutch supermarket chain]! There, it has like a hole that you stick the bottles into, with a conveyor belt and everything is separated there. That's the kind of thing we had in mind but then have it in every apartment complex, you know." (Netherlands FG2, P5)*

A less highly prioritised idea also related to convenience was to have a machine developed to automatically compress the volume of waste in a household bin. Another idea involved the development of multifunctional robots that can replace all other household machines, with the additional effect that fewer single appliances would have to be produced.

A prioritised idea which aimed to use fewer resources was simply to have producers develop products with a longer lifespan, made with better quality materials and parts, and easier to repair when broken. Fewer products would end up as waste and, eventually, fewer resources would have to be used to replace broken products. Another idea with the aim of using fewer resources was to provide household items with solar cells so that batteries would no longer be needed:

> *"For hearing aids, for instance, scales, [televisions], remote controls, watches, use solar cells instead of batteries." (Netherlands FG3, M)*

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	Create a system to reuse household waste for energy for the house	Effective use of waste/ Convenience in the home/ Improve recycling	Waste management companies/ Consumers	☆☆☆☆☆
	Develop products to have a longer life-span	Less use of resources	Producers	☆☆☆
	Machines for (higher-quality) waste separation so consumers don't have to do it	Convenience in the home/ Improve recycling	Waste management companies	☆☆☆

Pipe system to take waste out of the house for separation and processing	Improve recycling/ Convenience in the home	Consumers/ Waste management companies	☆☆
Make solar cells instead of batteries for all household items	Less use of resources	Producers	☆☆
Waste incineration as a source of energy	Effective use of waste	Waste management companies	☆
A household machine that shrinks/ compresses waste	Convenience in the home	Consumers	☆
Develop robots that can do everything so no need for different products/machines	Less use of resources/ Convenience in the home	Producers/ Consumers	☆

MATERIALS

A second category related to the domain of 'environmental sciences and technology' groups ideas that focus especially 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. In the focus groups, not many ideas were raised related to this category and only one idea was prioritised, namely that all products should be made out of material that can be converted into energy. The idea was originally meant as a comment on the idea 'Create a system to reuse household waste for energy for the house', discussed in the previous section. This latter idea would work a lot better if the former idea became reality too.

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

Category	Idea	Aim	Target Group	Priority
Material	All products should be recyclable into energy, for example	Improve recycling/ Effective use for waste	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). These ideas focus on biological processes and organisms. Only two prioritised ideas emerged in this category and both were assigned a low priority level. The first idea is based on the concept of having biological organisms decompose waste to produce raw materials. Variations of this idea arose in two focus groups:

"Using principles from nature, in how we live, so nature recycles everything itself through organisms, algae and so on. So for example if you put a carton of milk on your kitchen top, that it is absorbed by your kitchen top and that it is processed and returned to nature." (Netherlands FG2, P8)

"[...] bacteria that break waste down into raw materials or into something else that does not bother anyone, e.g. in the form of placing a pellet in the rubbish bin that takes care of all that dirt, gets rid of it." (Netherlands FG3, M)

The other idea was to develop something that would assist people to eat in new ways:

"Have a pill, yes or when you sleep hook up to one of those systems." (Netherlands FG2, P5)

Participants considered that if people no longer bought normal food, food packaging would be made obsolete, saving resources.

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	Let natural organisms like algae and bacteria degrade all kinds of waste	Less use of resources/ Eliminate waste	Other	☆
	Develop pills or fluid nutrient system so people do not have to eat anymore	Less packaging/ Less use of resources	Producers/ Consumers	☆

4.3.2 Policy, management and communication

POLICY

Many of the ideas that emerged from the Dutch focus groups were classified under policy (see Table 4.3.4). From these policy-orientated ideas, the one that received the highest priority was the idea to only allow products on the market that have been made from 100% recycled waste:

"By using a high-quality method of separation, I think that you can actually separate almost 100% of waste back into raw materials, and at the point, when it's obligatory that product can only be brought onto the market when it has reused those raw materials from start to finish, that's what I thought. […]" (Netherlands FG3, P1)

Many participants expressed enthusiasm for this idea.

Another highly prioritised idea was to use a specific system (employing computer chips, stickers, or barcodes) to register the amount of waste people dispose of, and how well they separate this. Based on that information, consumers should be either rewarded or fined according to the way they deal with their waste:

"[M] Registration system with chips?
[P3] Yes, of course. Perhaps they could read it and see if you've sorted correctly. That when you have perhaps done it wrong a little bit is deducted. Perhaps people put everything in a bag and then place it in the wheeled bin, but that you can then see what's inside it." (Netherlands FG4)

The way people deal with waste can then be better regulated with fines and incentives.

One idea considered that people should be rewarded for separated waste. In one focus group, this idea was approached from the notion that waste should be seen more as a resource, and that it should be given a certain value. To support this vision, a policy would make it possible for consumers to turn their waste into money. In another focus group, the idea was proposed that adults should be forced to separate waste with the help of fines and incentives.

Also concerning regulation, another idea was highly prioritised, namely that EU regulations should ensure by rewards, subsidies and fines that producers manufacture products with a long lifespan.

Several focus groups considered that products should be cheaper (through subsidies) when they produce less waste and when they produce less harmful waste:

"Yes, encourage people to reuse products. If you encourage people to reuse, and thus make it cheaper..." (Netherlands FG4, P5)
"Yes, and then there is an addition that the smaller packaging must also be cheaper which will make people more likely to buy it." (Netherlands FG2, M)
"Or maybe make products cheaper if there is no plastic or raw materials." (Netherlands FG2, P1)
"Yes. Biodegradable packaging. I don't think that should be more expensive, I actually think it should be more attractive, so making it cheaper." (Netherlands FG2, P1)

"Well, look, you can provide subsidies to sustainable companies and then also make it cheaper." (Netherlands FG 1, P6)

All these ideas were all clustered as the idea of making products that are less harmful cheaper. Together, this idea was assigned quite a high level of priority.

Another idea was that the government should stimulate 'urban farming'. Participants explained that urban farming would entail growing one's own crops at home, or at a communal farm. Government could stimulate these practices with subsidies, and by providing people with greenhouses. Participants explained that this would stimulate local production, and solve the previously discussed problems of having to buy packaged food in a shop.

Other (lower prioritised) ideas addressed more measures that could be taken, for example making it mandatory throughout the EU to use as little packaging as possible. One strategy to do this would be prohibiting producers from using packaging material merely for the commercial purpose of displaying their products more attractively. Another idea was to set up a special certification system so people can see which companies operate sustainably. The government could subsidise these companies. Conversely, there was the idea of setting higher tax rates for companies that do not operate sustainably. Lastly, there was the idea of having the government act as a role model for the general public by having them do business with companies that operate in a sustainable way.

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

Category	Idea	Aim	Target Group	Priority
Policy	With the help of high quality methods of separation only put products on the market that have been made from 100% recycled waste	Effective use of waste/ Improve recycling/ Less use of resources	Producers/ Government/ Waste management companies	☆☆☆☆☆☆☆
	Use computer chips, barcodes or stickers to register how much individual consumers sort their waste, and then reward/fine them based on this	Behaviour change	Consumers	☆☆☆☆☆☆
	EU regulations (rewards, subsidies, and fines) ensuring that producers produce long life-span products	Less waste production	Producers	☆☆☆☆☆☆
	Make products that produce less harmful waste cheaper	Less use of resources	Producers/ Government	☆☆☆☆☆☆
	If consumers hand in (separated) waste (which is raw material), they receive money in return	Less use of resources/ Improve recycling/ Behaviour change	Producers/ Consumers	☆☆☆☆☆☆
	Fines and incentives for waste	Behaviour change/ Awareness	Consumers	☆☆☆
	Stimulate urban farming people grow their own food	Local production	Consumers	☆☆

Policy	Certification for companies that operate sustainably (possibly involving subsidies)	Less use of resources	Producers	☆
	Make it mandatory throughout the EU to use as little packaging as possible, and prohibit extra waste for commercial reasons like displaying brand names	Less packaging	Producers	☆
	Government to act as a role model and do business mainly with companies that are sustainable	Less use of resources	Producers	☆
	Producers should be taxed on the materials they use	Less use of resources	Producers	☆

MANAGEMENT AND LOGISTICS

'Management and logistics' is another category in the domain of 'policy, management and communication' (see Table 4.3.5). Many of the ideas mentioned above require a certain number of managerial and/or logistical changes, but only some ideas have this as their primary focus.

One idea that was prioritised by two focus groups was the idea to start replacing plastic packaging by paper or glass because many participants considered that plastic is a more harmful type of waste than paper or glass. Similarly, participants prioritised the idea to have producers stop with mixing plastic with other packaging material like paper. The participants did not specify on how to go about this.

Another idea that was mentioned in different focus groups was the idea of expanding the deposit return system. Participants from different focus groups talked about expanding the variety of types of waste included in the deposit system:

> *"I was asking myself, why are more things not recycled. Like cans, for example. These days you have plastic bottles that you can return, and you are given a return deposit for it. But in Germany, there you can return your cans and are given a return deposit for them. They should also do that in the Netherlands. Because there are so many cans along the side of the road. And that should not be the case. That you can hand them in for a return deposit; I think that's the perfect solution. […]" (Netherlands FG4, P4)*

In addition to cans, plastic bags, plastic beer glasses, half litre bottles, milk cartons and egg cartons are given as examples on which participants would like to see a deposit return. Also raising the deposit amount was mentioned. However, one participant expressed discontent with the idea of having to save meat packaging in the house in order to get money back.

Another idea that was given priority by two focus groups was the idea of bringing one's own packaging to the shop to refill it. Logically, shops would then not need to provide all their products in a package that would eventually go to waste.

Table 4.3.5 Ideas within the category 'management and logistics' that received priority, ranked accordingly

Category	Idea	Aim	Target Group	Priority
Management/ Logistics	More paper or glass packaging instead of plastic packaging	Improve recycling	Producers	☆☆☆☆☆

No plastic mixed with other packaging material like paper	Improve recycling	Producers	☆☆☆
Expand the monetary return deposit system	Improve recycling/ Behaviour change	Producers/ Consumers	☆☆☆
Bring own packaging to shops, and refill	Less packaging	Producers/ Consumers	☆☆☆
More opportunities to keep re-using products	Less use of resources	Producers	☆☆

COMMUNICATION AND EDUCATION

Most ideas that were categorised as 'communication and education' were aimed at raising awareness and bringing about behavioural change. Only one idea was prioritised. However, this turned out to be the most highly prioritised idea of all, and three out of four focus groups assigned priority to this idea. This idea concerned educating young children about waste in school. Participants expressed that if one wants to raise awareness, one should start with children because they are the future. Participants thought schools should raise awareness about the whole process of the waste chain: how a product is made, where waste ends up and what you can do with it. Children should be made aware of the consequences of buying specific things and taught about deposits and packaging. Possibly school could organise trips to the junkyard.

"Like, that you start from a really young age and really indoctrinate people, like you have to separate that, and rules, and I think that we are really too lazy, too spoiled." (Netherlands FG2, P5)

Table 4.3.6 Ideas within the category 'communication and education' that received priority, ranked accordingly

Category	Idea	Aim	Target Group	Priority
Communication and education	Start educating children about waste early in school, influence them at a young age	Behaviour change/ Awareness	Other	☆☆☆☆☆☆☆☆ ☆☆☆

LOCAL INITIATIVES

Some ideas that were forwarded in the focus groups do not need much research as they merely need some organisation and someone to start it. The category 'local initiatives' captures these ideas. In general, these ideas focus on raising awareness and/or mobilising people to take part in recycling and/or reusing.

Participants gave priority to the idea of creating more opportunities for trading, exchanging, and reusing products (e.g. clothes). By organising specific systems where people can trade, share, and borrow products within communities, the general public would need fewer possessions in total, and would thus use fewer resources.

Table 4.3.7 Ideas within the category 'local initiatives' that received priority, ranked accordingly

Category	Idea	Aim	Target Group	Priority
Local initiatives	Systems (like websites) where people can trade and share products with a community, so people have fewer possessions	Less use of resources/ Behaviour change	Consumers	☆

5. Conclusion, discussion and evaluation

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

The Netherlands ranks 4th on the EU27 ranking list on Municipal Solid Waste (MSW) recycling. Regarding the EU recycling MSW target of increasing recycling to 50% by 2020[13], the Netherlands already reached 50% in 2009, eleven years ahead of the deadline. The National Waste Management Plan has introduced its own target to increase the recycling of household waste to 60% by 2015. Almost all focus group participants mentioned that they separate waste, although some admitted that they sometimes did not separate exactly as they should. This is in line with findings from the Flash Eurobarometer survey 'Attitudes of Europeans towards resource efficiency'[14] in which 94% of respondents from the Netherlands indicated that they separate at least some waste (see Annex 2). Overall, participants in the focus groups were willing to put effort into separating waste at household level and their good intentions are reasonably well met with facilities to do so. Despite the Netherlands' high ranking and its rapid progression with regard to recycling, the focus groups suggest that concerns about waste and its effects on the environment are still widespread. Most of the participants indicated that they are unaware of what happens with waste after it is collected, how this affects the environment and how commercial producers deal with waste and the environment.

Barriers and concerns for dealing with waste properly have been classified over three main categories. The first of these categories was concerned with the income stream of waste characterised by the production and prevention of waste. In this category, participants were generally concerned with the unnecessary amount of waste with which consumers have to cope. Many participants complained about excess packaging of the majority of products for sale. However, the Flash Eurobarometer survey established that a product's environmental impact is a low priority when making a decision about which products to buy. Participants considered that responsibility for this lies with producers. The second category of barriers and concerns is related to domestic convenience. Most of these barriers and concerns were related to the inconvenience of having to separate and save waste at home. Lack of time for separating and lack of space to keep everything separated were commonly raised. These barriers were often reinforced by the perceived long period between waste collections, and the foul smell from waste at home. Lastly, there were barriers and concerns that have to do with the disposal of waste. Many remarks were made about the inconvenience of waste collection. A commonly mentioned barrier was the inconvenient distance to collection points for separated waste. This is consistent with findings from the Flash Eurobarometer survey showing that the majority of Dutch respondents think that more and better drop off points for recyclable and compostable waste and improved separate waste collection at home would help people to separate more and better.

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', each further divided into four categories. In the first domain 'environmental sciences and technology', ideas consisted mainly of ideas to develop technological systems or machines to make the management of waste more convenient and, at the same time, to improve recycling to reduce use of resources. Hence, the proposed technologies were often meant to assist people in dealing with their waste in a way that would be best for the environment. Participants seemed to be most enthusiastic about machines or systems to separate waste. Also the ideas that would help consumers conveniently convert waste into something useful like raw materials, fuels, or energy were most popular. Other ideas did not focus on convenience but only on reducing the use of resources or using waste effectively.

The vast majority of ideas in the second domain 'policy, management and communication' were categorised in the subcategory 'policy'. These ideas focused mainly on enforcement, and regulation by incentives and fines for producers/manufacturers and the general public/consumers, established both at EU level and the national level. Examples of ideas include the EU-broad prohibition of unnecessary packaging, government rewards for sustainable producers, and fines and rewards for the way citizens deal with waste. Under 'manage-

ment/logistics', the idea of expanding the deposit system was widely supported, such as a deposit return for returning waste to the shop. There were also many ideas raised that fall under the category 'communication and education'. These ideas were mainly about using education in primary schools to raise awareness and change behaviour, starting at a very young age to bring about behavioural changes. More specifically, participants noted that this type of education should teach children about the waste chain, and about how they deal with waste.

Of the most highly prioritised ideas, the first is to start educating children about waste early in school, influence them at a young age (11 stickers). The second involves only allowing products on the market that have been made from 100% recycled waste (8 stickers), followed by four ideas that received the same number of priority stickers (7): use computer chips, barcodes or stickers to register how much individual consumers sort their waste, and then reward/fine them based on this; make products that produce less harmful waste cheaper (subsidies); regulate throughout the EU that producers produce long life-span products by rewards, subsidies, and fines; if consumers hand in (separated) waste (which is raw material), they receive money in return.

5.3 Reflection

All participants indicated they enjoyed taking part in the focus groups. They thought that the assignments were an enjoyable and original way of asking for their opinions, although the exercises were not always entirely clear. Although participants from one focus group (Netherlands, FG2) did not find the topic interesting and struggled to stay focused throughout the meeting, participants from the other focus groups were interested in the topic. The focus groups were different with different ideas. Many participants found the idea that something is being done with their ideas interesting and were curious about the outcome. Some participants wondered whether anything would really change as a result of the findings. One participant was critical of the small number of people involved in the project across Europe and wondered whether this is enough to really make a change. Others were convinced that a lot could be done with minor adjustments.

[13] European Environment Agency (2013). "Managing municipal solid waste - a review of achievements in 32 European countries" EEA Report No 2/2013

[14] Flash Eurobarometer No. 316 - The Gallup Organisation (2011)

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	Create a system to reuse household waste for energy for the house	Effective use of waste/ Convenience in the home/ Improved recycling	Waste management companies/ Consumers	☆☆☆☆☆
	Develop products to have a longer life-span	Less use of resources	Producers	☆☆☆
	Machines for (higher-quality) waste separation, so consumers don't have to do it	Convenience in the home/ Improve recycling	Waste management companies	☆☆☆
	Make solar cells instead of batteries, for all household items	Less use of resources	Producers	☆☆
	Pipe system to take waste out of the house for separation and processing	Improve recycling/ Convenience in the home	Consumers/ Waste management companies	☆☆
	Waste incineration as a source of energy production	Effective use of waste	Waste management companies	☆
	A household machine that shrinks/ compresses waste	Convenience in the home	Consumers	☆
	Develop robots that can do everything so you don't need different products/machines	Less use of resources/ Convenience in the home	Producers/ Consumers	☆
	Substance to reduce the foul smell of organic waste	Convenience in the home	Consumers	
	Make it possible to make a raw material from waste, that can be used for 3D-printing at home	Effective use of waste	Consumers	
	A space shuttle in the street that brings waste into space	Eliminate waste	Waste management companies	
	Let cars and other vehicles run on waste	Effective use of waste	Producers/ Consumers	
	A robot in the house that turns your waste into useful products (rubbish bags/fuel)	Convenience in the home/ Effective use of waste	Consumers	
	An automatic machine that takes apart e.g. other machines and separates the different materials	Improve recycling	Consumers	
	Develop a smart system like channels that bring food/drinks directly to the house when needed, making packaging obsolete	Convenience in the home/ Less packaging	Consumers/ Producers	
	A system with which to live in a virtual world so people don't need much stuff in their house	Less production of waste	Consumers	

Material	All products should be recyclable into energy, for example	Improve recycling	Producers	☆☆☆
	Make packaging material easily foldable to reduce waste volume	Convenience in the home	Producers/ Consumers	
	More bio-degradable packaging material e.g. decomposable plastic	Effect on planet/ Eliminate waste	Producers	
Bio(techno)-logical	Develop pills or a fluid nutrient system so people don't have to eat anymore	Less packaging/ Less use of resources	Producers/ Consumers	☆
	Let natural organisms, like algae and bacteria, degrade all kinds of waste	Less use of resources/ Eliminate waste	Other	☆
	A system with which people can absorb only those nutrients that they need from air	Less production of waste	Consumers	

POLICY, MANAGEMENT AND COMMUNICATION

Category	Idea	Aim	Target Group	Priority
Policy	Only allow products on the market that have been made from 100% recycled waste	Effective use of waste/ Improve recycling/ Less use of resources	Producers/ Government/ Waste management companies	☆☆☆☆☆ ☆☆☆
	Use computer chips, barcodes or stickers to register how much individual consumers sort their waste, and then reward/fine them based on this	Behaviour change	Consumers	☆☆☆☆☆ ☆☆
	Make products that produce less harmful waste cheaper (subsidies)	Less use of resources	Producers/ Government	☆☆☆☆☆ ☆☆
	EU regulations (rewards, subsidies and fines) ensuring that producers produce long life-span products	Less waste production	Producers	☆☆☆☆☆ ☆☆
	If consumers hand in (separated) waste (which is raw material), they receive money in return	Less use of resources/ Improve recycling/ Behaviour change	Producers/ Consumers	☆☆☆☆☆ ☆☆
	Make products with biodegradable packaging more attractive/cheaper by subsidies	Less packaging	Producers/ Government	☆☆☆
	Regulate and enforce adults with fines and incentives for their waste	Behaviour change/ Awareness	Consumers	☆☆☆
	Stimulate urban farming people grow their own food	Local production	Government/ Consumers	☆☆
	Make it mandatory throughout the EU to use as little packaging as possible, and prohibit extra waste for commercial reasons like displaying brand names	Less packaging	Producers	☆
	Certification for companies that operate sustainably (possibly involving subsidies)	Less use of resources	Government/ Producers	☆
	Government to act as a role model and do business mainly with companies that are sustainable	Less use of resources	Government/ Producers	☆

	Producers should be taxed on the materials they use	Less use of resources	Government/ Producers	☆
	Go back to one version for every type of product on the market (think of communism)	Less waste production	Producers	
	Tax people according to the waste they produce	Behaviour change/ Other	Consumers	
	Less people; birth restrictions	Less waste production	Consumers	
	Make unemployed people clear up rubbish in exchange for their benefits		Government	
	A central European distribution point for waste		Waste management companies/ Government	
Management/ Logistics	More paper or glass packaging instead of plastic packaging	Less plastic	Producers	☆☆☆☆☆
	Expand the monetary return deposit system	Improve recycling/ Behaviour change	Producers/ Consumers	☆☆☆
	Bring own packaging to shops, and refill	Less packaging	Producers/ Consumers	☆☆☆
	No plastic mixed with other packaging material like paper	Improve recycling	Producers	☆☆☆
	More opportunities to keep re-using products	Less use of resources	Producers	☆☆
	Stop curing people, just let them die when someone is ill	Less waste production	Other	
	Make the manufacturer buy products (in the form of waste) back from the consumer, so no new raw materials will be needed	Less use of resources	Consumers/ Producers	
	More litter bins, with the opportunity to sort in these	Improve recycling	Waste management companies/ Consumers	
	Produce locally, in own country (less distribution)	Local production	Producers	
	Make it easy to dispose waste everywhere - regardless of what municipality you live in	Improve recycling	Waste management companies	
	Reusing plastic	Less use of resources	Producers	
	Use less packaging material or material that degrades easily	Less packaging/ Less plastic	Producers	
	One month without waste collection (raise awareness)	Awareness	Waste management companies	
	Investigate how people dealt with waste in the past, and see what we can adopt from our old methods.		Other	
	Produce a smaller variety of waste types so it becomes less complex for the consumer to separate it	Convenience in the home/ Improve recycling	Producers/ Consumers	

	Give the homeless a smartphone so they know where they can pick up plastic and turn it in for money	Improve recycling	Waste management companies	
Communication and education	Start educating children about waste early in school, influence them at a young age	Behaviour change/ Awareness	Other	☆☆☆☆☆ ☆☆☆☆☆ ☆
	Move towards a 'zero waste society' by using schools to raise awareness among children	Awareness	Government/ Other	
	More advertisement on systems where people can trade and reuse useful products like clothes	Awareness of possibilities/ Less use of resources	Consumers	
	Inform people about what might happen if they keep going on this way	Awareness of negative effects	Consumers	
	Provide all waste with codes so it is traceable on the internet for consumers	Awareness	Consumers/ Producers	
Local initiatives	Systems (like websites) where people can trade and share products with a community, so people have less possessions	Less use of resources/ Behaviour change	Consumers	☆
	Reusing clothing and other stuff, (and subsidise it) e.g. more thrift shops	Less use of resources/ Behaviour change	Producers/ Consumers	
	Creating a ski slope from a waste mountain	Effective use of waste	Other	
Other	Put solar panels in desert for energy	Effect on planet	Other	

Annex 2: Attitudes of citizens from the Netherlands 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.

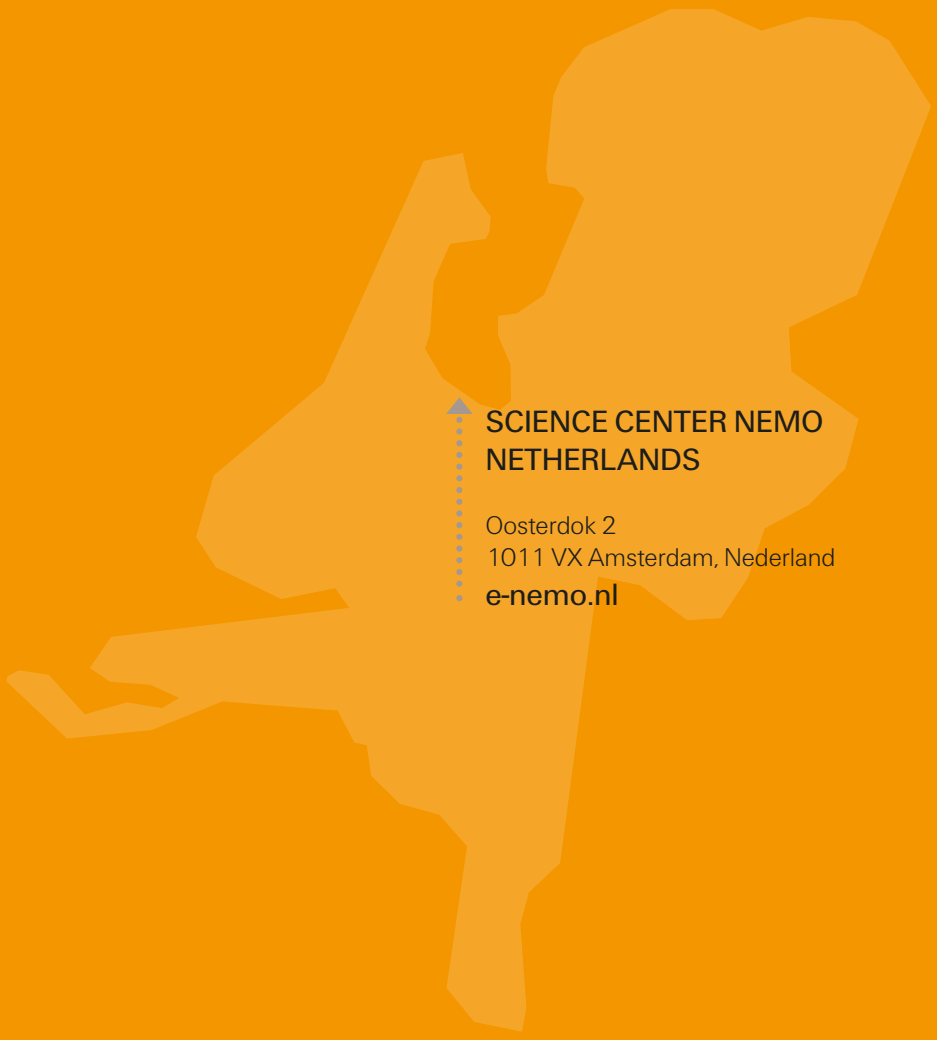
The survey obtained interviews - fixed-line, mobile phone and face-to-face - with nationally representative samples of EU citizens (aged 15 and older) living in 27 Member States. The target sample size in all countries was 1,000 interviews. Below we give the results from the Netherlands.

Question	Answer	%	EU27 Average
Do you think Europe could be more efficient in its use of natural resources?	Yes	83%	87%
	No	6%	5%
	DK/NA*	13%	8%
Do you think that your household is producing too much waste or not?	Yes	47%	41%
	No	53%	58%
	DK/NA*	0%	1%
Do you separate at least some of your waste for recycling or composting?	Yes	94%	89%
	No	6%	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	68%	76%
	Improve separate waste collection at your home	68%	67%
	More information on how and where to separate waste	53%	65%
	Legal obligation to separate waste	48%	59%
	Taxes for waste management	35%	39%
What initiatives would improve waste management in your community?	Better waste collection services	35%	70%
	Stronger law enforcement on waste management	56%	65%
	Make producers pay for collection and recycling of waste	59%	63%
	Make households pay for the waste they produce	46%	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	22%	14%
	To pay proportionally to the quantity of waste you generate	73%	75%
	DK/NA*	5%	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	30%	25%
	Include the cost of waste management in the price of the products you buy	63%	59%
	DK/NA*	7%	16%
Can you estimate what percentage of the food you buy goes to waste?	None	9%	11%
	15% or less	75%	71%
	16% to 30%	13%	13%
	More than 30%	2%	4%
	DK/NA*	1%	1%
What would help you to waste less food?	Better estimate portion sizes (how much food you cook) to avoid excess food	60%	62%
	Better information on food product labels, e.g. how to interpret "best before" dates, information on storage and preparation	48%	61%
	Better shopping planning by my household	47%	58%
	Smaller portion sizes available in shops	57%	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	25%	39%
	Rather important	48%	41%
	Rather not important	15%	12%
	Not at all important	12%	6%
	DK/NA*	0%	2%
Are you willing to buy second-hand products?	Yes	74%	68%
Base: all respondents, % of yes			
Would you buy the following products second hand?	Furniture	64%	56%
Base: all respondents, % of yes	Electronic equipment	46%	45%
	Textiles (clothing, bedding, curtains, etc)	35%	36%
What reasons prevent you from buying second-hand products?	Quality/usability of the product	18%	58%
	Health and safety concerns	41%	50%
	Less appealing look of the product	46%	25%
	Afraid of what others might think	17%	5%
Would you buy products made of recycled materials?	Yes	95%	86%
	No	3%	11%
	DK/NA*	2%	3%
What would be the most important factors in your decision to buy products made of recycled materials?	Quality/usability of the product	47%	51%
	Environmental impact of the product	30%	26%
	Price of the product	18%	18%
	Brand/brand name of the product	1%	2%
	DK/NA*	4%	3%
What prevents you from buying recycled products or products containing recycled materials?	Health and safety concerns	18%	44%
	Quality/usability of the product	41%	42%
	No clear consumer information on the recycled product	46%	32%
	Less appealing look of the product	17%	17%
	Afraid of what others might think	2%	5%

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

NOTES



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VOICES, CITIZEN PARTICIPATION IN SOCIAL INNOVATION

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

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

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

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

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