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Views, Opinions and Ideas of Citizens in Europe on Science

COUNTRY REPORT LUXEMBOURG

www.voicesforinnovation.eu

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Published in June 2013.

The VOICES project and the present publication have been funded with support from the European Commission (Grant Agreement No 612210), under the Science in Society Environment [Sis ENV] theme, Coordination and Support Action, of the Directorate-General for Research and Innovation (FP7-Adhoc-2007-13). This report reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

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, 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 Luxembourg, 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

LUXEMBOURG

3. Country relevant data - Luxembourg

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

Luxembourg is one of the smaller EU countries with a population of approximately half a million. All live in intermediate areas.

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

		2011	
Population at 1 January		511 840	
Population as percentage of EU27		0.1%	
Gross Domestic Product (PPP)		68 100 Euro	
Population urban-rural typology	Urban		
	Intermediate	512 000	100%
	Rural		

3.2 Factsheet on waste

The amount of municipal waste generated and treated in Luxembourg is higher than the average amount of waste treated in the EU27. Luxembourg ranks 6th 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 is very likely to be met if efforts to increase MSW recycling are sustained.

Table 3.2 Municipal Waste[10,11]

		Luxembourg		EU27 average	
Municipal waste generated (kg per person)		678 kg		502 kg	
Municipal waste treated (kg per person)		678 kg		486 kg	
Municipal waste treated	Landfilled	122 kg	18%	185 kg	38%
	Incinerated	237 kg	35%	107 kg	22%
	Recycled (material recycling)	176 kg	26%	122 kg	25%
	Composted (organic recycling)	142 kg	21%	73 kg	15%

3.3 Composition of the focus groups

In Luxembourg, three focus groups (FGs) took place in the weekend of 23rd March 2013. They were held at the Quest SA - Luxembourg social research agency, moderated by Carlo Kissen, founder and managing associate of the agency.

In total, 30 people (29 male and 31 female) participated in the three FGs. The age of the participants ranged from 24 to 68: 10 participants were aged between 18 and 34; 10 between 35 and 50; and 10 were aged 51 or over. Educational levels were diverse: 8 participants with a high level, 11 with a middle level and 11 with a low level of education. 24 participants were working, while 3 were unemployed and 3 were retired. 18 participants live in a house and 12 in a flat. Details of the composition of these focus groups are presented in the table below.

Table 3.3 Composition of the Focus Groups

		FG1	FG2	FG3	TOTAL
Participants	Total	10	10	10	30
Gender	Male	5	5	4	14
	Female	5	5	6	16
Age	18 - 35	0	10	1	11
	36 - 50	0	0	9	9
	50+	10	0	0	10
Education	High	4	2	2	8
	Medium	2	5	4	11
	Low	4	3	4	11
Employment	Unemployed	2	1	0	3
	Employed	5	9	10	24
	Retired	3	0	0	3
	Student	0	0	0	0
Housing	Flat	3	4	5	12
	House	7	6	5	18

[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 Luxembourg. 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

In Luxembourg, there seems to be a great variety of possibilities for separating waste and all participants were well informed about the various waste streams (a waste stream is defined as one type of waste that is collected separately covering the majority of their household waste) available for their household. Plastic bottles, furniture, metal, wood, chemicals, electrical waste and clothes are often separated. Garden and food waste is separated in some households, while in others there are no facilities available for separating this type of waste. If participants do not have facilities to dispose of their food waste or green waste, it goes in the general bin.

Participants generally have similar waste management systems in place. Nevertheless, small differences can be noted among the focus group participants. There seems to be a large variety in type and colour of collection possibilities. Some have plastic bags from Valorlux[13] (the current collection system for plastic etc); others collect waste in a bin. It varies from one municipality to the next, which bins are compulsory and which are optional. One participant contradicted this, saying you can choose the size of the bin:

> *"One can decide whether one wants to get a big bin or get a small bin. The bigger one is grey then, but the smaller one is brown, with a round lid and we have the small one there, that one is cheaper also." (Luxembourg FG 1, P5)*

The main difference in waste streams seems to be between houses and apartment buildings. One participant explained that most waste in apartment buildings is collected in a large black bin, while plastic, batteries and

[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.

[13] Valorlux is the organisation in Luxembourg that is responsible for the coordination of selective collection, sorting and recycling of household packaging waste.

broken mobile phones are collected separately. Other participants who live in apartment buildings do have separate bins available for sorting waste, although not for green waste. This might be avoided for reasons of hygiene.

"We don't have an organic waste bin, I assume because it's a little bigger, our apartment building isn't huge but I assume after a certain number of residents they try and avoid this for hygiene reasons." (Luxembourg FG3, P5)

One participant mentioned living in an apartment building where everything is separated as in houses:

"There aren't many great differences. In an apartment building, with 15 apartments, we have a bin room, with glass bins, paper bins, residual waste bins and also those Valorlux bags." (Luxembourg FG3, P5)

4.1.2 Waste collection

Most waste items seem to be collected from the doorstep, either from bins or in bags:

"Well, in principle anything that is waste, you put outside, glass, paper, plastic and any other waste!" (Luxembourg FG3, P6)

Large household waste is often collected as is electrical waste. For those who do not have their waste collected, there are often collection containers in the immediate vicinity where they can dispose of their waste. For large waste or items that are not collected nearby, people have access to recycling centres. For example, batteries can be brought to boxes at several locations like shops and schools.

There are small differences between municipalities. In some municipalities, collection of large waste items or scrap metal might involve fees. The main difference between municipalities, according to participants, is how the green waste is collected:

"For grass, there's also throughout summer once a week a collection site, we don't have bins at home where you can put grass." (Luxembourg FG 1, P3)

For two of the participants, green waste is collected by a neighbouring farmer. In a few municipalities, electronic appliances can be brought to a collection site at the municipal administration. There is also the option to bring items to charity or second-hand shops for reuse. At second-hand shops, it is also possible to swap items.

4.1.3 Knowledge about waste pathways

Most participants do not know what happens to their waste after it is collected. Most participants assume that residual waste is incinerated and that clothes are reused, but they say it is an assumption, not knowledge. One participant knows that the waste from the green bin goes to a compost centre because the municipality provided information about this. Another participant mentioned that it is possible to get free compost at the recycling centre.

4.1.4 Waste management behaviour and convenience

Participants have a lot of options to choose from and they generally dispose of their waste according to plan and most participants claimed they work with the system.

In addition, participants in all three focus groups generally felt that the system is well arranged and that everything is clear to them, which makes handling waste convenient:

"I find the fact that every apartment building has its bins and that they are collected, I find that wonderfully easy, certainly for me as a consumer!" (Luxembourg FG3, P2)

4.2 Barriers and concerns regarding urban waste

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

4.2.1 Waste prevention and production

In the discussion about the prevention and production of waste, one of the major topics discussed was packaging. One of the main concerns mentioned is that products in shops are over-packaged. The participants see many reasons for this way of packaging: first of all, for a small household, food has to be shrink-wrapped, otherwise it spoils and has to be thrown away. Packaging is also intended to meet modern hygiene restrictions. However, packaging often consists of different layers, which are considered unnecessary:

"A banana with the most beautiful packaging in the world, a banana that's going to get peeled, wrapped in plastic?!" (Luxembourg FG3, P3)

Participants also thought that products are packaged according to their branding. This makes recycling more difficult but also leads to over-packaging. This problem does not only affect items from normal shops. For example, medication is often over-packaged and there is more medicine in a package than you usually need, as the moderator summarised:

"I only need 6 pills, and there are 22 in my box." (Luxembourg FG 1, M)

And lastly, advertisements cause a lot of waste, not only the quantity of paper but also the fact that they are often wrapped in plastic.

Some participants indicated that they would rather buy products with better packaging, but there are several reasons why they do not. First of all, these products are much more expensive.

"If I earned 5 thousand [Euros] a month then I would always shop at the Naturata or something like that; the way I was taught to." (Luxembourg FG 1, P 10)

Items with plastic packaging are also considered more convenient.

Participants acknowledged that the problems with waste prevention lie with both producers and consumers. The main barrier identified during focus groups is that consumers are considered to be ignorant and lazy which keeps them from considering prevention. Participants also say that they live in a consumer society:

"I would question the entire industry, the model as a whole, the excessively high consumption, the whole economy that is geared towards simply producing, producing, more and more, things you don't actually need." (Luxembourg FG3, P5)

"iPhones provide two-year subscriptions and after those two years it is usually cheaper to purchase a new iPhone rather than extend the subscription." (Luxembourg FG2, P3)

Participants considered that even when they want to consider waste prevention, industry is making it difficult for several reasons. For example, industry does not offer any good and affordable alternatives to over packaged products in stores. Furthermore, participants are concerned about so called 'planned obsolescence' which ensures that products break after a certain period, reducing the lifetime of products considerably. In addition, repair of products is often more expensive than buying a new one, leading to more waste.

Lastly, the lack of information about how to prevent waste is mentioned as a barrier: if people do not have the knowledge about how to prevent waste, this will demotivate them to make the effort to do it properly.

4.2.2 Waste management in the household

Although most focus group participants in Luxembourg consider the waste management system as convenient, some barriers and concerns concerning waste disposal in the household are mentioned.

Some participants throw recyclable waste in the residual waste bin because other bins are too full with packaging material. They would prefer a higher frequency of collection, also because they do not like to store their waste in the house for a long period. Furthermore, some items consist of two or more materials, making it hard to separate and recycle them. For some participants, there are no facilities near their household to separate their waste.

Lack of knowledge about the waste management system was mentioned several times during the focus groups. Participants mentioned that many people, especially those from abroad, are not aware of how the system works and how to recycle the waste properly.

> *"In our house, there are four people who live there, they come from Cameroon, they don't know what a garbage bin is!" (Luxembourg FG 1, P3)*

It is also often unclear whether waste should be separated and if so how, because the information about this is lacking or unclear:

> *"Now I'm a little confused about my spray cans, I had thought I wasn't to put them with Valorlux, or couldn't, and now suddenly it's allowed." (Luxembourg FG 1, P6)*

If people do not know, they will throw waste in the residual waste bin.

Furthermore, the motivation of people to dispose of waste properly is considered important. Some participants find it time-consuming to separate all the waste, while others consider that people in their neighbourhood are too lazy to separate waste:

> *"I put together a special cardboard box to collect the lids from bottles and I put it above the bin, to collect the lids for recycling and then the next day, I still see 5 to 10 bottles with lids on!" (Luxembourg FG3, P 10)*

Participants also considered that people who do not produce much waste might think that their efforts do not make a difference and therefore do not put in the effort.

Finally, participants considered that people often throw things out that do not need to be thrown out, such as mobile phones:

> *"I have had this one for 10 years. Others get a new one every year. Why?" (Luxembourg FG3, P3)*

4.2.3 Waste disposal and pathways

Participants experienced a number of flaws in the waste management system that keeps them from separating their waste. For some participants, containers are too far away and they have to transport their waste by car. Others would like to have more public spaces where you can dispose of bottles. In some municipalities, there are no bins for disposing of waste at all:

> *"I told them that at the municipality, and they said to me that then they'd have to hire more people again, and then they'd have to pay them more again." (Luxembourg FG 1, P4)*

Separate disposal of waste is also often made difficult. For example, items that are not coded correctly cannot be deposited at the SuperDrecksKëscht[14]:

> *"And when I go to the SuperDrecksKëscht, I can't deposit anywhere the things that don't have a code on them." (Luxembourg FG 1, P3)*

Valorlux does not take all sorts of plastic. The rest of the plastic has to be brought to a recycling centre and if the waste is not separated correctly, it might not be collected.

People are often not willing to pay to recycle their waste. This was often mentioned in relation to collecting large household items. Also the disposal of waste is sometimes experienced as inconvenient because people do not have the transportation or the time; the effort is considered too much. Others feel that they have to bring too much waste by car to a recycling centre because they think the system should collect everything from home. For these reasons, a lot of waste is dumped in the forest.

Furthermore, participants worried that their efforts might not make a difference; they are afraid that all the waste still ends up on one big pile after collection:

"I used to drive to Esch-sur-Alzette, where those little plastic yoghurt containers ended up in the large household waste! Simply because they weren't of any interest, but I have been collecting them at home for the last three months." (Luxembourg FG3, P8)

Participants would like to have more transparency about these pathways.

In addition, participants questioned whether the whole waste management system is energy efficient and whether recycling does not cost more energy. For example, having to go to a recycling centre by car is experienced as inconsistent:

"It is not ecological that I have to recycle with my car." (Luxembourg FG 1, P 10)

One participant was concerned that the focus of the current system is more on convenience than the environment:

"I was thinking more along the lines of convenience because, recently, I was at home and I noticed that with regard to toilet paper, once it's used, it can be flushed down the toilet / and that is very convenient, it's a convenience made for humans, but I used to work at a sewage waste syndicate and I know that actions such as these cause sewage plants to break down and fail time and again, meaning that such things are made to make life convenient for people but, at the end of the day, it actually hurts the environment." (Luxembourg FG2, P4)

Lastly, participants are concerned that not all plastic goods are recyclable and that they will end up in landfill. Again mobile phones were brought forward to illustrate a concern, this time about the sustainability of a waste pathway:

"I have all those mobile phones lying at home, I do NOT throw them away as junk! Because a couple times I have seen a documentary about that, that our European electronic waste goes to India or Africa, and that there barefoot people have to rummage around in it, with poisonous fumes." (Luxembourg FG 1, P8)

4.2.4 Other urban waste issues

Participants worry that people, especially children, do not feel responsible for their waste because they are not aware of the impact it has on the environment.

Many participants were concerned about the destruction of nature:

"It doesn't matter whether we throw it in this or that bin, or how it is reused, we shouldn't be using these things in the first place because we are really destroying something, our own air, we are destroying our world." (Luxembourg FG3, P2)

Finally, some participants are concerned about the efficacy of the labelling system, like the label of SuperDrecksKëscht. They are puzzled about whether this label is of benefit for companies and whether it helps large companies to handle their waste better.

"The SuperDrecksKëscht label, what advantage does that one have or is that simply to have a pretty sign in their window?" (Luxembourg FG 1, P3)

[14] SuperDrecksKëscht is a programme for managing problematic waste from households and for implementing waste management in the business sector (http://www.superdreckskescht.lu/en/Home.html)

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

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

4.3.1 Environmental sciences and technology

In the domain of environmental sciences and technology, the main target group for the ideas of participants are the consumers, and this also shows in the priorities. The aims of the ideas vary considerably but most priority is given to effective use of waste and less use of resources.

TECHNICAL, PHYSICAL, CHEMICAL, ENGINEERING

Most of the priorities are in this category with ideas concerning effective use of waste being ranked highest. Several ideas came up that will help to reach this aim. These ideas mainly focus on retrieving energy from waste, at the household level.

Participants would like to see the development of a mini biogas plant per household that converts waste into energy:

"[P2] Every household has its own biogas plant, a mini biogas plant.
[M] OK, every household has a mini biogas plant, ok, what do we prevent this way?
[P2] The transport of waste." (Luxembourg FG2)

Next to the abovementioned idea, there is also a more specific idea concerning this energy brought up during the focus groups. Participants would like to have a machine that turns waste into energy, but not only heat, also other forms of energy.

"[P9] Not only heat, for example, because heat we already get from Sidor and company at the moment, they produce heat, that we can transform into long-distance heating.
[M] So a superduper machine, where I can toss everything in, and it yields energy, in different forms.
[P9] Like for instance that cube, I take that home with me, plug it into my machine, and then my TV runs for 3 weeks, for instance." (Luxembourg FG 1)

Participants would also like machines to be developed that break waste down into basic elements that can be reused and converted into many different things:

"[M] So that means anything is convertible into anything? What kind of technology do we need for this?
[P2] A machine that can split basic elements and then create whatever you require at a given moment." (Luxembourg FG2)

Another idea that is mentioned and prioritised to reduce packaging is the development of food tablets that transform into a meal with a drop of water:

"[P 10] Astronaut food / tablets, in some cases from a can, that transform into a delicious meal with a drop of water [...]
[P3] Packaging is no longer needed." (Luxembourg FG2)

A more concrete idea from one of the focus groups is that there should be a new garbage truck developed that has a different department for recycling. This should make collection and recycling easier:

"[P9] That means that the same people come with smaller or the same size of trucks [...] new trucks have to be designed in order to recycle.
[M] Okay, you said design new trucks, so what has to happen inside these trucks?
[P9] Well, the same as now, normal garbage heap, but that you can put 3 different kinds [of waste] in there." (Luxembourg FG 1)

A chemical process that that turns waste into wood or helps it decompose faster is an idea that aims to use waste more effectively and to improve recycling:

"We had the idea of chemical reactions. For instance, you dump plastic in the forest and it's transformed into wood. Or that somehow it decomposes much more quickly." (Luxembourg FG2, P 7)

Participants also gave priority to the development of a 'Lego' system for furniture. This technology makes it possible to adapt furniture to your needs at any time:

"You could have a type of lego system for furniture, where you could transform it according to your needs at a given time. For instance, you need a cupboard so you just add another module." (Luxembourg FG2, P8)

In addition, participants suggested disposing of waste very effectively by finding a black hole (a space in the universe where gravity is so strong that matter is squeezed into tiny space) that makes waste disappear.

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	A mini biogas plant or machine per household that converts waste into energy	Effective use of waste/ Convenience in the home	Consumers	☆☆☆☆☆☆☆☆☆☆
	A robot that breaks waste down into atoms and molecules that can be reused	Effective use of waste	Consumers	☆☆☆☆☆
	Food tablets that transform into a meal with a drop of water	Less packaging	Consumers	☆☆☆
	New garbage trucks with separate departments for recycling	Improve recycling	Waste management companies	☆
	A machine that turns waste into energy that can be used for electrical appliances	Effective use of waste	Consumers	☆
	A machine that can split basic elements and can convert anything into anything	Effective use of waste	Consumers	☆
	A robot in house that disposes of waste for you	Convenience in the home	Consumers	☆
	Chemical process that turns dump waste into wood or helps it decompose faster	Improve recycling/ Effective use of waste	Other	☆

Technical/ Physics/ Chemical/ Engineering	A lego system for furniture so it can be transformed according to your needs at any time	Less use of resources	Consumers	☆
	A small black hole	Eliminate waste	Waste management companies	☆

MATERIALS

The category 'material' only includes a few ideas. However, most of the ideas mentioned in this category received priority from the participants. Those ideas are mostly targeted at producers. The first idea is that materials should be developed that have a longer life span. This way fewer new products would have to be produced, involving fewer resources. This can either be done by improving the quality of current products or by developing new products.

The idea that ranks second in this list is that all products on the market should be recyclable or made out of recyclable materials to improve and increase recycling:

"[P2] Or that all products entering the market must be recyclable! [...]
[P 10] Or the wrapping must be made of recycled cardboard." (Luxembourg FG2)

In addition, research should be promoted to develop biodegradable packaging.

Participants also proposed another idea to use fewer resources, namely the development of materials or a preservation technology to prolong the lifespan of food:

"New materials research, such as developing new preservation technology to avoid food being thrown out too quickly..." (Luxembourg FG2, P2)

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

Category	Idea	Aim	Target Group	Priority
Material	Improve materials lifespan or invent new, long lasting, products	Less use of resources	Producers	☆☆☆☆☆☆
	All products must be recyclable or made out of recyclable materials	Improve recycling	Producers	☆☆
	Promote research on biodegradable packaging	Improve recycling	Producers	☆
	Develop materials that prolong lifespan of food	Less use of resources	Consumers	☆

BIO(TECHNO)LOGY

The category 'bio(techno)logical' yielded several ideas aiming at the target group consumers. However, only one of these ideas received priority in the focus group sessions. This idea aims to use waste more effectively by developing a symbiotic technology that makes it possible to use bottle lids as a seed or multivitamins after use. Symbiotic technology relates to close, prolonged association between two species.

"[P 10] Well, plastic bottles where the lid afterwards turns into the seed of a plant.
[P6] Anything can be transformed into anything.
[M] Ok so my plastic lid in some way, through some crazy symbiotic process, becomes a seed.
[P 10] Exactly." (Luxembourg FG2)

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	Bottle lids that transform into a seed or multivitamins	Effective use of waste	Consumers	☆☆

ICT

One of the focus groups also had the idea to produce less waste by the development of on demand software. This software will make sure that you can use the products when you need them and after use they will dissolve again as made clear in the following quote:

"Simply what you need in terms of material for driving, for instance, you push a button and then all of a sudden your car is there, and when you're done it disappears." (Luxembourg FG3, P 1)

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

Category	Idea	Aim	Target Group	Priority
ICT	Demand software	Less waste production	Consumers	☆☆

4.3.2 Policy, management and communication

POLICY

Ideas related to policy measures were brought up in all three focus groups. The ideas are targeted both towards producers and consumers, but the highest ranked ideas mainly focus on producers.

The idea that received most priority in this category is the idea to have EU legislation that will control the production processes in the EU. This idea had multiple facets. First, it is important to have legislation stimulate production inside the EU to reduce pollution and unemployment:

"[...] the entire south, France, Portugal, Spain, in the past they used to produce clothing and other things, that falls away now, we would help against unemployment and also pollution." (Luxembourg FG 1, P 10)

Secondly, this idea aims to have laws that stimulate better production processes and thus less waste production. In addition, participants prioritised the idea that research on this theme should be coordinated and supported at the European level:

"[P4] That on a European level, research gets funded and gets coordinated in order to work out zero-waste.
[M] Okay, we need research coordination.
[P4] Yes and support." (Luxembourg FG 1)

Another group of ideas suggest incentives or penalties that aim to bring about a change in behaviour. Participants suggest the development of an institution that monitors and controls the compliance with regulations, both in the industry and at a household level:

"[P2] Yes, a type of waste police to develop an institution that really monitors those things, also on a higher level, meaning in the industry also and also in people's homes, waste separation and compliance with prohibitions. For instance, [not] throwing batteries in with the residual waste...
[M] Yes, where is the control? Ok at industry level but also in the households..." (Luxembourg FG2)

In addition, producing, consuming and promoting products that are harmful to the environment should be made a crime:

"Well, when talking of increasing demand we could say that it should be made a crime to consume prod-

ucts that are harmful to nature, to produce such products and to promote them!" (Luxembourg FG3, P2)

Furthermore, the authorities should enforce reuse by prohibiting throwing out items that still can be used:

"Simply prohibiting the act of throwing out, when you go to the STEP[15] and see what people throw out. Plates that can still be used, that are simply chucked out with all the large household waste. You shouldn't be allowed to throw out anything that can still be used! So you should have to somehow go to another place." (Luxembourg FG3, P8)

Lastly, behaviour change should be induced by reducing the price of organic products. This will stimulate the consumption of these products.

Participants would like the government to allow green rooftops where people can grow their own vegetables instead of buying everything in a store where all vegetables are packaged:

"[M] Okay, we need green roofs, you're saying.
[P8] But not only with lawns, but possibly, that those who want can plant their vegetables there." (Luxembourg FG 1)

Another idea in this category is to legalize e-mails as legal documents to dramatically reduce the use of paper and decrease use of resources:

"[P6] That they are legalising emails to avoid that everything gets sent twice, by email and by mail.
M] Ok, I need email, emails need to be legalised. OK, so that I don't need to print out physical documents. Hmm, no physical documents any more.
[P5] Everyone needs to have an email address where their social security numbers are stored.
[P10] The law would have to agree to this." (Luxembourg FG2)

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

Category	Idea	Aim	Target Group	Priority
Policy	EU legislation that subsidises and controls EU products (statutory requirements for better production)	Less waste production/ Effects on planet/ Behaviour change	Producers	☆☆☆☆☆☆
	Control compliance with prohibitions, in household and industry	Behaviour change	Producers/Consumers	☆☆☆
	Research coordination at the European level	Understanding of zero-waste	Researchers	☆☆
	Legalize emails as legal documents instead of everything on paper	Less use of resources	Consumers	☆
	Allow green roofs where people can grow vegetables	Local production	Consumers	☆
	Stimulate consumption of organic products: reduce the price	Behaviour change	Consumers	☆
	Make it a crime to produce or consume harmful products	Behaviour change/ Effect on planet	Consumers/ Producers	☆
	Reuse should be enforced by the authorities	Less use of resources	Consumers	☆

[15] STEP is a recycling park (parc de recyclage) in the municipality of Dudelange: http://www.step.lu/

The first idea on the list of priorities aims to use waste effectively but also to produce less waste by having towns with closed energy cycles:

"A closed energy cycle, meaning you could for instance have a little town as a closed cycle, [...] that you have a town in which the industries work together in such a way that the entire needs of the town can be ... [...] so that the town can be autonomous." (Luxembourg FG2, P2)

A group of ideas aims at producers as target group. Participants would like stores to have last-minute shelves or even entire last-minute shops at which products can be bought that supermarkets would otherwise throw away:

"It means that things don't get thrown out once they're beyond their so-called expiry date and, in every supermarket, you'll find people who might be able to buy something for themselves." (Luxembourg FG3, P9)

Participants also thought there should be a greater emphasis on local production because less transportation and packaging for transport would be required.

Another idea focused on producers, ensuring that they think about what will happen with their product after use during the production process:

"[P 1] That in advance ... say what should happen to the product afterwards.
[M] Ah okay, producers have to say what happens and how to that product afterwards?
[P 1] Yes.
[P2] And have to think about development [...] They would have to invest in research as well!" (Luxembourg FG 1)

Some more concrete ideas to reduce waste also came up. Participants would like to see more space created to facilitate swapping and reusing items. Also they feel that the option of refilling packaging will lead to less waste production:

"Refill products! Instead of always ending up with new packaging when something runs out, being able to say, I don't need any new packaging, I will just go there and get it refilled." (Luxembourg FG3, P9)

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

Category	Idea	Aim	Target Group	Priority
Management/ Logistics	An autonomous town with closed energy cycles	Less waste production/ Effective use of waste	Consumers	☆☆☆
	Create more space for people to be able to swap and reuse items	Less use of resources	Consumers	☆☆☆
	Have the option to have packaging refilled	Less packaging	Consumers	☆☆
	Last minute shops or shelves to buy products the supermarkets want to throw away	Less waste production	Producers	☆☆
	Only use local products to avoid the transport and packaging for transport	Less packaging/ Local production	Producers	☆
	Producers have to think about what happens to the product after use during production	Awareness of effects and possibilities	Producers	☆

COMMUNICATION AND EDUCATION

In all focus groups, education and raising awareness are ideas that received priority. These ideas are mainly focused on consumers with the aim of changing their behaviour when it comes to disposing of waste properly.

Participants considered that people need to be educated not to 'overbuy' and this will lead to less waste production:

"[P5] Yes, but if you go to buy things from your biofarmer, then you only buy... then only those things are available. If you go to the Cactus [supermarket], then you often buy something else that you don't actually need and then more gets consumed that way...
[M] Yes, I am absolutely with you, I believe you too! But how do we do that?
[P9] By teaching people from infancy onwards to eat healthy, and with natural products, and not by getting used to eating strawberries in winter, for example, and by knowing that we only have strawberries during strawberry season and then we would avoid a lot." (Luxembourg FG 1)

Participants considered that children should be educated about the system and about waste. They also believe that education at school will help to make children aware of the possibilities that are available to separate waste and, by this means, change their behaviour from an early age:

"We also wrote about raising awareness within the consumer society, starting with children, teaching children how to separate waste from an early age, yes." (Luxembourg FG2, P7)

Several marketing campaigns were proposed to induce a behaviour change among consumers. Participants would like a marketing campaign to stimulate consumption and demand for more sustainable products:

"A change in consumer behaviour, a demand thus to increase products that possibly don't have quite the same sophisticated packaging!" (Luxembourg FG3, P5)

Furthermore, participants considered that a campaign to promote the use of tap water could be effective in reducing the use of plastic water bottles. A campaign to promote organic farming would also reduce waste production by reducing the use of chemicals and the amount of waste produced.

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

Category	Idea	Aim	Target Group	Priority
Communication and education	Educate people not to overbuy and to eat healthily (seasonal products)	Behaviour change	Consumers	☆☆☆☆☆☆
	Teach waste-aware behaviour at schools as part of the curriculum	Behaviour change	Consumers	☆☆☆
	Boost ecological farming, fewer chemicals	Less waste production	Producers	☆☆☆
	Marketing to increase demand for more sustainable products	Behaviour change	Consumers	☆☆
	Raise awareness, starting with children, on how to separate waste	Awareness of possibilities	Consumers	☆☆
	Marketing campaign for tap water use, instead of buying plastic bottles	Less waste production	Consumers	☆

5. Conclusion, discussion and evaluation

This country report presents country-specific findings from citizen focus groups in Luxembourg. 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 Luxembourg three focus groups were held in total.

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 the coming years for similar initiatives.

Below, we present the main findings of the focus groups in Luxembourg. 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

Luxembourg ranks 6th on the EU27 ranking list on Municipal Solid Waste Recycling (MSW). It has a strict policy to reduce landfill and incineration, and to increase recycling and reuse to meet the target set by the EU by 2020.[16] From the focus groups, it can be concluded that most participants have access to the facilities needed for handling waste according to the country's policy and that much waste is recycled at household level. This is consistent with findings from the Flash Eurobarometer survey 'Attitudes of Europeans towards resource efficiency'[17] in which almost all respondents from Luxembourg were separating at least some waste (see Annex 2). The VOICES focus group results show that most participants know what is expected of them at the household level and that they consider the waste management system to be convenient. However, knowledge about what happens to waste after collection is very limited.

During the focus groups, some large clusters of barriers and concerns for dealing with waste appropriately could be distinguished. When talking about production and prevention, one of the main concerns discussed in all focus groups was the (over)packaging of products. Participants would like to buy products with less packaging but those products are often more expensive and there are no other alternatives. Participants also worry about the short life span of modern products, one cause of high waste production. However, participants do not only blame producers. They worry that consumers are ignorant and lazy, and do not have the correct information to prevent waste. Another major concern here is the excessive consumption of modern society.

In terms of convenience in the household, three clusters can be identified. First, some participants experience recycling as complicated and inconvenient. This inconvenience is often related to waste bins. Second, participants need more information about the waste management system to help them dispose of their waste appropriately. Third, participants considered that many people are too lazy to separate their waste.

The disposal of waste faces some challenges. For some participants, bins are not available or too far away. Furthermore, separate disposal of waste is often difficult because it is unclear what parts of items can be recycled. Even though the participants would like to see the waste management system improved, they are not willing to pay more to recycle their waste. In addition, many participants would like to have more information regarding waste disposal and the waste pathways to see whether their efforts really do make a difference. This is consistent with findings of the Flash Eurobarometer survey which show that the majority of respondents in Luxembourg think that better waste collection services and more information on waste separation would convince them to separate more waste.

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 smaller categories. In the first domain, ideas focus mainly on technology (machines and processes) to improve the effective use of waste and to reduce the use of resources. Consumers are the most prominent target group, followed by producers.

Most ideas in this domain focus on managing waste directly, either transforming waste into other useful materials or transforming it into energy, and increasing the possibilities for recycling and improving the collection system. Other ideas aim to improve products to prevent them from becoming waste, by making them easier to recycle or more durable. Furthermore, some ideas aim to reduce the production of waste by developing new technologies to replace current waste producing products.

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

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

Ideas in the second domain 'policy, management and communication' were mainly concerned with regulations, penalties and control; as well as education to reduce (packaging) waste, change behaviour and foster awareness. In this domain, most ideas aim to induce a behaviour change, generally targeted at consumers but some also targeted at producers.

The need to stimulate the demand for alternatives and increased control of compliance with the regulations are core issues in this domain. It is thought that current practices stimulate the consumer society and overproduction. However, without control of the production and disposal practices, it will be difficult to improve the current situation.

Of the most highly prioritised ideas, the first is a mini biogas plant per household that converts waste into energy (9 stickers). The second priority is shared between three ideas that received the same number of priority stickers (6): improving materials lifespan or invent new, long lasting, products; EU legislation that subsidises and controls EU products (statutory requirements for better production); educate people not to overbuy and to eat healthy (seasonal products).

5.3 Reflection

The atmosphere in the focus groups was very good and most participants enjoyed the discussion. The topic was described as interesting, necessary and a priority, and the participants found it interesting that a broad range of subjects was broached. The participants were, in particular, relieved to find other people who had the same thoughts and worries about waste issues. Some participants expressed surprise at the high level of organisation of waste streams in comparison with neighbouring countries. However, participants fear that their efforts will not make a difference. If industry and manufacturers are not involved, the consumer cannot achieve much alone. Participants are also worried that change will occur at the cost of the consumer and they consider that empty promises are not enough: the EU should put a plan into action and send a strong message to all stakeholders.

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	A mini biogas plant per household that converts waste into energy	Convenience in the home/ Effective use of waste	Consumers	☆☆☆☆☆ ☆☆☆☆
	A robot that breaks waste down into atoms and molecules that can be reused	Effective use of waste	Consumers	☆☆☆☆☆
	Food tablets that transform into a meal with a drop of water	Less packaging	Consumers	☆☆☆
	New garbage trucks with separate departments for recycling	Improve recycling	Waste management companies	☆
	A machine that turns waste into energy that can be used for electrical appliances	Effective use of waste	Consumers	☆
	A machine that can split basic elements and can convert anything into anything	Effective use of waste	Consumers	☆
	A robot in house that disposes of waste for you	Convenience in the home	Consumers	☆
	A lego system for furniture, so it can be transformed according to your needs at any time	Less use of resources	Consumers	☆
	Chemical process that turns dump waste into wood or help it decompose faster	Improve recycling/ Effective use of waste	Other	☆
	A small black hole	Eliminate waste	Waste management companies	☆
	A heating system (in house) that burns waste	Effective use of waste	Consumers	
	Subterranean containers with electronic recognition of matter: recognizes the type of waste that is thrown in there	Convenience in the home/ Improve recycling	Consumers	
	A robot that measures the food needs of people and then buys exactly what is needed	Less waste production	Consumers	
	A robot that manages the refrigerator and buys what is needed	Less waste production/Convenience in the home	Consumers	
	Products of higher quality	Less waste production	Producers	
	A machine that converts waste back to the raw materials	Improve recycling	Waste management companies	
	Improve incineration plants: more energy recovery and less harmful fumes	Effects on planet/ Effective use of waste	Waste management companies	
	Transparent containers to make people feel embarrassed	Behaviour change	Consumers	
	An implant in our brain that replaces paper and computers	Less use of resources	Consumers	

	A beamer for teleportation that replaces cars	Less use of resources	Consumers	
	A genetic coding reader (barcode on arm) that replaces administrative work like passports	Less use of resources	Consumers	
	The e-beer, everything is consumed virtually	Less use of resources	Consumers	
	A machine that produces food in liquid form with no packaging	Less packaging	Consumers	
	Make products in puzzle form: to easily repair and recycle it	Improve recycling/ Less use of resources	Consumers	
	Universal mobile phone charger	Less use of resources	Consumers	
	A pneumatic tube system that shoots waste into outer space	Eliminate waste	Waste management companies	
	An eliminator or tablet that makes waste just disappear	Eliminate waste	Consumers	
	A machine that converts waste into energy	Effective use of waste	Consumers/Waste management companies	
	A machine that converts waste into a product of choice	Effective use of waste	Consumers/Waste management companies	
	Build an artificial planet of waste	Effective use of waste	Waste management companies	
	Compress waste so it can be used as building material	Effective use of waste	Producers	
Material	Improve materials lifespan or invent new, long lasting, products	Less use of resources	Producers	☆☆☆☆☆☆
	All products must be recyclable or made out of recyclable materials	Improve recycling	Producers	☆☆
	Develop materials that prolong lifespan of food	Less use of resources	Consumers	☆
	Promote research for biodegradable packaging	Less packaging	Producers	☆
	Consumable packaging	Less packaging	Consumers	
Bio(techno)-logical	Bottle lids that transform into a seed or multivitamins	Effective use of waste	Consumers	☆☆
	A superbiscuit that contains all necessary food uptake	Less waste production	Consumers	
	Flies that eat our garbage	Eliminate waste	Consumers	
	Develop enzymes that allow us or animals to eat waste	Less use of resources	Consumers	
	Genetically modified human and animals so we need less energy	Less use of resources	Consumers	
ICT	Products on demand via cosmic software	Less waste production	Consumers	☆

POLICY, MANAGEMENT AND COMMUNICATION

Category	Idea	Aim	Target Group	Priority
Policy	EU legislation that subsidises and controls EU products (statutory requirements for better production)	Less waste production/ Effects on planet/ Behaviour change	Producers	☆☆☆☆☆ ☆
	Control compliance with prohibitions, in household and industry	Behaviour change	Producers/ Consumers	☆☆☆
	Research coordination at the European level	Understanding of zero-waste	Researchers	☆☆
	Legalize emails as legal documents instead of everything on paper	Less use of resources	Consumers	☆
	Allow green roofs where people can grow vegetables	Local production	Consumers	☆
	Stimulate consumption of organic products: reduce the price	Behaviour change	Consumers	☆
	Make it a crime to produce or consume harmful products	Behaviour change/ Effect on planet	Consumers/ Producers	☆
	Reuse should be enforced by the authorities	Less use of resources	Consumers	☆
	Reward recycling	Improve recycling	Producers/ Consumers	
	Restrict merchandising	Less waste production	Producers	
	More realistic expiry dates	Less waste production	Consumers	
	Obligate to use only rechargeable batteries	Less use of resources	Consumers	
	Make laws against the reduced quality of products	Less use of resources	Producers	
	Enforce producers to take their items back when they are replaced by a new one	Improve recycling	Producers	
	Quotas to prevent overbuying; buy something only when you return something	Less waste production	Consumers	
	Have the producers pay more tax for certain types of packaging	Less packaging	Producers	
	Punish consumers who do not handle their waste properly	Behaviour change	Consumers	
Management/ Logistics	An autonomous town with closed energy cycles	Less waste production/ Effective use of waste	Consumers	☆☆☆
	Create more space for people to be able to swap and reuse items	Less use of resources	Consumers	☆☆☆
	Have the option to have packaging refilled	Less packaging	Consumers	☆☆
	Last minute shops or shelves to buy products the supermarkets want to throw away	Less waste production	Producers	☆☆
	Only use local products to avoid the transport packaging	Less packaging/ Local production	Producers	☆
	Producers have to think about what happens to the product after use already during production	Awareness of effects and possibilities	Producers	☆
	Have people use thermos flasks instead of plastic bottles	Less use of resources	Consumers	
	Introduce smaller supermarkets where people can buy correct quantities	Less use of resources	Consumers	
	Immediately produce with environmental friendly materials	Effect on planet	Producers	

	Avoid complicated ways of (food) production: 'what grows naturally produces no waste'	Less waste production	Producers	
	Introduce reusable packaging with a deposit	Improve recycling/ Less packaging	Producers	
	Produce more consumers friendly also small households should be able to buy the necessary quantity	Less waste production	Consumers	
	Let stores sell items without the packaging	Less packaging	Consumers/ Producers	
	Shopping basket tailored to a week consumption	Less waste production	Consumers	
	Developing bottles for tap water	Less waste production	Consumers	
	Make bigger bottles instead of a few small ones	Less packaging	Consumers/ Producers	
	Increase the price of plastic bags	Less waste production	Consumers	
Communication and education	Educate people not to overbuy and to eat healthy (seasonal products)	Behaviour change	Consumers	☆☆☆☆☆ ☆
	Teach social behaviour at schools as part of the curriculum	Behaviour change	Consumers	☆☆☆
	Boost biological agriculture, less chemicals	Less waste production	Producers	☆☆☆
	Marketing to increase demand for more sustainable products	Behaviour change	Consumers	☆☆
	Raise awareness, starting with children, on how to separate	Awareness of possibilities	Consumers	☆☆
	Marketing campaign for tap water use, instead of buying plastic bottles	Less waste production	Consumers	☆
	Make people think less materialistically	Awareness of values	Consumers	
	Role models that make the children aware of the waste issue	Awareness of effects	Consumers	
	Information about the origins of products and what can be done with it after use	Awareness of possibilities	Consumers	
	Information about raw material use on packaging	Behaviour change	Consumers	
	Promote local production	Other	Producers	
	Product labels should provide info about ecological alternatives	Behaviour change	Producers	
	Introduce labels for imported materials to stimulate people to buy local products	Behaviour change	Consumers	
	Increase motivation to recycle by more transparency about pathways by the government	Improve recycling	Consumers	
Local initiatives	More composting	Effective use of waste	Consumers	
	Increase the number of collections from the house	Convenience in the home	Consumers/ Waste management companies	
	Big clean ups in the municipality, for everyone in the community	Other	Consumers	
	Make new items (example lamps) from waste	Effective use of waste	Consumers	
Other	Take left over medicine to doctors without borders	Effective use of waste	Consumers	

Annex 2: Attitudes of citizens from Luxembourg 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.

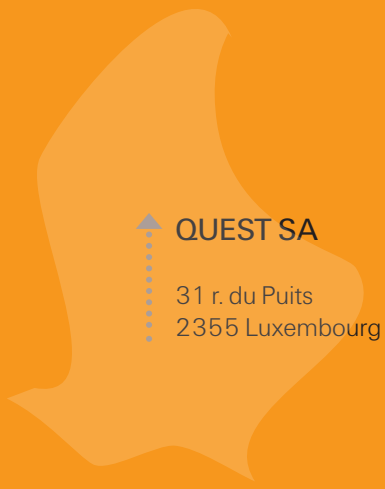
The survey obtained interviews - fixed-line, mobile phone and face-to-face - with nationally representative samples of EU citizens (aged 15 and older) living in 27 member states. The target sample size in all countries was 1,000 interviews. Below we give the results from Luxembourg.

Question	Answer	%	EU27 Average
Do you think Europe could be more efficient in its use of natural resources?	Yes	90%	87%
	No	6%	5%
	DK/NA*	4%	8%
Do you think that your household is producing too much waste or not?	Yes	42%	41%
	No	57%	58%
	DK/NA*	1%	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	75%	76%
	Improve separate waste collection at your home	70%	67%
	More information on how and where to separate waste	66%	65%
	Legal obligation to separate waste	64%	59%
	Taxes for waste management	42%	39%
What initiatives would improve waste management in your community?	Better waste collection services	61%	70%
	Stronger law enforcement on waste management	67%	65%
	Make producers pay for collection and recycling of waste	64%	63%
	Make households pay for the waste they produce	51%	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	10%	14%
	To pay proportionally to the quantity of waste you generate	88%	75%
	DK/NA*	2%	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	23%	25%
	Include the cost of waste management in the price of the products you buy	71%	59%
	DK/NA*	6%	16%
Can you estimate what percentage of the food you buy goes to waste?	None	3%	11%
	15% or less	70%	71%
	16% to 30%	19%	13%
	More than 30%	7%	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	68%	62%
	Better information on food product labels, e.g. how to interpret "best before" dates, information on storage and preparation	68%	61%
	Better shopping planning by my household	63%	58%
	Smaller portion sizes available in shops	67%	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	46%	39%
	Rather important	42%	41%
	Rather not important	9%	12%
	Not at all important	2%	6%
	DK/NA*	1%	2%
Are you willing to buy second-hand products?	Yes	60%	68%
Base: all respondents, % of yes			
Would you buy the following products second hand?	Furniture	48%	56%
Base: all respondents, % of yes	Electronic equipment	38%	45%
	Textiles (clothing, bedding, curtains, etc)	32%	36%
What reasons prevent you from buying second-hand products?	Quality/usability of the product	71%	58%
	Health and safety concerns	53%	50%
	Less appealing look of the product	34%	25%
	Afraid of what others might think	3%	5%
Would you buy products made of recycled materials?	Yes	92%	86%
	No	8%	11%
	DK/NA*	0%	3%
What would be the most important factors in your decision to buy products made of recycled materials?	Quality/usability of the product	53%	51%
	Environmental impact of the product	28%	26%
	Price of the product	14%	18%
	Brand/brand name of the product	4%	2%
	DK/NA*	1%	3%
What prevents you from buying recycled products or products containing recycled materials?	Health and safety concerns	47%	44%
	Quality/usability of the product	66%	42%
	No clear consumer information on the recycled product	39%	32%
	Less appealing look of the product	33%	17%
	Afraid of what others might think	17%	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.

VOICES for innovation

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