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Views, Opinions and Ideas of Citizens in Europe on Science

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

CONTENTS

1. Introduction

1.1 The VOICES project

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

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

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

1.2 Citizen participation in social innovation

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

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

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

1.3 The process

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

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

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

1.4 Structure of the report

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

2. Methodology

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

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

2.1 The VOICES focus group approach

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

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

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

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

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

BOX 2.1 SUMMARY OF VOICES FOCUS GROUP SCRIPT

INTRODUCTION

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

EXERCISE 1

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

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

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

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

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

2.2 The VOICES approach to urban waste

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

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

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

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

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

2.3 Analysis of the focus groups

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

2.4 Ethical issues

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

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

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

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

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

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

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3. Country relevant data - Czech Republic

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 Czech Republic is one of the smaller EU countries with a population of over 10 million. Inhabitants are spread over rural areas (33%), urban areas (24%) and intermediate areas (43%).

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

		2011	
Population at 1 January		10 486 731	
Population as percentage of EU27		2.1%	
Gross Domestic Product (PPP)		20 200 Euro	
Population urban-rural typology	Urban	2 522 000	24%
	Intermediate	4 536 000	43%
	Rural	3 475 000	33%

3.2 Factsheet on waste

The amount of municipal waste generated and treated in the Czech Republic is considerably lower than the average amount of waste treated in the EU27. The Czech Republic ranks 21st on the EU27 ranking list on Municipal Solid Waste Recycling (MSW). The MSW recycling rate has steadily increased over the past decade. According to present trends, it will require a significant effort to fulfill the EU Waste Framework Directive's target to recycle 50% of MSW by 2020.[9]

Table 3.2 Municipal Waste[10,11]

		Czech Republic		EU27 average	
Municipal waste generated (kg per person)		317 kg		502 kg	
Municipal waste treated (kg per person)		303 kg		486 kg	
	Landfilled	206 kg	68%	185 kg	38%
	Incinerated	48 kg	16%	107 kg	22%
	Recycled (material recycling)	42 kg	14%	122 kg	25%
	Composted (organic recycling)	6 kg	2%	73 kg	15%

3.3 Composition of the focus groups

In the Czech Republic, three focus groups (FGs) took place on the weekend of 23rd March 2013. They were held at the University of West Bohemia, in Plzeň, moderated by Ondřej Sloup, External Communications Manager, Techmania Science Center.

In total, 30 people (15 male and 15 female) participated in the three FGs. The age of the participants ranged from 20 to 70: 10 participants were aged between 18 and 35, 10 between 36 and 50; and 10 were aged 51 or over. Educational levels were diverse with 6 participants of a high level of education, 15 of a middle level and 9 with a low level of education. 17 participants were working, while 8 were unemployed, 2 were students and 3 were retired. 13 participants live in a house and 17 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	5	15
	Female	5	5	5	15
Age	18 - 35	0	10	0	10
	36 - 50	10	0	0	10
	50+	0	0	10	10
Education	High	2	2	2	6
	Medium	5	5	5	15
	Low	3	3	3	9
Employment	Unemployed	3	3	2	8
	Employed	7	5	5	17
	Retired	0	0	3	3
	Student	0	2	0	2
Housing	Flat	7	6	4	17
	House	3	4	6	13

[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 Czech Republic. 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

Most participants have access to facilities which allow them to separate their waste at the household level. Plastic, glass, paper, and residual (mixed) waste are the most common waste streams (a waste stream is defined as one type of waste that is collected separately, covering the majority of their household waste). Collection bins for plastic, paper, and glass are communal and can be found throughout all municipalities represented at the focus groups. Communal bins for clothing and cardboard are also available both in villages and cities, although they are less common.

Electronics, household appliances, and toxic substances (such as batteries, paint, and car oil) are also separated and disposed of in various ways. Food waste is not collected separately in municipal bins, nor did participants mention any facilities for collection of food waste. In cities, food waste usually goes into the mixed waste bin while in villages, it is common practice to compost food waste or feed it to animals.

The exact organisation varies from one household to the next and slight differences were observed between participants living in villages or towns, compared with those living in cities. Those living in flats in the cities had collection bins for glass, plastic and paper on the ground floor of the building or just around the corner of the street. Mixed waste was always collected in a bin in the building. For those living in smaller villages, mixed waste is disposed of in a household bin, while the bins for other waste are located in the village centre.

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

4.1.2 Waste collection

Waste collection for the four main waste streams was a relatively uniform experience for all participants. Plastic, glass and paper were each sorted in the home before being taken to the communal bins, with the only major difference between participants being the location of the bins. Mixed waste bins are collected from the house with collection frequencies ranging from twice a week to fortnightly, depending on the municipality. In flats, mixed waste is collected in bins on the ground floor where it is picked up regularly. Some participants noted that there is a compulsory annual fee for their household's waste bin or that they pay per collection.

Other waste items did not have a standard collection routine and were therefore disposed of in various ways. Household appliances, such as refrigerators and washing machines, were either taken to a recycling point, left outside next to the mixed waste, or left at the store upon purchase of a new appliance. Bulky items are generally collected twice per year either by truck or by bringing them to large metal containers, called skips. In the street of one respondent, a skip is placed fortnightly from spring until autumn while another household had use of a skip which could be found in a different location each day. Participants used skips to dispose of items such as furniture, tree cuttings, old carpets or tyres. There are also special skips for toxic materials, such as engine oil, batteries, and paint. Single cell batteries can also be returned to small collection boxes in public places, such as at post offices and supermarkets. Electrical waste, such as old computers, can be brought to a shop or recycling centre.

Reuse is also institutionalised in several ways; particularly reuse of clothing and shoes. Clothing collection bins can occasionally be found in towns and villages for items that are still in relatively good condition. Alternatively, items can be taken to the town hall, church, or charity store. Charities also organise days where bags of clothing are collected directly from the home. A few respondents said they pass old clothing on to their friends or family, or use worn-out clothing to make cleaning rags for the home.

4.1.3 Knowledge about waste pathways

Most participants were not certain about what happened to waste once they had disposed of it. Many guessed or knew that the mixed waste went directly to the local landfill or incinerator without further processing. With regard to separated waste, respondents did not know exactly how materials were recycled but many firmly believe that they were being appropriately processed and recycled. Others expressed concern as to whether the separated waste was actually being recycled at all. Participants mentioned that collection trucks mix separated materials, indicating that they end up in landfill since it would be costly to re-separate.

4.1.4 Waste management behaviour and convenience

The basic separation of waste is something that seems to be relatively standard across most municipalities that were represented in the focus groups. The most commonly separated waste streams—plastic, glass and paper—also appear to be the most convenient. Most respondents, with the exception of those few from very small villages, have bins for those waste types near their flat or home. All respondents knew where those bins could be found. However, even with those facilities available, some participants admitted that they do not recycle or know people who do not recycle, with some waste ending up in the mixed bin even though they know it could be recycled.

Uncertainty of how to dispose of items also led to them being put in the mixed waste bin. One participant, for example, felt that butter wrappers should be separated but did not know where they should go, so ended up throwing them in the mixed waste bin. This also appeared to be the case with less common waste items, such as home appliances and electrical waste. A few participants said they place such items in the mixed

waste bin or collection skips, without acknowledging if they thought this practice was correct.

Many participants said they recycle either because they feel they should or because it helps them save a little money. Most, however, were of the opinion that the majority does not separate waste. Additionally, fly-tipping (the disposal of waste in an unsanctioned area) was noted to be a problem, especially those from towns or villages where household and bulky waste is simply dumped in the forest.

4.2 Barriers and concerns regarding urban waste

This section provides an overview of the participants' barriers and concerns with respect to current urban waste and identifies underlying reasons for the reported barriers and concerns. The section consists of three parts. The first part, 'Waste prevention and production', focuses on barriers and concerns related to goods in the phase before they enter the household including both waste prevention and production. The second part, 'Waste management in the household', addresses goods and waste in the phase while they are in the household. The third part, 'Waste disposal and pathways', describes barriers and concerns related to the phase in which waste is disposed.

4.2.1 Waste prevention and production

With regards to preventing waste and waste production, the participants pointed out that there are quite a few barriers to overcome. Two topics in particular were frequently brought up during the discussions: packaging and food waste. Many participants considered product packaging to be completely unnecessary and they therefore thought that too much packaging is being used.

"Well, of course lots of packaging is completely unnecessary..." (Czech Republic FG3, P10)

"I don't know why people can't take a bag along when they go to buy bread." (Czech Republic FG3, P10)

Additionally, participants believed that companies did not take environmental issues into consideration, instead opting for the cheapest or most economic packaging:

"Yes and an easier method, which is more profitable, on the face of it, for the manufacturers of such items." (Czech Republic FG3, P10)

One participant also mentioned that the European Union ensures that everything is packaged in plastic. Other respondents mentioned that companies use all sorts of irrelevant frills in their packaging to make products more appealing to the consumer. Not only does this create excess and unnecessary packaging waste, but also added pressure for customers to consume more than necessary or normal, which in turn leads to increased waste.

The second barrier to waste prevention was the difficulty of preventing food waste. At a household level, participants mentioned that people often prepare too much food, which they are unable to eat and must therefore throw away. Two respondents proposed a possible solution to this:

"[P7] People should only cook what they eat.

[P3] Not go overboard on stupid things they don't need." (Czech Republic FG3)

Many people found nurseries and schools to be particularly wasteful when it comes to food:

"There is loads of waste in schools and nursery schools. It gets put in barrels or mixed waste dustbins and gets taken away every four or five days... I mean the leftovers." (Czech Republic FG3, P5)

On an even larger scale, respondents said that supermarkets throw away a lot of food and that this represents a barrier to reducing waste disposal.

"[P2] Food leftovers from supermarkets - everything has to be chucked away. Anything that is damaged, bad vegetables or just if the packaging is damaged, then it has to get chucked.

[P7] Perfectly good vegetables get chucked away. If they are just a day or two past the sell-by date." (Czech Republic FG3)

Participants indicated this to be a large source of waste and that it is difficult to address.

4.2.2 Waste management in the household

Although many of the participants said they separate waste streams to some extent, many mentioned barriers that prevent them from separating certain waste streams. These barriers often relate to attitudes toward separating waste, convenience, and knowledge about waste disposal.

Attitudes towards waste separation are commonly mentioned barriers in each of the three focus groups. Participants felt that the majority of people do not separate their waste simply because it is not what they are used to doing or because they are too lazy.

"They are not interested in looking for the relevant information and so they are not interested in recycling and they just chuck it all into one dustbin. Too lazy to recycle." (Czech Republic FG2, P2)
"[P3] The recycling bins are there, but people don't sort their waste. How many times have I seen it... they just stick everything together...
[M] And why not?
[P3] Inconvenience, laziness, all of that... You live there in the same block as them and you see it all... plain and simple." (Czech Republic FG 1)

Convenience of disposing of separated waste was also mentioned by participants as a potential barrier in the household. If people do not know where to dispose of particular items or if the recycling bins are too far away, people do not bother to separate these waste streams.

"We haven't got any recycling bins for textiles or organic waste here next to the building... If they wrote down where they are perhaps then we might take stuff there." (Czech Republic FG2, P5)
"I don't have any glass recycling bins near where I live... I would recycle more, but it's like I don't have anything to put it in." (Czech Republic FG 1, P 7)

One participant indicated this inconvenience was compounded by the need to pay for their municipal mixed waste bin, regardless of whether they use it or not.

"To be honest, since it's a fair way away, I chuck it in the dustbin, because I still pay the money for it..." (Czech Republic FG3, P 1)

In fact, one participant from a different focus group stated that the fee itself is a barrier to separating waste. People who do separate waste and recycle occasionally often do not see an added financial benefit in separating their waste.

"It's just a way of demotivating people from recycling. The sum is compulsory and you have to stump up, even though you don't get anything for it." (Czech Republic FG 1, P6)

Others, who are interested in waste separation or who currently separate waste in their home, question the effect of their efforts. Many had noticed that separated waste was recombined into one truck during collection.

"We recycle and sort it, completely pointlessly, and then they heap it all in one pile." (Czech Republic FG2, P8)

Most were disappointed with the perceived waste of their effort and some doubted as to whether it was actually re-separated or just dumped in the landfill. Often, the worst was assumed which discourages people from separating their waste in the future.

Furthermore, knowledge about what is recyclable and how items are recycled is another barrier to waste separation. When people do not know what should be separated or how to do this, it is impossible for them to separate.

"I only found out a few years ago that there was such a thing as recycling bins for clothing... I didn't know about that at all, for instance." (Czech Republic FG2, P2)

One focus group also paid attention to people who burn their rubbish and think that they are recycling.

"[P 1] They see that it burns so they chuck it in the boiler...
[P6] And they think that they are recycling, yeah...
[P2] And you get completely green smoke, it happens every day." (Czech Republic FG 1)

4.2.3 Waste disposal and pathways

Once waste has been sorted in the household, it is disposed of in various ways. Occasionally, barriers prevent people from disposing of their waste in the appropriate manner. The most commonly mentioned problem, identified by multiple participants in each of the three focus groups, was the fact that recycling bins overflow, which prevents people from disposing of their separated waste.

"[P6] I've got overflowing recycling containers.
[M] Right, overflowing...
[P8] I've got something similar. They don't collect them very often.
[P1] That's the same where we live too." (Czech Republic FG2)
"Unfortunately with plastic, even when I have got it ready for recycling and take it there in a bag, all crushed up, there's never any room. It's always overflowing." (Czech Republic FG3, P8)

According to the participants, there are a number of factors that lead to full recycling bins. The bins for plastic are the most problematic. Waste bins are not collected regularly. People do not always crush plastic bottles or cardboard beforehand, which takes up a lot of bin space. When the bins in the villages fill up, people take their recycling to the towns and cities, overloading those bins as well.

"Our recycling bins are always full of stuff that people from the village bring in." (Czech Republic FG2, P1)

When the bins are full, instead of holding onto their waste while waiting for the bins to be collected, people often get frustrated and dump their separated waste with the mixed waste.

Another commonly cited reason for dumping sorted waste with mixed waste is the fact that waste separation facilities are not always easily accessible, or close by. One participant mentioned having recycling bins in the middle of a square, with no parking places near them.

"They are in the middle of the square and you have got 'residents only' parking as well, so in the end I get fed up and plonk it in with the normal rubbish." (Czech Republic FG2, P1)

Another factor that limits the disposal of separated waste is the frequency of collection. This is the case, not only for recycle bins, as mentioned above, but also for collections of clothing and unusual or bulky items. Charity collections of clothing are infrequent. Skips for large items are usually only available twice per year, with people needing to store their waste until the skip is available. In addition, one participant mentioned that once the skip is full, no more items are accepted, so people who do not get there early enough have to take their waste back home. There are others who avoid the skips all together because they are often filthy and unhygienic.

When people cannot dispose of waste appropriately, due to full bins or infrequent collection, they occasionally dump waste in unsanctioned areas, such as in the forest or along the roadside. Although this is illegal, each of the three focus groups said the laws are not properly enforced. The lack of enforcement was considered to be a barrier to waste disposal at all levels, since neither companies nor individuals fear legal consequences for improper waste disposal.

"No-one enforces compliance with local regulations. What's the use of local regulations if there's no one checking they are complied with?" (Czech Republic FG 1, P 1)

Lastly, some participants in one focus group were also suspicious of the role of lobbyists in waste disposal. According to the group, the landfill owners are paid by weight so it is in their interests to recombine all waste and dump everything in the landfill.

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

This section presents participants' ideas for achieving a 'zero waste society'. A distinction is made between ideas related to environmental sciences and technology, and ideas related to policy, management and communication. Below, these ideas are described separately in tables. For each idea in the table, the research category is mentioned as well as the aim of the research and the proposed target group. In addition, the priority

of the research idea as perceived by the participants is indicated in the tables, using stars to indicate the number of stickers assigned to a specific idea by the participants. Only ideas that were prioritised by the participants are described in this section. Ideas that were not prioritised are included in the full list of research ideas which is provided in Annex 1.

4.3.1 Environmental sciences and technology

TECHNICAL, PHYSICAL, CHEMICAL, ENGINEERING

Of the eight ideas put forward regarding 'technical, physical, chemical and engineering' innovations by all focus groups, four were assigned stickers which denoted priority. Interestingly, FG3 was the only group to assign priority to ideas in this section. Among the ideas which received stickers, those that focused on the practical reuse of waste were ranked highest priority (see Table 4.3.1).

Many of the participants noted that they burned coal during the winter for heating but that the coal ash could not be reused or composted as organic waste. They therefore threw it away with the mixed waste. The participants proposed that instead, coal ash should be treated to produce soil or fertiliser for crops, which would prevent waste by reusing it in a practical way.

"My idea would be that you would use sort of a miracle procedure to make high-quality chernozem [a black soil with high levels of humus] out of ash... Yes... Desulphurise it... So just recover this old material somehow..." (Czech Republic FG3, P 10)

For others, the idea was appealing and addressed a problem to which they could relate.

"I was interested in that because I get loads of ash at my country cottage and it really bothers me. Yes, I don't have to deal with it much, but I really find it unpleasant - physically. So I said to myself, that's a really good idea. Like, I would get something out of that." (Czech Republic FG3, P8)

Participants discussed a number of ways to make waste disposal more convenient. One method is to create a single household bin for all waste, eliminating the need for waste separation. Ideally, the waste would be broken down chemically, reformed and compressed into a brick which could ultimately be used for building.

"[P9] If there is such a thing as a chemical toilet, where the excrement can be broken down into something... why couldn't we achieve the same thing with this? Something can be chucked there. There'll be some sort of device or some sort of chemicals that decomposes it...

[P8] I would be left with, I dunno, maybe some sort of cube once every two months... I imagine something like a brick.

[P3] Someone would build a house out of it..." (Czech Republic FG3)

Once again, participants expressed interest in the idea of reusing waste for a practical purpose. Other participants valued the convenience of dealing with waste at home.

"I liked the fact that everyone would have waste disposal at home, next to the washing machine and the fridge." (Czech Republic FG3, P4)

The final two ideas ranked as priority, each receiving one sticker, involved developing technology to physically alter food. One involved instant, dehydrated food which would require the addition of water to create a meal. The other comprised production of food, particularly food essences and nutrients, which could be inhaled. This food would be pumped into the air and people would receive their nutrition by breathing.

"We would breathe things in - dumplings, sauerkraut and pork in Prague for instance... We would just breathe things in... Well someone would have to come up with the essence and release it into the air for us... We'd just breathe in and wouldn't produce any waste. We will just breathe things in and satisfy our appetite." (Czech Republic FG3, P3)

Both alternatives to food aimed to eliminate excessive food waste from leftovers and from supermarkets, as well as reducing the amount of packaging material needed. Additionally, there would be no excreted waste with inhaled food.

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

Category	Idea	Aim	Target Group	Priority
Technical/ Physical/ Chemical/ Engineering	Produce soil from the ash of burned coal	Effective use of waste	Consumers/Waste management companies	☆☆☆☆☆ ☆☆☆
	Common waste bin for households where waste is treated with chemicals to break it down and reform and compress it into a brick which can be used for building	Effective use of waste	Consumers	☆☆☆☆☆ ☆☆
	Develop instant food that only requires addition of tap water. This will also eliminate leftovers	Less packaging/ Less waste production	Consumers	☆
	Create food/nutrition that could be inhaled. It would be released into the air so there is no need to package and dispose of food	Less waste production/ Less packaging	Producers/ Consumers	☆

MATERIALS

Focus groups proposed the development of new materials, particularly for the composition of packaging materials (see Table 4.3.2). Most participants agreed that packaging material contributes a large portion of mixed waste that ends up in landfills because non-recyclable plastic is often used in packaging. One idea was biodegradable plastic:

"It's actually in the interest of prevention... development of new plastics, some sort of materials that are easily biodegradable." (Czech Republic FG3, P4)

"Biodegradable, so that it can be broken down naturally, that's right... So there is no need to use chemicals and pollute the environment." (Czech Republic FG 1, P8)

In this way, much of the current packaging and waste system would be maintained. Items would still be packaged and the packaging would still be thrown away. However, it would not pollute landfills because it would decompose naturally, over time. One participant even suggested that if the packaging is biodegradable, it could be composted.

Another new material proposed as a solution to excessive packaging waste is edible packaging.

"We were thinking about packaging and having packaging made from something edible." (Czech Republic FG 1, P8)

Packaging of items would be done in much the same way as it is currently but, instead of disposing of the packaging in a landfill, packaging would be used as animal feed. Participants valued this idea as an appealing way to eliminate waste from packaging, which is perceived as very significant.

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

Category	Idea	Aim	Target Group	Priority
Material	Develop new plastics/materials for packaging that are biodegradable	Effect on planet	Producers	☆☆☆☆
	Edible packaging material	Effective use of waste	Consumers	☆☆☆

All four of the ideas in this category were assigned stickers by the participants. The ideas varied widely from disposing of waste permanently to producing less waste or reusing waste more effectively.

The highest ranked idea was the complete destruction of waste by nano-robots. Participants in this focus group were inspired by a television show in which nano-robots could create and destroy everything. They thought it would be good to develop biological nano-robots, operating like white blood cells in the body, to eat and destroy waste. Participants appreciated this idea because most thought that nano-technologies are becoming popular and that this could be a feasible option in the future. Additionally, it would not require a change in lifestyle or restrict the amount of waste people produce, making it an attractive option.

A similar idea was to use bacteria to break down waste. Ideally, there would be nothing left, destroying waste completely, as with the nano-robots. However, if there were a residual product of decomposition, it could be reused as fertiliser or converted into something useful.

"Well, we also put down here about some sort of bacteria that would decompose waste. Like some sort of liquid solution. Residue-free breakdown of waste... If the waste could be completely broken down... and if something was leftover, that couldn't be broken down any further, then it could be used as fertiliser, for instance." (Czech Republic FG 1, P5)

Another idea was based on the understanding that changing people's recycling behaviour was fundamental to achieving the goal of a 'zero waste society'. To bring about this behavioural change, all people would undergo DNA manipulation which would make them care more about recycling.

"[P8] DNA manipulation.
[P 1] Reboot and reprogramme us...
[P8] Somehow we need to rewire ourselves, because as that chap over there said, we are programmed wrong...
[P6] It can be summed up in one term - it needs to become second nature." (Czech Republic FG 1)

The final idea in the category of 'bio(techno)logy' was to reduce the need for polluting chemicals, such as pesticides, by investigating how organisms can be used as biological alternatives. The participants pointed out that bacteria are already used in septic tanks and certain insects can be used to control crop pests. These current applications should be expanded and adapted to reduce the amount of chemicals and to treat organic waste. Lower chemical use would mean less chemical waste and less pollution.

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

Category	Idea	Aim	Target Group	Priority
Bio(techno)logy	Biological nano-robots that can destroy waste	Eliminate waste	Waste management companies	☆☆☆☆☆☆
	Manipulate people's DNA so they will care more about recycling	Behaviour change/ Improve recycling	Consumers	☆☆☆
	Use of biological organisms for pest control and to treat organic waste to limit chemical waste	Effect on planet	Consumers	☆☆
	Bacteria that would be able to decompose waste. The residue could be used as fertiliser or for other applications	Eliminate waste/ Effective use of waste	Consumers/Waste management companies	☆☆

4.3.2 Policy, management and communication

POLICY

The majority of the ideas proposed during the focus groups related to changing policy. Fourteen ideas came under this category, and the second most common category was management, with seven ideas. Ideas in the category 'policy' were also the most frequently assigned priority stickers, with a total of eight ideas. An idea was considered to be related to policy if the idea required central or local government to take action, even if the rest of the idea required other expertise. For example, one idea was to adjust warranties on household appliances.

"And there's a two-year warranty on everything. And companies have got it carefully calculated and they use poor-quality materials... Why not make it a twenty-year warranty period - by law?" (Czech Republic FG2, P1)

Participants considered that producers are able to produce better quality appliances but simply do not. By requiring a twenty-year warranty by law, producers would make appliances that lasted longer, leading to less frequent disposal and less waste. Another idea put forward by participants would place restrictions on product advertising, especially advertising which encourages people to consume more.

"Limit advertising encouraging ever-increasing consumption. We would do that by, you know, providing more information about products... Probably a law on information." (Czech Republic FG 1, P 7)

This law would affect both producers, who do the advertising, and the consumers, who are the target of the advertising, with the aim of bringing about behavioural change to reduce unnecessary consumption and waste production.

Participants often mentioned financial incentives as a means of achieving a 'zero waste society'. They proposed tax incentives for companies that use environmentally friendly packaging, or disincentives for those that do not. This tax legislation would reduce the amount of plastic produced and could be used to promote materials that would have a smaller impact on the environment. Other ideas, which were not so highly prioritised, included banning disposable products to reduce waste production; giving people land to increase local food production, self-sufficiency and reduce waste production; and improving recycling by employing the unemployed to separate waste into the various waste streams. Lastly, participants wanted greater control over the decision-making process regarding waste. The aim of this idea was to have greater control over decisions that affected people locally. An appropriate waste management system could be established for local contexts and external interests would not be able to dictate waste management regulations. The participants proposed to ensure this by voting on regulations and by direct election of those who make key waste decisions.

"[P 1] Yes, a change in the voting system and a change in the people at the top... We want to be able to have an influence on it. We don't want decisions affecting us to be made in Brussels, but somewhere closer to home. We feel that certain things are decided, without the region in question actually being taken into consideration. Every location has different accessibility. Every area a different landfill or incineration accessibility.

[P 10] Also political elections and formulation of municipal regulations.

[P 1] But the people who actually formulate municipal regulations, we need to be able to control them and to be able to dismiss them, for instance." (Czech Republic FG 1)

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

Category	Idea	Aim	Target Group	Priority
Policy	Legislation requiring long (e.g. 20-year) warranty periods for appliances	Less waste production	Producers	☆☆☆☆☆
	Restrictions on advertising that encourages people to consume more. Advertising should state negative environmental aspects and instructions for disposal or reuse	Less waste production/ Behaviour change	Producers/ Consumers	☆☆☆☆☆

Policy	Decentralisation of waste management decisions and direct elections to influence the system by voting for those who are making key waste decisions	Other	Government/ Consumers/ Waste management companies	☆☆☆
	Tax incentives for companies that use environmentally friendly packaging, and higher taxes for companies that do not	Less plastic/ Effect on planet	Producers	☆☆
	Reducing the use of disposable products by law, such as a ban on plastic cutlery	Less waste production/ Less plastic	Producers	☆☆
	Give people who agree to be environmentally friendly land and incentives so they could become self-sufficient and produce only what they need	Local production/ Less waste production/ Behaviour change	Consumers	☆
	Employ the unemployed to sort waste/recycling and maintain recycling areas	Improve recycling	Waste management companies	☆

MANAGEMENT AND LOGISTICS

Some ideas were proposed in the focus groups that make use of existing technologies and systems but require that structures and resources be established or reorganised. These ideas would involve management or logistical adjustments.

One example of a prioritised idea was based on scaling up the deposit system for beer bottles used in the Czech Republic, and many other European countries, in which the consumer pays a deposit at the time of purchase which is refunded automatically when the bottle is returned to a machine. This system could be used to assign a deposit to all sorts of bottles and also many more consumer goods, which would be identified using the barcode.

"[P5] If there were deposits on lots of things, then people would learn to take them back and not chuck them away... We were thinking plastic bottles, glass, cans - they could be returned via machines - and then you could have deposits on clothes, electrical goods and furniture. Everything would be returned... The deposit would work the same way it does now on bottles of beer...

[P3] I just thought that the system could be based on barcodes... we said here that the barcode could incorporate the deposit." (Czech Republic FG2)

Therefore, when the item is disposed of properly, the barcode would be scanned and the deposit, paid at the time of purchase, would be refunded. The participants considered that the financial incentives to recoup their deposits would encourage people to dispose of items properly, resulting in a behaviour change towards improved recycling.

Another prioritised idea proposed to organise the disposal of food waste. Communities would be provided with containers, like a barrel, where people could dispose of leftover food which could then be used as animal feed. Food waste was considered a substantial barrier to achieving a 'zero waste society' and participants considered this to be a good way of reusing food, preferable to dumping it in a landfill.

The fourth idea which was ranked as priority in this category was to fund central composting facilities for organic waste.

"Funds should be allocated to newly established compost facilities, where we can get rid, finally, of all biological waste... Definitely for more than one municipality. Let's say for at least 100,000 people, or 200,000 people. All the organic waste from the municipalities would be taken there, because organic waste rots, so it would have to be taken there regularly... it would be spread back on gardens and you wouldn't have to buy fertiliser." (Czech Republic FG3, P 1)

The organisation of this system would be similar to that of mixed waste and landfills. Organic waste would be

collected from multiple municipalities and brought to a central facility for composting. Participants who prioritised this idea considered that it would be an effective way to treat organic waste and also liked the idea of reusing the composted product.

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

Category	Idea	Aim	Target Group	Priority
Management/ Logistics	Deposits for plastic bottles	Improve recycling	Consumers	☆☆☆☆☆ ☆☆
	System of deposits linked to product barcodes for many consumer goods. The deposit would be refunded to the consumer on returning, or appropriately disposing of, the packaging or product	Improve recycling/ Behaviour change	Consumers	☆☆
	Provision of bins in the community specifically for food waste. This would then be used as animal food	Effective use of waste	Consumers/ Waste management companies	☆☆
	Establish regional composting facilities for organic waste to produce fertiliser	Effective use of waste	Waste management companies/ Government	☆☆

COMMUNICATION AND EDUCATION

Many ideas that fall under the category 'communication and education' pertain to education, raising awareness of recycling. All of the focus groups considered education to be an important issue. Educating the individual was the most highly ranked activity (13 priority stickers in total).

"[P8] People need to be made aware... if I know what's going on, you know, then I'll recycle and the result will be such and such. What we need is for the whole nation to know what's happening...
[M] So education, like you've got here, will motivate you to recycle?
[P8] Yes, that's right." (Czech Republic FG3)

In educating the individual, a commonly suggested approach was to educate children early, through nursery and primary school programmes.

"We put that there needs to be some sort of prevention taught in schools, so that children know what happens with waste and why and how... kids should be taught about it in nursery school. They would have recycling bins and the kids would be able to recycle there." (Czech Republic FG2, P9)
"And then I'd have thought education of the individual... starting off at school... Encouraging them towards it... simply drumming it into them from an early age that we have to take care of the environment. We have to instil it in people." (Czech Republic FG 1, P2)

In this way it was thought that people should be introduced to the concepts, values, and practices of waste separation and recycling at an early age and would continue to recycle throughout their lifetime. Other participants mentioned that some nursery and primary schools do have some information about recycling in their current curriculum but that it is not given enough attention.

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	Educate individuals about waste and recycling: why it is important and how to go about doing it	Awareness of values and possibilities/ Behaviour change	Consumers	☆☆☆☆☆ ☆☆☆☆☆ ☆☆☆

LOCAL INITIATIVES

Some ideas presented in the focus groups were targeted to be implemented in a particular region, and were considered to be 'local initiatives'. Many of the participants considered that financial incentives were the best way to motivate people to sort waste, particularly for those who paid a fee for their municipal waste bin regardless of whether they recycled. Participants said households should be able to trade in bags of recyclable goods for coupons which could be redeemed for discounts on their municipal waste collection fee.

"Twice a week we will drive around and we'll give them coupons, for the time being, in exchange for plastic and when someone has got 100 coupons, then they won't pay CZK 500[13] for their dustbin but CZK 400." (Czech Republic FG3, P 1)

This would be coordinated by the town or municipal authorities, since waste collection payments differ between municipalities, and would provide people with a financial incentive to separate their waste. Once they hand in their separated waste, the municipality would only need to ensure that the separated waste ends up at the appropriate processing facility.

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

Category	Idea	Aim	Target Group	Priority
Local initiatives	Trade in bags of recyclable goods for coupons/ discounts off the municipal collection fee for mixed waste (There is currently a fee for waste to be collected)	Improve recycling/ Behaviour change	Consumers/ Waste management companies	☆

OTHER

The category 'other' is concerned with issues that are outside the scope of 'municipal solid waste'. One idea was put forward that belonged to this category and this idea was also ranked as priority (see table 4.3.8). The idea was to make clean energy options cheaper, with incentives to reduce coal and other fuel waste.

"The people who use that sort of energy need incentives... I know in our specific case that we started heating using electricity and we got an exemption from real-estate tax, or something... and then they stopped it... well now everyone is turning back to fossil fuels, and three-quarters of Prague is being heated with all sorts of terrible stuff." (Czech Republic FG3, P 1)

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

Category	Idea	Aim	Target Group	Priority
Other	Make clean energy options cheaper or provide financial incentives to households that use clean energy options in order to reduce waste from burning coal	Effect on planet/ Less waste production	Consumers	☆☆☆☆

[13] CZK 500 is approximately € 19.50 in June 2013 (1 CZK = Euro 0.039)

5. Conclusion, discussion and evaluation

This country report presents country-specific findings from citizen focus groups in the Czech Republic. 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 Czech Republic three focus groups were held.

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

Below, we present the main findings of the focus groups in the Czech Republic. 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 Czech Republic ranks 21st on the EU27 ranking list on municipal solid waste recycling. Over the past decade, the recycling of municipal solid waste has increased from 1% to 16%. Efforts continue to be made in an attempt to achieve the EU target of recycling 50% of household waste by 2020.[14] The results of the focus groups clearly show the results of these efforts. Nearly all participants separate their waste to some extent at the household level and have access to basic facilities to dispose of these separate streams. This is consistent with the findings from the Flash Eurobarometer survey 'Attitudes of Europeans towards resource efficiency'[15] in which 92% of respondents from the Czech Republic indicated separating at least some of their waste for composting or recycling (see Annex 2). It is clear that participants know what is expected of them in terms of waste separation. Knowledge about what happens to their waste after disposal is limited and varied from one participant to the next.

In the focus groups, clusters of barriers and concerns were identified which hinder waste management. With regard to waste production and prevention, participants from all focus groups were concerned about excess packaging material which is often not reusable or recyclable. Food waste was also considered to be a barrier to waste production and prevention. Participants noted that people often prepare too much food and then throw out leftovers in the mixed waste, and both supermarkets and schools throw out large volumes of food waste daily.

Participants questioned whether or not separating their waste actually had any effect because everyone knew other citizens who did not separate waste and had seen separated waste being recombined during collection. Participants did not separate their waste when they did not know how it should be disposed of properly, when there was no financial incentive to do so, and because of laziness.

Participants encountered a number of challenges when disposing of their waste. The most common barrier, mentioned in all focus groups, was an insufficient number of recycling bins and overflowing bins. When bins are full, participants take their waste elsewhere, causing those bins to fill up faster too. Other participants become frustrated and dump their separated waste next to the mixed waste, or do not bother separating in the first place. Limited accessibility to sorting facilities, due to distance or collection frequency, also served as a barrier to waste disposal. Large or toxic items are only collected about twice per year and people are turned away on collection days once the skip is full. Inability to deal with waste appropriately sometimes leads to dumping of waste in unsanctioned areas.

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 of these domains is further divided into four sub-categories. Ideas in the first domain, 'environmental sciences and technology', focus mainly on developing new materials and technical processes that will reduce the amount of waste produced, reduce the impact waste has on the environment, and promote effective reuse of waste. Consumers and producers are the most common target groups of the innovations, followed by waste management companies.

Participants proposed research on innovative, biodegradable materials that would have less of an environmental impact when they end up in landfills, and which would reduce the use of plastics, particularly for prod-

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

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

uct packaging. Other key findings related to the disposal of waste. Participants found it important to try to reuse as much as possible, developing technologies to reuse waste for other applications, or to have waste destroyed all together.

Ideas in the second domain, 'policy, management and communication', included proposals for regulations, incentives and the organisation of structures or services. Proposals in the category 'communication and education' aim to reduce waste production, improve recycling, raise awareness, and change behaviour. As in the first domain, the reduction of waste, with emphasis placed on plastic packaging, was a common goal. Many ideas also aimed to improve recycling behaviour. The main target groups are consumers and producers, with waste management companies and the government also mentioned.

Education was found to be the most important theme across all the focus groups. Educating people, especially children, was seen to be a fundamental step toward achieving a 'zero waste society', and indeed central to achieving the aims put forth in other ideas. By targeting children (consumers), it would be possible to instil an understanding of the importance of recycling and habits in people at a young age.
It is also clear that legislation is thought to be an important tool for bringing about change by the sheer number of ideas put forward for policy change. Proposed policies targeted consumers and producers with financial incentives for good recycling practices, penalties for improper waste disposal and excessive (non-recyclable) waste production, and banned the use of certain materials outright. Furthermore, participants expressed a desire to be more involved and have greater control over waste management regulations.

When looking at the three highest prioritised ideas, the first priority is to educate individuals about waste and recycling: why it is important and how to go about doing it (thirteen stickers). The second priority involves producing soil from the ash of burned coal (eight stickers), followed by deposits for plastic bottles (seven stickers).

5.3 Reflection

The focus groups were effective in eliciting citizens' preferences, values, needs and expectations concerning urban waste and innovation. Overall, participants felt that the discussion was informative and enjoyable, and most participants appreciated the relaxed nature of the discussion. Many were pleased that waste management issues are being tackled and that the European Commission is asking their opinions. Although they were sceptical as to whether or not their discussions will have any practical impact, the participants were hopeful that this initiative will lead to change.

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	Produce soil from the ash of burned coal	Effective use of waste	Consumers/ Waste management companies	☆☆☆☆☆ ☆☆☆
	Common waste bin for households where waste is treated with chemicals to break it down and reform and compress it into a brick which can be used for building	Effective use of waste	Consumers	☆☆☆☆☆ ☆☆
	Create food/nutrition that could be inhaled. It would be released into the air so there is no need to package and dispose of food	Less waste production/ Less packaging	Producers/ Consumers	☆
	Develop instant food that only requires addition of tap water. This will also eliminate leftovers	Less packaging/ Less waste production	Consumers	☆
	Develop nutritional tablets to replace food	Less waste production	Consumers	
	Transport waste to another planet or incinerate it as it is being blasted to space	Eliminate waste	Waste management companies	
	Create an invisibility device or hologram that would hide landfills from sight	Other	Waste management companies	
	Equip households with tube transport systems for food to reduce the need for packaging. Milk would come out of a tap and bread would come straight from the bakery through the tube	Less packaging	Consumers	
Material	Develop new plastics/materials for packaging that are biodegradable	Effect on planet	Producers	☆☆☆☆
	Edible packaging material	Effective use of waste	Consumers	☆☆☆
	Biodegradable clothing that would disintegrate after two years or could be left outside and grass would grow from it	Less waste production/ Effective use of waste	Consumers	
	Re-usable packaging	Less waste production	Producers/ Consumers	
Bio(techno)-logical	Biological nano-robots that can destroy waste	Eliminate waste	Waste management companies	☆☆☆☆☆ ☆
	Manipulate people's DNA so they will care more about recycling	Behaviour change/ Improve recycling	Consumers	☆☆☆

Use of biological organisms for pest control and to treat organic waste to limit chemical waste	Effect on planet	Consumers	☆☆
Bacteria that would be able to decompose waste. The residue could be used as fertiliser or for other applications	Eliminate waste/ Effective use of waste	Consumers/ Waste management companies	☆☆

POLICY, MANAGEMENT AND COMMUNICATION

Category	Idea	Aim	Target Group	Priority
Policy	Legislation requiring long (e.g. 20-year) warranty periods for appliances	Less waste production	Producers	☆☆☆☆☆
	Restrictions on advertising that encourages people to consume more. Advertising should state negative environmental aspects and instructions for disposal or reuse	Less waste production/ Behaviour change	Producers/ Consumers	☆☆☆☆☆
	Decentralisation of waste management decisions and direct elections to influence the system by voting for those who are making key waste decisions	Other	Government/ Consumers/ Waste management companies	☆☆☆
	Tax incentives for companies that use environmentally friendly packaging, and higher taxes for companies that do not	Less plastic/ Effect on planet	Producers	☆☆
	Reduce the use of disposable products by law, such as a ban on plastic cutlery	Less waste production/ Less plastic	Producers	☆☆
	Give people who agree to be environmentally friendly land and incentives so they could become self-sufficient and produce only what they need	Local production/ Less waste production/ Behaviour change	Consumers	☆
	Employ the unemployed to sort waste/ recycling and maintain recycling areas	Improve recycling	Waste management companies	☆
	Provide financial incentives to businesses and entrepreneurs who develop and implement new waste management technologies	Other	Producers	
	Taxes or fees on the amount of waste produced that cannot be biodegraded or recycled	Less waste production/ Behaviour change	Consumers/ Producers	
	Require companies to utilise recyclable or biodegradable packaging for their products	Effect on planet/ Less plastic	Producers	
	Grants and subsidies from State or EU for companies that produce more durable, longer-lasting products	Less use of resources	Producers	
	Financial incentives for those who recycle	Improve recycling/ Behaviour change	Consumers	
	Get rid of the flat-rate fee for garbage collection and charge people only for the mixed waste they produce	Improve recycling	Consumers	
	Better enforcement of laws and policies regarding waste disposal and recycling	Improve recycling/ Behaviour change	Consumers/ Producers/ Waste management companies	

Management/ Logistics	Deposits for plastic bottles	Improve recycling	Consumers	☆☆☆☆☆ ☆☆
	System of deposits linked to product barcodes for many consumer goods. The deposit would be refunded to the consumer on returning, or appropriately disposing of, the packaging or product	Improve recycling/ Behaviour change	Consumers	☆☆
	Establish regional composting facilities for organic waste to produce fertiliser	Effective use of waste	Waste management companies/ Government	☆☆
	Provision of bins in the community specifically for food waste. This would then be used as animal food	Effective use of waste	Consumers/ Waste management companies	☆☆
	More frequent collections of recyclable waste	Improve recycling	Waste management companies	
	More frequent collections of second hand clothing by charities	Improve recycling	Other	
	Garbage collectors will not collect rubbish bins if there is recyclable material in it	Improve recycling/ Behaviour change	Consumers/ Waste management companies	
	Improve access to recycling centres/bins: there should be sufficient space in the bins and have parking alongside them	Improve recycling	Waste management companies/ Consumers	
Communication and education	Educate individuals about waste and recycling: why it is important and how to go about doing it	Awareness of values and possibilities/ Behaviour change	Consumers	☆☆☆☆☆ ☆☆☆☆☆ ☆☆☆
	Raise nationwide awareness of the negative effects of improper waste disposal and the benefits of recycling	Awareness of negative effects/ Awareness of possibilities	Consumers	
	Use billboards to inform the public how recycled materials are being recycled/reused	Awareness of possibilities	Consumers	
	Label products made from recycled material	Awareness of possibilities	Consumers	
Local initiatives	Trade in bags of recyclable goods for coupons/discounts off the municipal collection fee for mixed waste (There is currently a fee for waste to be collected)	Improve recycling/ Behaviour change	Consumers/ Waste management companies	☆
	Buy drinks using your own bottle	Less packaging	Consumers	
Other	Make clean energy options cheaper or provide financial incentives to households that use clean energy options in order to reduce waste from burning coal	Effect on planet/ Less waste production	Consumers	☆☆☆☆

Annex 2: Attitudes of citizens from the Czech Republic 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 Czech Republic.

Question	Answer	%	EU27 Average
Do you think Europe could be more efficient in its use of natural resources?	Yes	80%	87%
	No	9%	5%
	DK/NA*	11%	8%
Do you think that your household is producing too much waste or not?	Yes	29%	41%
	No	70%	58%
	DK/NA*	1%	1%
Do you separate at least some of your waste for recycling or composting?	Yes	92%	89%
	No	8%	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	72%	76%
	Improve separate waste collection at your home	49%	67%
	More information on how and where to separate waste	57%	65%
	Legal obligation to separate waste	36%	59%
	Taxes for waste management	38%	39%
What initiatives would improve waste management in your community?	Better waste collection services	73%	70%
	Stronger law enforcement on waste management	58%	65%
	Make producers pay for collection and recycling of waste	61%	63%
	Make households pay for the waste they produce	43%	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	20%	14%
	To pay proportionally to the quantity of waste you generate	73%	75%
	DK/NA*	7%	11%

Which one would you prefer: to pay taxes for waste management or to include the cost of waste management in the price of the products you buy?	To pay taxes for waste management	25%	25%
	Include the cost of waste management in the price of the products you buy	58%	59%
	DK/NA*	17%	16%
Can you estimate what percentage of the food you buy goes to waste?	None	36%	11%
	15% or less	55%	71%
	16% to 30%	8%	13%
	More than 30%	1%	4%
	DK/NA*	0%	1%
What would help you to waste less food?	Better estimate portion sizes (how much food you cook) to avoid excess food	37%	62%
	Better information on food product labels, e.g. how to interpret "best before" dates, information on storage and preparation	46%	61%
	Better shopping planning by my household	48%	58%
	Smaller portion sizes available in shops	41%	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	34%	39%
	Rather important	32%	41%
	Rather not important	19%	12%
	Not at all important	12%	6%
	DK/NA*	3%	2%
Are you willing to buy second-hand products?	Yes	4%	68%
Base: all respondents, % of yes			
Would you buy the following products second hand?	Furniture	37%	56%
Base: all respondents, % of yes	Electronic equipment	29%	45%
	Textiles (clothing, bedding, curtains, etc)	31%	36%
What reasons prevent you from buying second-hand products?	Quality/usability of the product	64%	58%
	Health and safety concerns	45%	50%
	Less appealing look of the product	14%	25%
	Afraid of what others might think	4%	5%
Would you buy products made of recycled materials?	Yes	76%	86%
	No	17%	11%
	DK/NA*	7%	3%
What would be the most important factors in your decision to buy products made of recycled materials?	Quality/usability of the product	50%	51%
	Environmental impact of the product	25%	26%
	Price of the product	22%	18%
	Brand/brand name of the product	3%	2%
	DK/NA*	0%	3%
What prevents you from buying recycled products or products containing recycled materials?	Health and safety concerns	35%	44%
	Quality/usability of the product	43%	42%
	No clear consumer information on the recycled product	11%	32%
	Less appealing look of the product	17%	17%
	Afraid of what others might think	8%	5%

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

NOTES

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VOICES, CITIZEN PARTICIPATION IN SOCIAL INNOVATION

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

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

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

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

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