

**CZECH UNIVERSITY OF LIFE SCIENCES**  
**FACULTY OF ECONOMICS AND MANAGEMENT**  
**AGRICULTURAL ECONOMICS AND MANAGEMENT**



**THE ECONOMY OF RECYCLING IN**  
**THE CZECH REPUBLIC**

**BACHELOR THESIS**

Supervisor:

Doc. Ing. Mansoor Maitah, Ph.D. et Ph.D.

Consultant:

Ing. Oldřich Výlupek, MSc, Ph.D.

Elaborated by:

Michal Kačor

**PRAGUE 2014**

## Declaration

I declare that I have worked on my bachelor thesis “the Economy of Recycling in the Czech Republic” by myself and I have used only the sources mentioned at the end of the thesis. As the author of this bachelor thesis, I declare that the thesis does not break copyrights of any third person.

In Prague

.....

Michal Kačor

## Acknowledgment

I would like to thank my supervisor Doc. Ing. Mansoor Maitah, Ph.D. et Ph.D. for his help. Furthermore I would like to thank my consultant Ing. Oldřich Výlupek, MSc, Ph.D. for his professional assistance during assessment of my bachelor thesis.

# The Economy of Recycling in the Czech Republic

## Summary

This bachelor thesis is focused on waste management and the economy of recycling in the Czech Republic. The theoretical part, which uses data and information from real life dynamics, describes the historical and current situation of the topic. There are introductions to definitions and various suggestions to improvements throughout the thesis. The structure of the waste utilization in the country and analysis of recent years create clearer understanding of this sector of economy. The practical part includes a questionnaire to find out the attitude to recycling of a limited group of people. The findings result in suggestions for improvements in future implementations.

**Key words:** Recycling, waste, economy, the Czech Republic

# Ekonomika recyklace v České republice

## Abstrakt

Tato bakalářská práce je zaměřena na problematiku odpadového hospodářství a ekonomiku recyklace v České republice. Teoretická část, která používá data a informace z reálné každodenní dynamiky, popisuje historickou a současnou situaci zvoleného tématu. V práci nechybí ani zasvěcení do definicí a návrhy na různá zlepšení. Struktura materiálového využití odpadu ve státě a rozbor posledních let nám přináší jasnější pochopení sektoru této ekonomiky. Praktická část používá dotazník jako nástroj k tomu, aby vyhodnotila postoj k recyklaci určité skupiny lidí. Z výsledků plynou návrhy ke zlepšení v budoucí implementaci.

**Klíčová slova:** Recyklace, odpady, ekonomika, Česká republika

# Table of contents

|   |    |
|---|----|
| 1. Introduction.....  | 4  |
| 2. Objectives .....   | 4  |
| 3. Literature review.....   | 5  |
| 3.1. What is recycling?.....  | 5  |
| 3.2. Before waste is even created.....  | 7  |
| 3.2.1. Reduce .....   | 7  |
| 3.2.2. Reuse.....   | 8  |
| 3.2.3. Recycle.....   | 9  |
| 3.3. The history of waste management system .....                               | 10 |
| 3.4. PRO EUROPE .....   | 12 |
| 3.5. EKO-KOM history.....   | 15 |
| 3.6. Rules in your town .....   | 20 |
| 3.7. Journeys of waste .....  | 21 |
| 3.7.1. Municipal waste.....   | 21 |
| 3.7.2. Waste and Recycling Centre.....  | 21 |
| 3.7.3. The containers and collection .....                                      | 22 |
| 3.7.4. Sorting lines .....  | 23 |
| 3.7.5. Incinerators .....   | 23 |
| 3.7.6. Mixed municipal waste.....   | 24 |
| 3.7.7. Paper .....  | 25 |
| 3.7.8. Plastic.....   | 26 |
| 3.7.9. Glass.....   | 27 |
| 3.7.10. Liquid packaging board (LPB).....                                       | 28 |
| 3.7.11. Metal .....   | 29 |
| 3.7.12. Clothing.....   | 30 |
| 3.7.13. Biodegradable waste .....   | 30 |
| 3.7.14. High volume waste, Dangerous compounds, Electronics, Drugs, Rubble..... | 31 |

|   |    |
|---|----|
| 4. Methodology .....                        | 33 |
| 5. Results.....                             | 34 |
| 6. Conclusion .....                         | 40 |
| 7. References.....                          | 41 |
| 7.1. Bibliography.....                      | 41 |
| 7.2. Legal documents .....                  | 41 |
| 7.3. On-line sources.....                   | 42 |
| 8. List of figures and list of tables ..... | 45 |
| 8.1. List of figures .....                  | 45 |
| 8.2. List of Tables.....                    | 46 |
| 9. Appendix.....                            | 47 |

# 1. Introduction

Waste management and recycling is an important issue that the human kind cannot avoid. These days the economy is built around this topic and nevertheless it is not often discussed. The waste generation has been often better overlooked than solved by us 'ordinary' inhabitants. This was partially the reason this topic was chosen. The initiator of this thesis firstly wanted to learn by gathering the knowledge and information regarding this topic. The secondary goal was to pass the knowledge to anybody who is interested in it and thus launch this thesis. Throughout the research there was more material gathered than it would be possible to describe in the following pages. These generally not obvious or simply overlooked facts (for example, the three 'R's with which the writing starts) put together would be available to the readers of this work, as well as anyone else interested in this topic.

The practical part will be focused on people and their view on recycling in the Czech Republic. To the author's belief it is necessary to get to know our audience to solve or improve any occurring problem. Their answers will provide valuable information that will help to improve the economy of waste utilization. Even though conclusions and suggested solutions will be only theoretical, the idea of spreading knowledge using this thesis is a satisfactory move towards a better future.

## 2. Objectives

The aims of the thesis are not only to analyse how much the recycled materials are reused and engaged again to the production process. The thesis is also focused on practical approaches and management of municipalities and companies in order to describe a structure of waste utilization in the Czech Republic. The other aim is to create clearer understanding of the issue. For example, as we will learn in the pages below, waste utilization might not mean only creating new products, but also generating heat and electric power. However, the main idea of this thesis remains to show the benefits of proper recycling and the economic factors of the proven system of recycling in the country.

The practical part will allow us to evaluate a questionnaire. It gives us an opportunity to analyse the findings and make conclusions. The methods of research for both, the theoretical part and practical part are described in the section Methodology.

## 3. Literature review

### 3.1. What is recycling?

The term recycling is related to waste utilization. Recycling is a kind of undertaken action which results in waste becoming base material for further usage; the products that originally served its purpose will now be reused. Recycling is the process of making or manufacturing new products from old ones. The main idea of recycling is to reduce the use of raw materials that would be collected and used. Recycling also involves less energy and there are serious rules of controlling air, water and land pollution. This processing of used materials has to be done in an appropriate and environmentally friendly way (Benefits, 2014).

Worrell (2014) introduces in his scientific journal that recycling was used back in 400 BC through re-melting glass and bronze. In modern times even some bank notes included recycled cotton. The industrial revolution caused low-cost mass production and made cost of material and products more attractive this way. He continues with a discussion of the changing role of recycling nowadays and its intensive integrating into waste management.

The first step in the chain of effective recycling starts with households or other places where waste is created. Everyone's attitude, knowledge and lastly behaviour directly influences the future of waste produced. If we sort waste correctly, it will allow its recycling and reusing. If we throw waste into the dustbin, it will be taken to a landfill or it will be liquidated without any other reintegration to production. In many countries, the authorities help households in this issue. They provide bin bags with labels on them and we seem to have less 'work' in sorting waste in proper bags for collection (Benefits, 2014).

It is believed that the trend of recycling is growing with time passing by. People start to realize the importance of recycling. On the other hand there are still individuals that are unaware or simply think it is a hassle. Throughout time the awareness deepened and many programs teaching children and also adults were established. As well as the awareness was raised in schools, the same was happening in businesses around the world.

Opportunities to help and care for the environment have risen in workplaces too. Businesses provide clearly marked bins for recyclable trash. Energy efficient light bulbs are introduced to the market. Management is able to offer educational materials on recycling and living sustainably to their employees. Businesses in general want to save



money anywhere possible and try to appear well for public sphere. When products go through a recycling process and they become cheaper, it creates a win-win situation for both people and the Earth. Many businesses expand by working on environmentally friendly projects like the solar energy or water conservation (Benefits, 2014).

It is time to be aware of the impact what we as humans do to our surrounding. Topics like energy efficient cars, solar energy and water conservation have something to do with recycling. The damage we might inflict on the environment results in global warming, secluding the space in nature for landfills, water insufficiency, loss of wildlife and plants and list goes on. The goal of this thesis is to educate the reader, inspire them to take an action and share the information with others. The writer believes that the human kind knows in its core that they are responsible for the environment they live in and as co-creators of this planet they need to maintain the beauty of it (Benefits, 2014).

## 3.2. Before waste is even created

There is a simple paragraph of one sentence in the introductory part of the EU Directive 94/62, the quote says: ‘... The best means of preventing the creation of packaging waste is to reduce the overall volume of packaging.’

There is a saying that the best type of waste is the one that will not come to existence at all. Recycling is one of three components which would make waste handling better. The components are to reduce, to reuse and to recycle. Recycling involves the processing of old and used materials. Whereas reducing and reusing still promises to live in a better surrounding, because the products are from the original raw materials. Reducing and reusing are the most effective ways to save natural resources. To create a new product several steps has to be followed. Raw materials have to be extracted from the earth. They are fabricated to products and transported to the place they are sold. Thus making a new product requires more energy and money. The environment is everything that is around us including air, water, land, plants and man-made things. Since it is the place we want to live in it is up to us how we choose to handle waste. Waste we create should be handled smart to be able to live in healthy environment for our own health and happiness (ARF, 2014; NIH, 2014a).

These three ‘R’s are here to illustrate the most effective way of waste management practices. Reducing means to reduce the amount of waste generated. Buying and consuming less automatically means we will throw away much less. Other times the consumption is necessary. The good choice is to reuse as much as possible. It is the smart choice, although often not very popular, to use an item again and again in its original form. Before choosing the last ‘R’, and it is to recycle, these two will greatly reduce amount of waste (ARF, 2014; NIH, 2014a).

### 3.2.1. Reduce

It all begins with the question if waste has to be even produced or if the new product has to be really purchased. The bottom line is that reducing is the most effective way of preventing waste and to conserve resources. Reduction means to make something smaller or use less. Therefore, we can think twice if we need that new thing in the shop. First of all, buy and use less. We can choose to buy what we need, not what we want and leave it after a while in the corner in the house, forgotten. Right now, we are a mass of population. We can think that we are just individuals and ask ourselves what difference we are able to

make anyway. Everybody can make a difference, if everyone takes another one along. By purchasing more than it needs to be the population feeds the culture of consumerism. It results in illusion of bigger need and demand than it actually is. The manufacturers produce more and more, in other words, they use more resources and create more waste (ARF, 2014; NIH, 2014b).

Flashy and fancy looking packages cost more. They usually add no value to the product. The initial look at the 'product' (read package) is great. Nevertheless, once we want to buy a thing, we want the thing the package contains inside of it. We made a choice what we want to buy and use but the wrapping goes into the trash. So when possible, grab the products in readily recyclable packaging. Use the recyclable containers, you can use beverages in large bottles and once you need to take water or juice with you to work, just take it in your own reusable plastic bottle. In many cities the tap water is just as healthy as bottled water in the shop. It is much cheaper as well. Are the store bags really necessary? When you buy up to two items, carry it in your hands. Other way is to have your own a reusable cloth sack with you. Paper and plastic bags are recyclable, too. Buying in bulks reduce the price and waste from the packaging. Do you get unwanted ads, catalogues, etc. in the mail? If possible call toll-free number to exclude you from mailing list. This is for only some type of people, but if you have a garden start growing food. The food does not have to go through all the process to get on your table (fuel to transport, pay the labour, package). Start the compost or vermiculture bin (worms turn our old food into plant food. It is called vermicomposting). All the organic materials can turn into compost and then serve for the garden as a fuel to grow your plants. The neat lawns will turn into fruitful gardens that your neighbour might envy when the peak of the season hits. It is better for environment, a little time consuming, but we humans have pleasure from creating, being independent from the shops and to be able to grab our own vegetable from the garden. It might be at least slightly fulfilling. Think on your own where it is possible to save energy or materials, such as electricity, water, fuel, etc. (ARF, 2014; NIH, 2014b).

### 3.2.2. Reuse

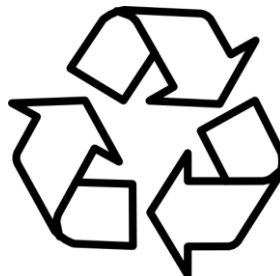
To reduce and reuse interconnects. When you buy what you need, use all what you buy. In case you will not use all you buy, make sure you pass it along. Other people might be as happy of getting it as you were back in the past. It is especially important with environmentally dangerous things. Be it chemicals, paint or even old electronics. You can think of any other objects which often end up in trash, or better in recycling place, on your own. One man's trash is another man's treasure (ARF, 2014; NIH, 2014c).

Carry along reusable bottles during a day. Keep it in the car or at the work place. Have washable cups or travel mugs. Instead of throwing away disposables like plastic cups, plates or forks and knives, wash and reuse them. Your time might be more expensive than washing these things, but you do not throw away a toothbrush or a table after one use either. Moreover, use silverware and dishes instead of disposable ones. Another form of reuse is to repair durable goods rather than replacing them when they break (a car, a bicycle, a computer, a printing machine, a table). Environment and your pocket will be more satisfied. Pass along cloths, toys, furniture. Somebody else will probably use them. Make a yard sale or give-away, sell on internet, donate or give them to friends. Reusing prevents new resources to be implemented for a while longer, and old resources to enter waste stream (ARF, 2014; NIH, 2014c).

### 3.2.3. Recycle

Who is not a huge fan of landfills will reduce the amount of waste sent there by sorting the garbage into multiple bins for different materials. Unlike many other countries, if there is recycling established at all, the Czech Republic has for different materials different containers. They are of different colours and of course with labels, often accompanied with a picture to support clear understanding of what belongs to which container. Recycling centres exist as well, where you can drop off things you want to recycle. The way of collecting, processing, manufacturing and creating new products out of different materials will be described further in the thesis. As we will learn the main idea of collecting in the Czech Republic is fixed, but the cities have it slightly diverse. Many people do not know it yet, but they are legally bounded to recycle (ARF, 2014; NIH, 2014d).

**Chyba! Nenalezen zdroj odkazů.**Chyba! Nenalezen zdroj odkazů. Figure 1: A typical



mbol for recycling

### 3.3. The history of waste management system

Waste management is a generally young sector even in developed countries. It occupied their focus intensively in the last 20 to 30 years, thus the first Waste Act in the Czech Republic was adopted not very long ago - in 1991. Before this year there was no legislative control over waste management in the Czech Republic and so called sectoral rules governed just secondary raw materials (which are materials created as 'side effect' by production of primary material, it does not have to mean it is low-grade material, but if there is no further use to it, it becomes waste) (ME, 2014a).

In the Act on Waste and Amendment of Some Other Acts, there is Section 3, Definition of Waste. At the point one it says: "Waste shall be any movable thing that a person discards or intends to discard or is obliged to discard and that is specified in some of the waste categories stipulated in Annex 1 to this act." I advise to read the Act more closely in case of real interest in classification of waste.

Waste has been accompanying human society since the beginning. It is a "by-product" of plenty of human activities. It materializes the most now, more than ever before. Referring to the Czech Republic and countries similar to it, we can say that the entire population generates municipal waste and sludge from wastewater treatment plants. Additionally, we are facing industrial, construction, agricultural, traffic, hazardous and other types of waste in the everyday consumer society (ME, 2014b).

Each type of waste requires different type of handling. The degree in which it can endanger environment plays an important role. The Waste Act specifies basic rules for waste treatment. With the compliance of this Act, Waste Management Plan of the Czech Republic for 2003-2013 was published in the form of Government Regulation. The goals for waste treatment methods and arrangements for achieving them were set in the document. The implementation and consequently evaluation is reviewed annually by means of Assessment Report, which is to be found on the Ministry website. The following table shows comparison of types of waste produced in EU and the Czech Republic in 2001, which is to be found in the document (ME, 2014b).

Table 1: Comparison of production of important groups of wastes in EU and in the Czech Republic in 2001

| Groups of wastes                    | Amount of waste (%) |                |
|-------------------------------------|---------------------|----------------|
|                                     | EU                  | Czech Republic |
| Municipal waste                     | 14                  | 13.3           |
| Construction and demolition wastes  | 22                  | 12             |
| Wastes from mining of raw materials | 29                  | 6              |
| Wastes from energy production       | 4                   | 24             |
| Industrial wastes                   | 59                  | 69             |

Source: SEP 2001, WMIS

Source: Waste Management Plan of the Czech Republic for 2003-2013

Interesting conclusions can be made and I will quote the text in the document concerning the table: “Waste production from mining mineral sources is substantially greater in the EU member states than in the Czech Republic; on the contrary, generation of waste in energy production is much lower in the EU member countries than in the Czech Republic.”

Three documents ‘Souhrnná data o odpadovém hospodářství v ČR v roce 2011; ... 2012; ... 2013’ from official webpage of Ministry of Environment (ME, 2014c), which translates to ‘Summary data description about waste management in 2011; ... 2012; ... 2013’ contain data description about waste management in the Czech Republic in recent years. The following table sums it up.

Table 2: Production and Overall Waste Management in the Czech Republic in 2011-2013

| Waste overall | Production (million tons) | Utilized (%) | Recycled (%) | Energetically utilized (%) | Removed (%) | Landfills (%) | Other handling (%) |
|---------------|---------------------------|--------------|--------------|----------------------------|-------------|---------------|--------------------|
| 2011          | 31.1                      | 78           | 75           | 3                          | 14          | 13            | 8                  |
| 2012          | 30                        | 79           | 76           | 3.5                        | 13          | 13            | 8                  |
| 2013          | 30.6                      | 79.5         | 76           | 3.5                        | 11          | 11            | 9.5                |

Source: [http://www.mzp.cz/cz/odpady\\_podrubrika](http://www.mzp.cz/cz/odpady_podrubrika)

According to data 79.5 % of overall packaging was utilized, 11 % was removed to landfills and 9.5 % was handled differently in 2013.

Table 3: Production and Municipal Waste Management in the Czech Republic in 2011-2013

| Municipal Waste | Production (million tons) | Utilized (%) | Recycled (%) | Energetically utilized (%) | Removed (%) | Landfill (%) | Other handling (%) |
|-----------------|---------------------------|--------------|--------------|----------------------------|-------------|--------------|--------------------|
| 2011            | 5.4                       | 42           | 31           | 11                         | 55          | 55           | 3                  |
| 2012            | 5.2                       | 42           | 30           | 12                         | 54          | 54           | 4                  |
| 2013            | 5.2                       | 42           | 30           | 12                         | 52          | 52           | 6                  |

Source: [http://www.mzp.cz/cz/odpady\\_podrubrika](http://www.mzp.cz/cz/odpady_podrubrika)

According to data just 42 % of municipal waste was utilized, 52 % was removed to landfills and 6 % was handled differently in 2013.

### 3.4. PRO EUROPE

PRO EUROPE s.p.r.l. (Packaging Recovery Organization Europe) was established in 1995. The 'Green Dot' symbol is used as a trademark. The organization involves many European countries now. The practice is following packaging and packaging waste recovery and recycling systems. PRO EUROPE is especially the general licensor of the 'Green Dot' trademark (Pro-e, 2014a).

Companies involved in the program are enabled to use 'Green Dot' symbol on packaging. Such companies contribute to producer responsibility. They paid financial contribution to a qualified national recovery organization, this organization (which has different name in different country) follow EU Directive 94/62 on packaging and packaging waste and furthermore corresponding national laws (Pro-e, 2014a).

Figure 2: The Green Dot symbol occurring on packages



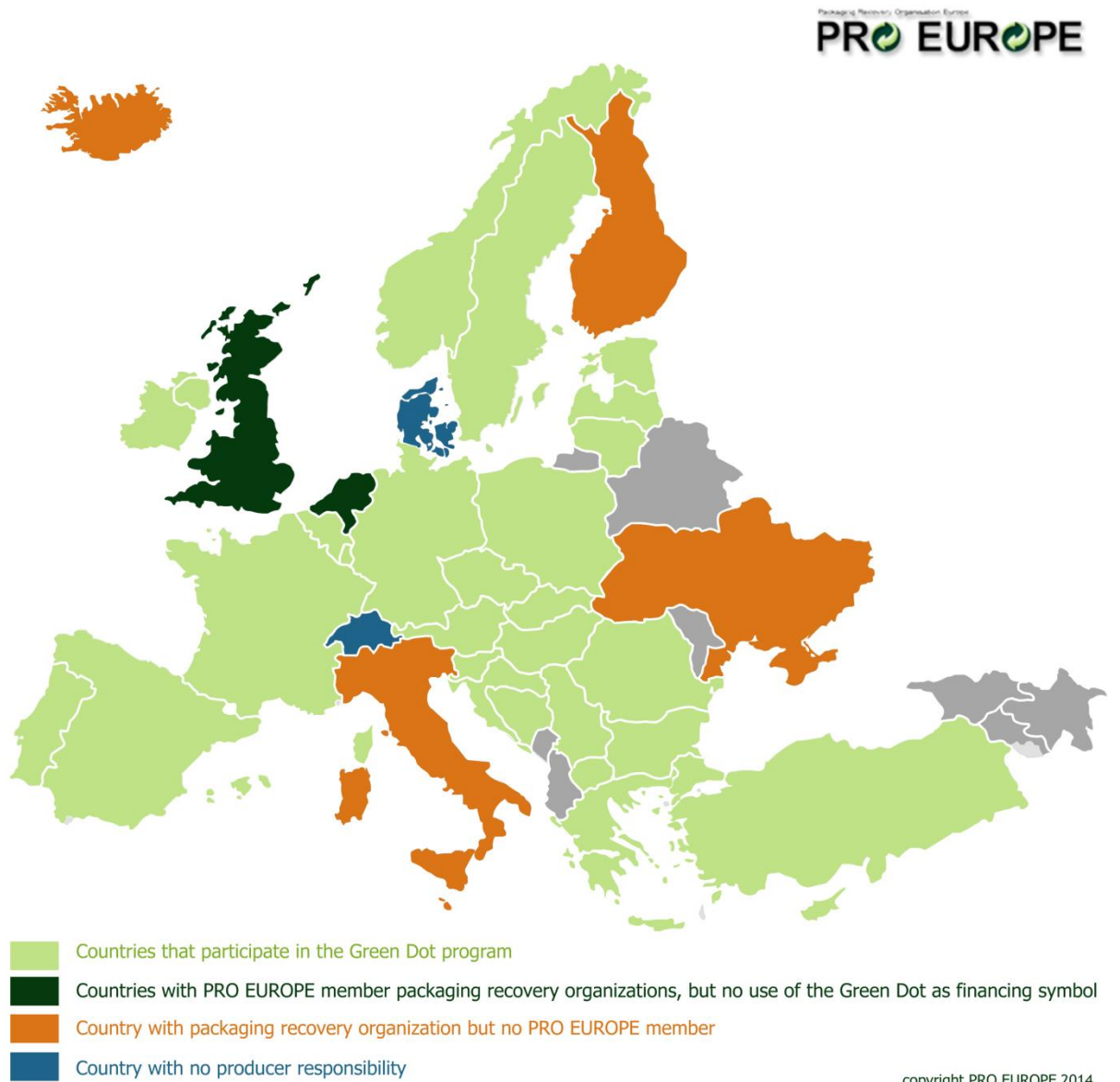
The 'Green Dot' spread in many countries. Such a fact made it the most extensively used trademark in the world. Over 170,000 companies are licensees and are operating with this trademark. Concerning packaging items - over 460 billion of them are made and labelled with the symbol annually (Pro-e, 2014a).

The members that implement this proven concept are formed of 31 nations in 31 countries. In Europe twenty-three EU member are Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, France, Germany, Greece, Hungary, Ireland, Latvia, Lithuania, Luxembourg, Malta, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, and Sweden. Norway (as an EEA member), Turkey, Bosnia Herzegovina, Serbia, Israel and Macedonia follow. Additionally, PRO EUROPE has agreed on co-operation with similar systems in UK (VALPAK) and Canada (Stewardedge). The solution to involve non EU members and go over the Atlantic Ocean to Canada was economic step. The trademark grows and the well proven system around Europe proved to be a good concept. The cooperation will help to unify ideas, to learn from other countries and to form better norms to recycling on the global scheme (Pro-e, 2014a).

Headquarter of PRO EUROPE is situated in 1140 Brussels, Avenue des Olympiades 2. Belgian law describes it as a private limited liability company (société privée responsabilité limitée, s.p.r.l.) (Pro-e, 2014a).



Figure 3: The map of countries involved in a packaging recovery organization



Source: <http://www.pro-e.org/Information-map.html>

### 3.5. EKO-KOM history

The ‘Green Dot’ symbol in the Czech Republic is represented by a non-profit undertaking EKO-KOM. It created an effectively operating nationwide system of sorting, recycling and reusing of waste materials at the first-rate European level (Eko-kom, 2014a).

In 1997 the law about waste came to existence, Act. No. 125/1997 Coll., and the package managing was mentioned only by two paragraphs. Reacting on this act, this joint-stock company (which is translated ‘akciová společnost’, that is why it is recorded as EKO-KOM, a.s.) was founded by industrial enterprises. The idea was to create the system of the ‘Green Dot’ in the Czech Republic. The company started introductory projects to try out various types of collecting waste for recycling. It was in the area of 120 000 people. The company also initiated a long term educational project Tonda Obal, which was focused on educating mainly pupils at primary schools (Eko-kom, 2011b).

In 1999 ČPSOŽP (which abbreviation translates to CICPEN – Czech Industrial Coalition for Packaging and the Environment) and Ministry of the Environment of the Czech Republic came to voluntary Agreement to enforcing EU Directive 94/62 about packages and waste produced by it in the country. The agreement had the meaning that firms involved in EKO-KOM system were obliged to ensure a recollection and utilization of waste to the predefined demanded extent. Since that year EKO-KOM was stated as the one who will be in charge of following the EU Directive 94/62 on packaging and packaging waste (Eko-kom, 2011b).

PRO EUROPE licensed EKO-KOM to use the ‘Green Dot’ trademark in the Czech Republic in 2001. Since the beginning of the year the obligation of reuse of the packages was created to the extent according to Act No. 125/1997 Coll. During the year EKO-KOM was starting investigative projects in municipalities and was providing educational services. In the end of the year there were over 600 firms involved in the system, which covered 42 % of packages introduced in the market in the Czech Republic. 2750 contracts with municipalities were imposed, which includes over 8 million inhabitants (Eko-kom, 2011b).

December 31, 2001 EC Packaging Directive 94/62/EC was introduced into the Czech national legislation. January 1, 2002 the Czech Packaging Act No. 477/2001 Coll. took effect. This Act defines more clearly responsibilities involved in handling packages and waste produced by it. 2002 is an important year because the Ministry of the Environment also authorized the company on 28th March 2002 as Integrated Recovery System EKO-

KOM for the Czech Republic. The Act was amended twice, March 3, 2004 (No. 94/2004 Coll.) and second is valid from valid from March 15, 2006 (No. 66/2006 Coll.). The goal was to enhance the recycling environment until 2012. The amendments brought changes for really small producers of packages. They dismissed liability to recollect and reuse the packaging waste if two conditions were to be met – quantity of packages produced are not to exceed 300 kg/year and the turnover of the company is not to exceed CZK 4,500,000. The next change was that marking of packages was not obligated anymore, especially material marking. Also some obligations were simplified and some definitions of law were stated more precisely (Eko-kom, 2011b; Pro-e, 2014b).

Since 2004 the system grew to reach about 21 000 companies. There were installed more than 100 000 containers during the year and 97 % inhabitants could be proactively involved in recycling. Approximately 4450 municipalities engaged in the system. There were also more contracts with individuals authorized with waste handling, the number exceeded 100 of them (Eko-kom, 2011b).

On 29<sup>th</sup> March, 2005 the Ministry of the Environment prolonged EKO-KOM, a.s. to be authorized until December 31, 2012 (Eko-kom, 2011b).

In the second half of 2008 the demand for recycled materials decreased. The crisis, that is to be linked to economic crisis around the world, continued and matured in 2009. The EU was dealing with the situation in the first half of the year. The stimulus for reaction was disruption of the market of secondary materials, the huge decrease of prices and sudden absence of recycling capacities. EKO-KOM established ‘Stabilization program’, which was approved by the Union of Town and Municipalities of the Czech Republic and the Czech Chamber of Commerce. The economic shock was originated in the cutoff of income from selling the secondary materials. Towns and municipalities cooperated with industry, with the help of EKO-KOM, to financially stabilize recycling again. In 2010 this market started to stabilize. The prices came back to the standard level and some commodities grew in price, e.g. some classes of paper. Expenses linked to collection and transport of waste materials did not fall, though (Eko-kom, 2011b).

From the table below it is significantly clear that more and more municipalities and therefore inhabitants of the Czech Republic have been involved in the recycling program (Eko-kom, 2011c).

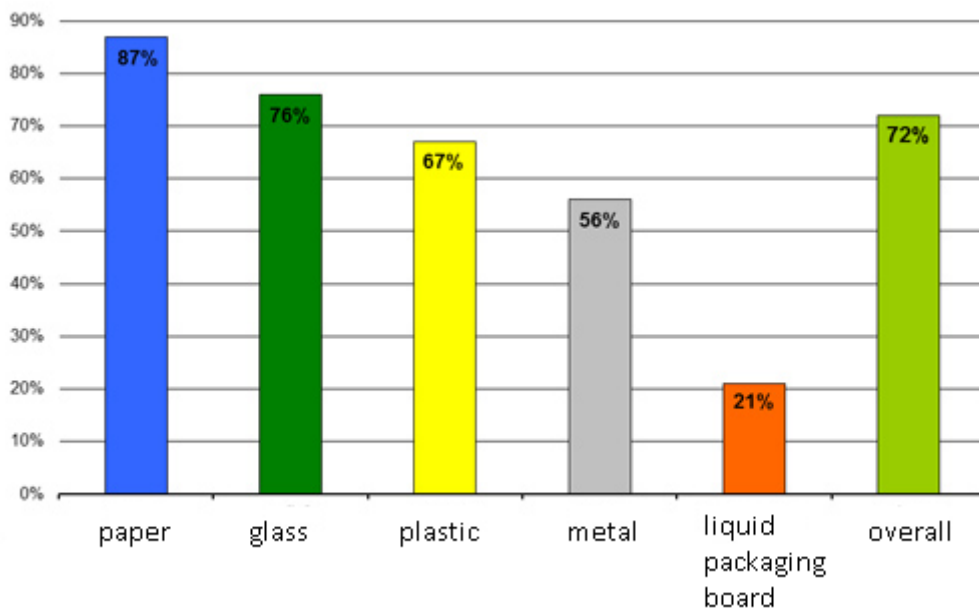
Table 4: The number of municipalities and inhabitants involved in EKO-KOM program in relation with the mass of utilized waste between 2009 and 2013

|                          | 2009       | 2010       | 2011       | 2012       | 2013       |
|--------------------------|------------|------------|------------|------------|------------|
| Number of municipalities | 5.861      | 5.904      | 5.993      | 6.025      | 6.057      |
| Number of inhabitants    | 10.390.647 | 10.399.153 | 10.457.137 | 10.488.753 | 10.471.722 |
| Percentage of population | 98%        | 98%        | 98%        | 99%        | 99%        |
| Mass of utilized waste   | 565.569 t  | 603.144 t  | 621.273 t  | 607.005 t  | 635.892 t  |

Source: <http://www.ekokom.cz/cz/ostatni/o-spolecnosti/system-eko-kom/aktualni-stav>

What is even more important is that the overall waste utilization has been also increasing. The Czech Republic has satisfied the demands of the EU with good percentage of recycling and waste utilizing. It is shown in the table below. The data are shown on the official webpage of EKO-KOM (Eko-kom, 2011c).

Figure 4: The achieved level of recycling and packaging waste utilization in 2013



Source: <http://www.ekokom.cz/cz/ostatni/vysledky-systemu/vyrocní-shrnutí>

The Table 2 shows slightly higher overall recycling percentage. The Table 2 considers the total waste generated and recycled and the graph in Figure 4 above might be counting with data from only clients of EKO-KOM. It is nearly impossible to recognize during waste

collection, which packages belong to which company. The variation might be caused due to a different method of data collection between the Ministry of Environment and EKO-KOM.

At the official EKO-KOM webpage, there are useful information about year 2011 described. The information says how the collective effort of the clients in EKO-KOM system helped to reduce production of greenhouse gases by 954,579 tons of CO<sub>2</sub> in one year. Waste sorting and recycling saved the energy compared to annual energy consumption in 260 thousand households. That relates to one average Czech region. It saved 23.3 milliard of MJ of energy. The program saved production of greenhouse gases in the Czech Republic by 1 %. Other useful information is in the Table 5 (Eko-kom, 2011b).

Table 5: The evolution of clients and their packaging involved in EKO-KOM system in the Czech Republic from 2009 to 2013

|  | 2009              | 2010              | 2011              | 2012              | 2013              |
|--|-------------------|-------------------|-------------------|-------------------|-------------------|
| <b>Number of clients</b>                             | 20.573            | 20.591            | 20.482            | 20.241            | 20.233            |
| <b>Packaging introduced to market in the CZE (t)</b> | 2.421.036         | 2.626.081         | 3.099.862         | 2.761.722         | 2.845.928         |
| <b>of which are not returnable</b>                   | 806.303<br>-33%   | 837.615<br>-32%   | 864.106<br>-28%   | 866.382<br>-31%   | 898.651<br>-31%   |
| <b>of which are returnable</b>                       | 1.614.733<br>-67% | 1.788.465<br>-68% | 2.235.756<br>-72% | 1.895.339<br>-69% | 1.947.277<br>-69% |
| <b>Participation on packaging market in CZE (%)</b>  | 81%               | 81%               | 81%               | 81%               | 81%               |

Source: <http://www.ekokom.cz/cz/ostatni/o-spolecnosti/system-eko-kom/aktualni-stav>

The clients of EKO-KOM introduced 2 845 928 tons of packaging to the market in 2013 (898 651 tons of returnable ones and 1 947 277 tons of packages which are not returnable). The participation of clients in the system in relation to all producers in the Czech Republic is 81 % (Eko-kom, 2011c).

The percentual representation of materials used by clients of EKO-KOM to create packages in 2013 is as follows: 41 % paper, 22 % plastic, 20 % glass, 5 % metal, 12 % the

rest. The ratio is approximately the same throughout last years and differs just in few units of percent. Again, it represents 81 % of packaging on the market (Eko-kom, 2011d).

Since 2013 EKO-KOM is also a member of European association EXPRA which delivers its know-how and proven good ideas in recycling gathered from all European members (Expra, 2014).

The Ministry of the Environment granted authorization for following years to ECO-KOM on March 19<sup>th</sup>, 2012. It is valid until 2020. The important change is on achieving higher rate in recycling, they plan to climb up to 80 % of waste utilization. Whereas, the overall utilization shown in the Graph 1 above is 72 % in 2013, the Table 1 shows 79.5 % of waste utilization (where 3.5 % is energetically utilized) in 2013. A new requirement asks to increase density of a recollection network of packaging waste. The authorization also asks EKO-KOM to provide further continual informing, and thus education to population, about the program to at least 90 % of inhabitants every year. Higher demands are set on environmental education of the youth. EKO-KOM is bound to educate at schools with its own school programmes at least 15 % of school population. The age of the children ranges from 3 to 15, the lesson has to be with a direct contact of lecturer and pupils. The authorization also claims higher demands on the Ministry of Environment to have more precise supervision over the correct information about packages in the companies producing or trading with packaged goods (Eko-kom, 2011b).

There is lawful enforcement for manufacturers or sellers of goods in packages to provide their recollection and recycling after use. It is very hard to manage it if the small packages of everyday use are sold in great numbers. So, if the packaging involves Green dot symbol, it means money was paid to the organisation which manages recollection and recycling the packaging and the company, which is EKO-KOM, will do it instead of manufacturer or seller. The company uses the accumulated money to organize the system of collecting, sorting and recycling in the Czech Republic. Thus the EKO-KOM has one more reason to educate population – to achieve the best possible smooth process. EKO-KOM values good recycling - the more the citizens recycle the more the municipality gets monetary reward from the company (Jakvid, 2014; Zákon o odpadech 185/2001 Sb.).

### 3.6. Rules in your town

‘Obecně závazná vyhláška’ which translates to ‘Generally Binding Announcement’, which has common rules for every municipality in the country, has slightly different rules for different municipalities. The common rules apply everywhere. They enforce that inhabitants have to sort waste into categories specified in the Announcement into proper places serving their purpose. The inhabitant is required to dispose only those components which are displayed on each container. Now, the categories differ – does liquid packaging board go with paper or plastic or it has a container on its own? What else differs is that each town or village imposes different price to its inhabitants for taking care of waste – based on the Announcement. The maximum lawful allowed price per inhabitant per year is CZK 500. The town is required to provide a company that collects waste. The inhabitants are required to put down the dangerous and high volume waste into waste and recycling centre and municipality has to provide this kind of place. There is also information written about fines – we are not allowed to burn waste or create landfills. In case of not following those rules, a fine of up to CZK 30,000 could be enforced. In case of importing foreign waste a fine of CZK 1,000,000 could be enforced. It again varies in each municipality, depending on its conditions and situation (Jakvid, 2014; Vyhláška Osek, 2014; Vyhláška Brno; 2013).

But what the Ministry of Environment enforces is that each member of population has to be recycling. Recycling brings money to municipality. The volume gathered is then evaluated and the system EKO-KOM rewards it with monetary transaction. Thus the more we recycle the less money we could be paying for waste management. The municipality has to provide containers, to hire collecting company (involves expenses for trucks, the oil, employees) and the end handling of waste is also pricy. Other expenses also go to cleaning, sweeping streets, public dust bins, waste collecting centres, mobile high volume containers and other things as taking care of green vegetation. The citizens pay in average less than the real price is. The annual payment for citizens for waste management is a usual scenario but there is also another one. Some towns allow us to pay for the size of the containers and frequency of their collection (Jakvid, 2014).

## 3.7. Journeys of waste

### 3.7.1. Municipal waste

At the official webpage of Eurostat, it is well suggested that the term ‘municipal’ is not enough to clearly understand which country follows which approach for data collecting. The official webpage of Ministry of Environment describes municipal waste as follows: The originator of municipal waste becomes the municipality in the moment the person delivers waste into its appropriate place. It covers mixed municipal waste, separately collected compounds (paper, glass, plastic, liquid packaging board), dangerous waste, bulky waste (too large to fit in regular containers) and biodegradable waste (from gardens and parks, organic leftovers, etc.) (Eurostat, 2014; ME, 2014).

Figure 5: Garbage truck and employees, collecting plastics at the picture



*Source: Jakvid (2014)*

### 3.7.2. Waste and Recycling Centre

The venue is assigned to collect larger amount of various types of unwanted things. The area is designed with containers to be able to gather recyclable materials, bulky waste, rubble, tree branches or grass, there is also space for old electronics, bulbs, batteries or dangerous waste. The employees know how to sort the things out. The firms arrive to collect them for further recycling. Wooden materials (boxes, window frames, etc.) are transformed to chipboards, ‘green’ waste is transported to compost facilities, old electronics is transported for disassembling, dangerous waste is handled by special companies for further utilization or safe disposal. The service is included in annual waste management fee. According to findings of Lange et al. (2014) the relationship between



participants' estimates of the distances to the nearest collection centre predicts more accurate recycling behaviour than actual distance does (Jakvid, 2014).

### 3.7.3. The containers and collection

The containers serving to collect various kinds of waste are to be found mostly in municipalities in a size capable to contain 80 to 3,200 litres. The material which forms them is plastic, metal or so called GRP (Glass Reinforced Plastic, the other name for fiberglass). They are of different shapes and various colours depending on kind of waste they serve for. The mixed municipal waste goes inside black containers. We can find all kinds of other shapes, sizes, colours or forms designed for it in public, e.g. at the bus stop, metro, or shape of an animal looking trash can in the zoo. The 'colourful' recycling containers are collected by trucks designed for it. They can be picked up also by trucks for mixed municipal waste. The truck carries a changeable plate signalling what it is oriented for. The interior of a car has to be cleaned for next material, to avoid pollution. Underground containers are being installed at some places. It saves place and makes an area look better. The movable high volume containers assigned for neighbourhood are usually announced in local newspapers or in public local radio before appearing. The computed average distance between recycling containers in the country is 101 metres. A Czech name for garbage container 'popelnice' translates to 'ash container'. It is because in the past there were more organic and natural packages and products. They were burned and the ash was thrown away (KO, 2010; Epa, 2014a; Jakvid, 2014f).

Figure 6: Containers (from left to right: clean glass, colourful glass, liquid packaging board, plastics, paper, biodegradable waste)



Source: Jakvid (2014)

Figure 7: 'Popelnice' in the past



Source: Jakvid (2014)

### 3.7.4. Sorting lines

The recyclable material is transported to sorting lines and employees pick out the materials on belts which can be utilized. According to presentation on recycling held by eco-consultant Martin Mach Ondřej (October, 2014), the human factor is the best. There could be a scanning machine invented but employees are the most feasible for this kind of sorting now. They usually use the same belt for different material after they sorted the first one. Paper is sorted to newspapers, magazines, cardboards, cartons, etc. Plastic is separated to plastic bottles, foils and polystyrene. Each type of material is processed different way. Liquid packaging boards are also sorted here. Everything is compressed to big bundles waiting for transport. The garbage is ‘renamed’ to secondary material. The wrong and dirty pieces found on the belt go to waste. The incorrectly separated garbage in ‘colourful’ container is given a second chance and is cleaned, separated again. Otherwise it goes to landfills (Jakvid, 2014).

Figure 8: Sorting lines in Malešice



Source: Foto Mach (2014).

### 3.7.5. Incinerators

The incinerators produce less pollution in a year than burning waste in a stove at home for one day would. The plants went through innovation and installed filters make it environment friendlier. That is why the ‘incinerators’ were renamed to plants for energetic utilization. As Mach (2014) mentioned about former incinerator Malešice renamed to ‘Zařízení na energetické využívání odpadů ZEVO Praha Malešice’. The heat and electricity produced partially uses the plant and partially sold to centrally distributed heat and electric network. Burning waste saves space in landfills. The slag left after burning is used as by-product to construction works, e.g. base for highways. The plastics would be very bad for incinerators, because they release too much heat. There are only three of them

in the Czech Republic – in Prague, Liberec and Brno. France owns 130, Germany 67, but Finland only 1. Sweden owning 30 of them imports waste from abroad to make use of its power plants. Planned incinerators are in Chotíkov, Komořany and Karviná (Jakvid, 2014; IDEA, 2012; Newslab, 2014).

Figure 9: The remains generated after burning the mixed waste



*Source: Jakvid (2014)*

### 3.7.6. Mixed municipal waste

It is most commonly known as garbage or trash. It contains all kinds of material, unfortunately also recyclable ones. Two scenarios exist where garbage goes. First are waste incinerators, where it is utilized into heat or electric power energy. Second are landfills, if they are secure and under control they serve us very well. At the end the landfills are buried under the ground and re-cultivated to form green hills (Jakvid, 2014h)

Figure 10: A landfill



*Source: <http://stredoceska-kampan.cz/>*

### 3.7.7. Paper

Dry and clean paper (not damaged by oil, paint etc.) belongs to blue container. It is transported to sorting lines, where the material is sorted. Then it is compressed and transferred in bundles to paper mills. The paper is being recycled there. The process starts with shredding and removing non-desirable particles as metallic clips. Water and special liquids clean the matter. It actually enhances the quality and the look of new paper. The most important is a drying process where at the beginning a thin compressed film of paper contains 96 % of water. Based on Mach (2014) cellulose fibres are able to stand this process only few limited times, until cellulose fibres lose their quality. It takes usually 5 to 7 times, exceptionally 20 times. He says that all products similar to paper material of egg-packages (they are formed from thick grey looking paper) should be thrown to mixed municipal waste. It is also because the incinerators need more flammable substances. New reintroduced products are of various types: isolation in buildings, toilet paper, newspapers, etc. More than 50 % of paper we use is recycled, if it was not, the price we pay for it would climb much higher. More wood and energy would be used for manufacturing. The cellulose fibres are able to be used from various sources, as it has been for centuries – wood, linen rags, hemp, bamboo, flax, sugar cane waste, wheat straw or cotton. But two main sources remain wood and recycled paper. The work of Bajpai discusses how paper recycling satisfies economic optimisation and environmental protection. As any other type of recycling it double decreases environmental loading – production from recycled paper fibres spends less energy, conserves natural resources and reduces environmental pollution (Jakvid, 2014; Mach, 2014; Epa, 2014b).

Figure 11: Mass of paper in the recycling process



*Source: Jakvid (2014)*

Figure 12: Final version of paper, after cleaning and drying



*Source: Jakvid (2014)*

### 3.7.8. Plastic

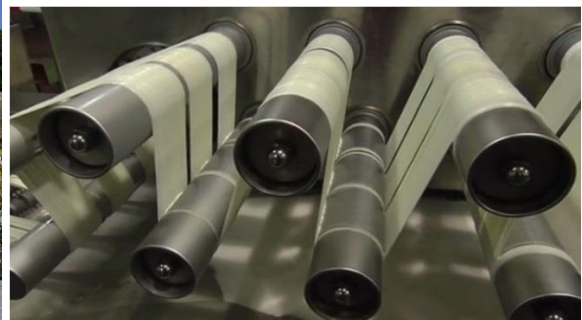
The containers are distinguished by yellow colour accompanied with a sticker and picture guidance what belongs inside. The most of plastic garbage in households is generated from food and goods packages. To minimize the volume capable to absorb it is often advised to compress the packages (e.g. water bottles). If the garbage truck has a compressor, it reduces a volume carrying 6 times. Dirt, novodur pipes, linoleum, oily plastic pieces do not belong there. It complicates the following recycling processes. Plastic bottles are quite demanded. They are usually separated into clear and colourful category. They are shattered into little flakes, washed out and cleaned. The particles of a top, a label and a body of the bottle are washed in the water and are able to be melted down within individual groups into granules. These are the particles which give life to new products. Bottles create bottles or fibres to clothes and sleeping bags, carpets or interiors of cars, etc. The foils create foils again. The polystyrene makes for example filling inside the lightweight concrete or isolation. The mixture of the rest of the plastic form firm and resistant products, it can substitute wood to crate benches and tables in the park or concrete looking objects. Noise reducing fence barriers, playgrounds and many more new ideas are inspiration for these mixed plastic materials. The incorrectly collected plastic can be used as fuel in incinerators, but should not be burned in a great volume (Jakvid, 2014; Eurostat, 2014).

Figure 13: Compressed plastic bottles waiting to be transported to recycling centre



*Source: Jakvid (2014)*

Figure 14: Recycled plastic fibres



*Source: Jakvid (2014)*

### 3.7.9. Glass

The most of the sources are beverage bottles, jars or broken drinking glasses, which probably already embody some recycled glass in them. It belongs inside a bell-shaped container – a green colour one serves for glass of diverse colours and white one serves for clear glass. The shape is designed for safety reasons and for a unique way of handling. The regular non-glass containers have little wheels and a door on the top, with little holes for little garbage, which can be shifted open in case the material we want to dump is too big. Thus they could be tilted and the waste is relocated on the bed of a garbage truck. But the glass containers are lifted in the air, the floor opens and glass is transferred on the bed of the dump truck. The cat has to have open box bed and in case it has separation in the middle, both categories of the glass can be loaded. It depends on a collecting company. The glass is migrating to a territory of collecting company or other transitional area. After the greater volume of it is accumulated trains or big trucks transport the material to special sorting lines for glass. There are only few of them in the Czech Republic. It is important to separate glass very carefully because the quality of new products depends on it. The materials which defect the process are ceramics, porcelain, metals and other solid particles. Mach (2014) says, for example, windshields of cars do not belong to recycling because it is created in different type of process, mirrors neither because they contain metallic particles. The quantity of times glass can go through recycling reaches almost infinity. The sorting line could belong to glassworks building complex or it can be built separately. After employees pick the big foreign matters, the glass is crushed and the vibrating lines regulate it. Magnetic, laser or optic-electric technology detectors clean the rest to achieve the highest desired quality. The labels and metal particles are easily taken care of on the line these days. The recycling of glass saves a lot of energy and raw materials. Shatter is melted between 800 and 1,400 °C. They use from 60 to 85 percent of sorted glass in the process of making new products, which are mostly glass packaging as bottles of sodas, beer other alcohol and many other products. The final products as glass wool, foam glass and other serve also at construction works (Jakvid, 2014).

Figure 15: Collected glass is waiting for a transport



*Sources: Jakvid (2014)*

### 3.7.10. Liquid packaging board (LPB)

Each municipality has the handling different. The colour on the container we should be looking for is orange (always look for sticker and picture). But the packages are collected usually together with paper or plastic. The containers can be designed only for collecting LPBs and there are also special bags designed for them in some towns – these two cases requires smaller collecting car with bigger intervals between collection as LPBs are less frequent type of package appearing for recycling (see graph 1). The packages which are mostly used to store milk, juices and wine are easily distinguished for their shape so the sorting on sorting belt is not problematic. Mach (October 2014) advises to rinse the inside a little to get rid of remaining liquids. We will get rid of bad smell when storing at home and it makes the life easier for employees in sorting lines, he says after taking a tour to one of them. The same counts with any organic leftovers in any type of packages (e.g., un-open cheese or yoghurt in plastic packing). It is made of high quality paper. The LPB is made of virgin cellulose fibres and some polyethylene and aluminium and that is why it is very demanded in paper mills, where the process of recycling is very similar to recycling paper (washed and cleaned of foreign particles). The material left is utilized into new products or used in incinerators in cement factories. The chopped leftovers are heated and compressed and construction or isolation boards come into existence. Family houses can be built using recycling. Over 5 tons of boards are required for a small house. The practice was already introduced into the Czech market (Jakvid, 2014).

Figure 16: Construction boards made of recycled LPB



*Sources: Jakvid (2014)*

### 3.7.11. Metal

The old used metal objects of numerous shapes and origins we usually bring to waste and recycling centre, or the containers brought near our house saves us the journey. But they appear there just once upon a time. Very heavy objects, as big as bathtubs, is convenient to be brought to a different collecting centre, where we get paid for the object. The list of different metals tells us the price for each kilogramme of the material in that centre. Copper, aluminium, brass, etc. are sorted and transferred to be melted in smelting plants. They are cleaned and melted there and semi-produced material is further transferred to other places as automotive manufacturing plants (Jakvid, 2014).

Figure 17: Collecting metals in high volume containers



*Sources: Jakvid (2014)*



### 3.7.12. Clothing

Old textile finds its way into recycling as well. There are containers for clothes to be found. The conditions for accepting the clothes inside are written on each container. The sorting places decide some clothes to travel to charity and the rest goes recycling. The cloth gets rid of zippers, buttons, etc. and goes further in process. The final products are floor clothes, isolation in tubes and pipelines. The last resort is incinerators in cement plants, because of its flammable characteristics. Hawley (2014) wrote that textile is almost 100 % recyclable. Along with this information many textiles end up in the landfills for a multiple reasons anyway. In recent years a special attention was given to recycling from textile from different sources. This approach decreases costs of landfills and upholds employment, charitable contribution and environmental protection (Jakvid, 2014).

Figure 18: Employee handling the clothing material



*Sources: Jakvid (2014)*

### 3.7.13. Biodegradable waste

The organic compounds are able to form suitable mass which is broken down into basic mixture by micro-organisms and other living things as worms. An appropriate time has to be given to the process. Peelings, leaves, grass, branches of trees are typical representatives of this category. But also human waste (feces and urine), sewage, manure and waste in slaughterhouse are of organic origin is good to mention but are not typical representatives which we collect in the containers and therefore are not the target of the study in the thesis. Each municipality has it different and the administrative authority gives away information. The smaller brown containers were introduced in the streets in the Czech Republic serving this purpose. The municipality can take care of bio waste in the form of big movable containers (the type serving for high volume waste) or we can bring

big branches to waste and recycling centre. The easiest way to handle organic waste in households is to buy a compost container for the garden. Mach (October 2014) says he purchased a basic container for his garden. Meat and milk products do not belong there because it can carry diseases. But following products as old bread, banana peels, tea-bags or coffee are all good for the composting within the households. He also notes that citrus fruits are not good in case you want to grow food after reintegrating the mass back to the ground. Also egg-shells are good to go but it needs far more time to decompose so it can hurt bare food when walking on the grass. Good solution is to give eggshells to chickens to eat (as it has been introduced in Belgium; under some condition authorities gave 5 chickens for each house to eat organic waste). The town Fulnek in the East of the Czech Republic has been recently giving away 2,000 bio-waste containers for each household (October 2014). It was reaction on the Appeal of Ministry of Environment and financial support from the Operational Programme Environment (OPE) which granted to cover 80 to 90 % of the costs given to Fulnek if the demand is big enough. A big compost centre knows how to treat its material. Big machines dig the mass and turn around until it reaches its maturity and then it is used as fertilizer in agriculture, parks and etc. Biodegradable waste finds another purpose in bio gas plants where the decomposing happens without a reach of oxygen. The bio gas generated is captured and can also serve as fuel for generators making electricity (Jakvid, 2014; Fulnek, 2014).

Figure 19: A machine in compost centre.



*Sources: Jakvid (2014)*

### 3.7.14. High volume waste, Dangerous compounds, Electronics, Drugs, Rubble

The high volume waste (as furniture) is collected by high volume containers appearing once in a while in a neighbourhood. Otherwise they always accept it in waste collection

centres. The dangerous waste (as paintings) and old electronics are collected in waste collection centres where they know how to take care of it. The shops also accept old electronics at the place of purchase (e.g., DVD players). The company Ecobat claims to be responsible of collecting one third of used batteries in the market in 2013. There are 18,000 collecting places in the country. Its project Ekocheese (2014) wants to establish recycling batteries as a part of our modern lifestyle. Unused or expired drugs are returnable in pharmacies in assigned boxes. Waste collection centres are also accepting construction waste – rubble. Rubble is further taken care of in plants. The construction material has to get rid of foreign materials which can be recycled or burned (metals, organic material – wood, some minerals and other, especially dangerous, waste). The basic remains are brick, concrete, bituminous parts and excavated soil. They will find its way to other construction works which help to save money and to prevent extracting new raw materials (Jakvid, 2014)

Figure 20: High-volume waste container



Source: Jakvid (2014)

Figure 21: Employees working on recycling electronic waste



Source: Jakvid (2014)

Figure 22: Dangerous waste



Source: Jakvid (2014)

Figure 23: Ekocheese collecting containers for used batteries



Source: Jakvid (2014)

Figure 24: Company in Plzeň specializing in demolition and following sorting and crushing



Sources: <http://www.apb-plzen.cz/>

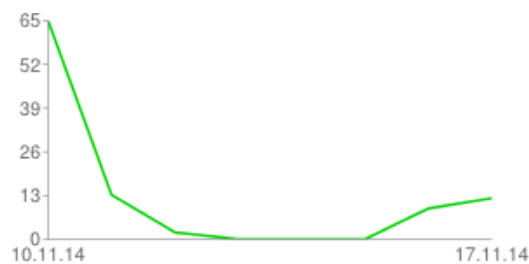
## 4. Methodology

There were multiple sources used for literature review. The internet is the place where companies are able to show their most up to date information. The internet was also a place for finding various types of information and definitions. It served also as a tool for translation from Czech to English or finding more diverse words. The internet was a tool which enabled to search the information in a quicker pace. Other very important sources were scientific journals, where the professionalism of authors brings a great value. Martin Mach Ondřej led the presentation about recycling and myths around it on the 22<sup>nd</sup> October 2014. The session was organized in cooperation with MHMP (Czech abbreviation for the Municipality of the Capital City of Prague) and Prague 7. It was held in public place, in the restaurant with a room secluded for people interested in the topic. Mach is an eco-consultant and journalist and it made the author of the thesis attend the session in order to get additional information about recycling.

For a practical part a questionnaire was conducted. The means for gathering information from respondents was internet and the Google forms helped to create the structure of it. The questions were simple and quick to answer. The form was sent out in two 'waves'. The first 'wave' was sent more in personal fashion. Facebook.com was the next means of delivering the questionnaire. The questionnaire was attached with a short message received in message inboxes of author's 'Facebook friends' list. The message attached was copied and thus the same for everybody. In some cases the message was corrected with other

personal statement. The internet link was posted also on the ‘Facebook wall’ with a short message attached saying what it is about. Everybody in the ‘friends list’ was able to read and decide on their own if to fill it or not. The questions and answers were both in Czech and English version. The English speaking respondents had to live in the Czech Republic in order to be eligible to fill the form. The second wave was sent out in more public fashion, just posting it on the ‘Facebook wall’, without approaching people in personal way. It was conducted a week later. The result of attaining more answers in the first try was expected and it was consequently proven. Nevertheless, the number of responses increased to convenient 100 of them and the questionnaire was closed by the author. The elaboration of the data was conducted automatically by Google forms. It enabled to analyse data in a convenient well-arranged way, because one of the function of Google forms is generating graphs and percentual values attached to them.

Figure 25: The timeline of number of responses



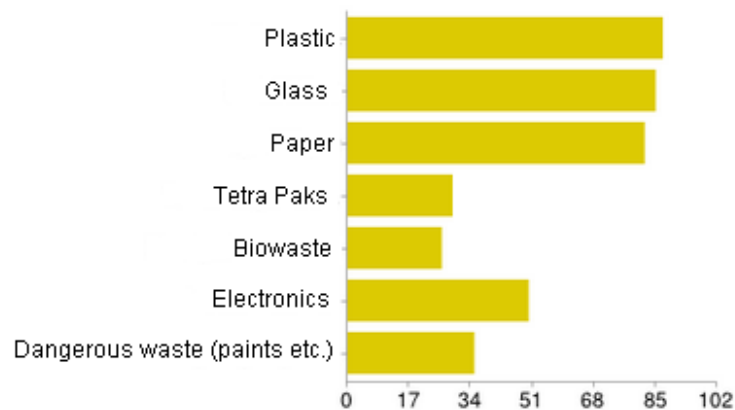
*Source: Author's findings*

## 5. Results

The number of received answers from internet questionnaire was 100. The background of respondents was important to find out. The sex of participants was balanced. Males represented 44 % and females 56 %. The part of their background including the student status and age is a factor the evaluation has to count with. 79 % were students. 61 % were between 22 and 29 years old and 31 % between 18 and 21 years old. Only 4 % between 30 and 39 years old and the rest 4 % belongs to other age groups. The respondents were relatively young. Even though 96 % of people said sorting waste in order to recycle was worth it, just 84 % of them do recycle. Most of the respondents live in their flats (55 %), a third in the houses (31 %) and a part in the dormitories (14 %).

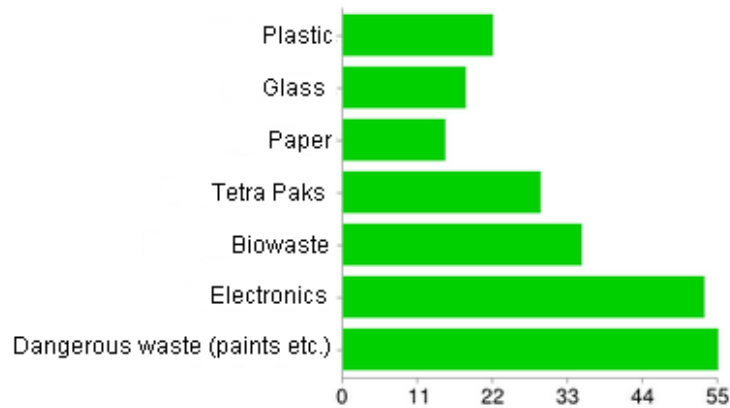
In the correlation to whether people recycle or not might be their knowledge of why they should even be part of it. And knowing what happens with the sorted waste in the future is, according to the author's idea, an important aspect. The question if people know what happens next with sorted waste after they dump it in the container for recycling had a result that 46 % of them do not know it. The following answers prove that the population is not thoroughly informed about the recycling. We might think that 92 % of respondents between age 18 and 29 are the group of most informed people, because of all the technology available these days. There were still 11 % of answers which state they do not know they can find containers for used batteries in the Czech Republic. Additionally 78 % of people do not know they are obliged to recycle by law! The information improvement would enhance, in the author's opinion, the economy of recycling and waste management in the Czech Republic. On the other hand 14 % of people feel like they recycle a lot, 67 % average, 15% almost not at all and just 4 % confessed do not recycle. It makes 81 % of people recycling in the Czech Republic in the acceptable rate. The questions number 10 and 11 were with a multiple choice. "What do you recycle?" and "Which material do you think should be more available and easier to recycle?" are shown in graphs below.

Figure 26: What do you recycle? The relation of number of percent of people recycling the material



*Source: Author's findings*

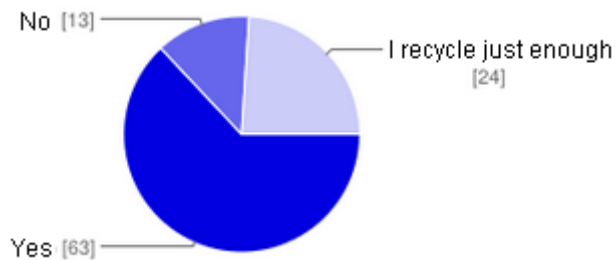
Figure 27: Which material do you think should be more available and easier to recycle?  
The relation of number of percent of people recycling the material



Source: Author's findings

In the theoretical part, in the Figure 4, there is the chart of materials recycled. Paper, glass and plastic proved to be very recyclable materials among our studied group of people, too. The liquid packaging board and others are not so favourable materials to find their place in recycling containers. To the author's little surprise 50 % of people manage to put effort to bring the old electronics to recycling place. The question number 11 proves that people really think that the accessibility or improvement in recycling should be better. They think that dangerous waste, electronics, biowaste or liquid packaging board should be easier to put into recycling process. Even paper, glass and plastic received 20 % of votes to improve their reachability. There follows a question if they would recycle more in case they had a chance to receive free of charge containers for waste separation into their flat.

Figure 28: If you had a chance to receive FREE of charge containers for waste separation into your flat, would you recycle more?



Source: Author's findings

The answers are surprising for the author of the thesis and might be of a good use to the future planning for the waste management and its economy. It would boost the sum of sorted materials in households and therefore more low-cost recyclable materials would be generated and more products would be created from it. Such a move like investing to containers would bring about economic improvement to the future. The containers in the public, containers given away in the section Biodegradable waste and the containers for used batteries you can order home for free in project Ekocheese are mentioned in the thesis. They all have something in common and it is that they are relatively for free (annual waste management fee) and it is an idea which already brings some results. Giving away suitable containers (for example from recycled materials) into the households would convince more people to recycling.

Findings from questions number 14 and 15 suggest that changing a mindset of a significant part of population would bring some improvement to the future. Findings say 35 % of questioned think that if people around them recycled more, they would recycle more, too. In other words, their actions depend on the actions of others. In other words, they are able to recycle or even decided to recycle more, but only if the condition is met. This obstacle is not really tangible and is only imaginary. 28 % of people thought it has no influence on their behaviour and 37 % of people thought they recycle just enough and do not need to look at other people if they recycle or not. The question “Do you think recycled products are economically convenient (it saves money, raw materials)?” revealed 23 % of questioned have the opinion they are not economically convenient. 77 % stated it has a meaning to recycle because it saves money and raw materials in production chain but almost a quarter of them (23 %) see no meaning in it. Educating and fixing the mindset of people would bring about less unnecessary waste in landfills and more valuable secondary raw materials in sorting lines.

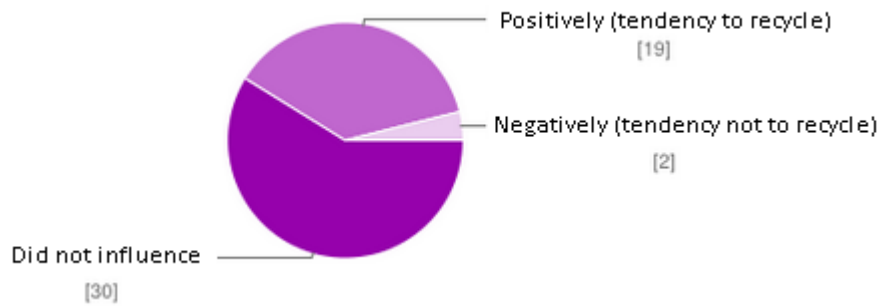
The next step was to find out the number of people with Czech nationality and foreigners. Both of them were supposed to live in the country, it was a condition to fill the form. 87 % of them were Czechs and 13 % foreigners. Depending on their answers the questionnaire skipped to the relevant page.

Czechs were answering the following in Czech version (to ensure they understand the text, if not they had the possibility to go to previous question and click on the option ‘foreigner’): “Have you ever been abroad for a longer period of time (3 and more weeks)?” 51 % of them said they have and 37 % said they have not (notice that the percents are in relation to whole group of 100 people, thus 88 people answered). Czechs went abroad to more than 20 different countries. And they were further asked if the stay abroad influenced



their view on recycling. 30 out of 51 people said it did not influence them and significant part of them said it influenced them to recycle more, 19 out of 51. Just two people said it made them recycle less than before going abroad.

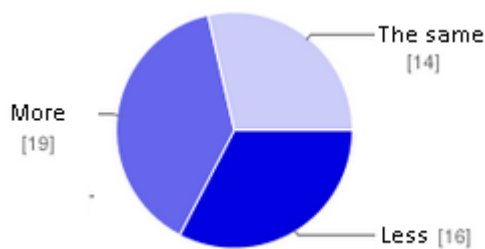
Figure 29: Did the stay abroad influence your view on recycling?



*Source: Author's findings*

The question whether they think the Czech Republic recycles more than the countries abroad had balanced answers. However, slightly more than other obtained answer there was an opinion that they think Czechs recycle more than citizens abroad. The answers that the Czech country recycles the same and less got similar number of points. The actual number of points each option received is illustrated at the graph below.

Figure 30: What do you think? The Czech Republic compared with country abroad recycles:



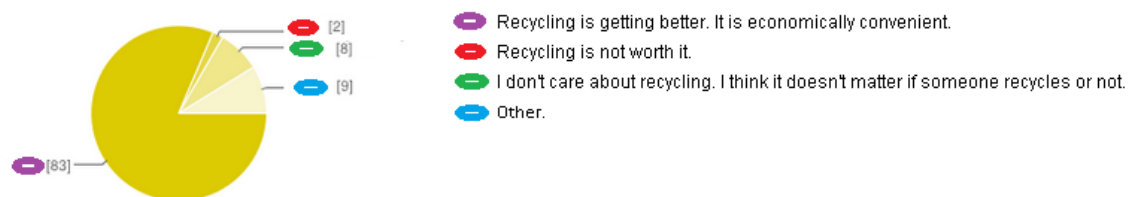
*Source: Author's findings*

The findings suggest that from the opinion of our surveyed people the recycling in the Czech Republic is at the better level compared to one country but worse compared to the other. The economy of waste utilization might improve with closer observing of countries which demonstrate better results.

The foreigners living in the Czech Republic were of 8 different nationalities among 13 people. The first question they were asked was if they think the country of their origin has any influence on whether they do recycle or not. 11 responses were ‘yes’ and 2 were ‘no’. The next question makes the Czech in the issue look very positive. 12 out of 13 people think that the Czech Republic exercises recycling more than their country of origin. And 1 vote went with the opinion that it is ‘pretty same in both countries’. There is a significant variation of opinions of Czechs and foreigners living in this country. It might be the demographic difference between the countries Czechs choose to go and the countries the foreigners come from. The developed and undeveloped countries play a role in the comparison.

The last question was redirected again for both type of respondents – Czechs and foreigners. The question on “How do you see the future of the Czech Republic?” finds out 85 % of people think that recycling is getting better and it is economically convenient. 8 % do not care about recycling and think it does not matter if someone recycles or not. 2 % think recycling is not worth it and 9 % of questioned have some other opinion.

Figure 31: How do you see the future of the Czech Republic?



Source: Author's findings

From the last graph it seems the recycling is improving in the eyes of the surveyed. They think it has a bright future in the Czech Republic.

## 6. Conclusion

From the start of the thesis the aim was focusing on practical approaches and management of municipalities and companies in the Czech Republic to create a structure of what will happen with waste in the future. The understanding of the issue is essential for the sake of living in the compact and 'greener' society. It was proven by the practical part, that not each one of us has the same understanding or sympathy with this topic. The network of companies and municipalities taking care of garbage would surprise many people. The system is not that complicated, however. It follows the proven framework implemented in many countries. Waste utilization brings about results and human kind is able to benefit from the things it throws away. Products shaped from reused materials are integrated again into everyday life and they serve either the same purpose or in customised forms with different purposes. Even though the history of recycling is young, the graphs and society, which are represented by the surveyed people, display that recycling is getting better and that it is economically convenient. This positive message emerges in the thesis. It designs the illusion that the problem is being solved. According to the author of the document it would be wise to keep developing this sector of the economy. It needs continual evolution to satisfy the global population growth and its waste production. Waste utilization has a huge potential, even from the perspective that the materials are quite cheap to gather. Ordinary citizens do not need them but it serves as 'gold' for manufacturers. Several materials found their way back to utilization process quickly (plastic, paper and glass), but there are still other ones that need to be better taken care of. There is a belief, according to the findings of the survey, that accessibility of containers to the rest of discussed units (dangerous waste, electronics, etc.) should be easier. A substantial number of respondents wish to be a part of this positive move in environment. There are always individuals that do not come along but most people go with the crowd, and most people have already started to recycle. It is enforced by the law, however according to the survey, most citizens are unaware of this. The past 20 years showed an increase in population education when it comes to recycling, and following this track, will further benefit the economy. The Czech Republic still might need to observe and communicate with other countries to keep progressing in the right direction. The products transformed from sorted materials are of good use and it is implemented in various places. Looking at a finished product, it is impossible to tell which was made from raw materials and which from recycled ones. There hardly exists an opposing objection to negate this trend.

## 7. References

### 7.1. Bibliography

Bajpai, P., 2014. Environmental Aspects of Recycling, Recycling and Deinking of Recovered Paper, 2014, Pages 271–282

Hawley, M. J., 2014. Textile Recycling, Handbook of Recycling, State-of-the-art for Practitioners, Analysts, and Scientists, Pages 211–217

Lange, F., Bruckner, C., Kroger, B., Beller, J., Eggert, F., 2014. Wasting ways: Perceived distance to the recycling facilities predicts pro-environmental behavior, Resources, Conservation and Recycling, Vol. 92, Pp. 246–254

Worell, E., 2014. Recycling in Waste Management Policy, Handbook of Recycling, State-of-the-art for Practitioners, Analysts, and Scientists, Pages 497–501

Mach (2014). Presentation on recycling held by eco-consultant Martin Mach Ondřej, attended in Prague 22<sup>nd</sup> October, 2014

### 7.2. Legal documents

Act No. 167/2008 Coll. Web page of Ministry of Environment ,  
[http://www.mzp.cz/C125750E003B698B/en/used\\_product\\_collection/\\$FILE/Waste%20Act\\_1852001.pdf](http://www.mzp.cz/C125750E003B698B/en/used_product_collection/$FILE/Waste%20Act_1852001.pdf), accessed 2<sup>nd</sup> November, 2014

Act No. 185/2001 Coll., Zákon o odpadech 185/2001 Sb.,  
[http://www.mzp.cz/www/platnalegislativa.nsf/d79c09c54250df0dc1256e8900296e32/8FC3E5C15334AB9DC125727B00339581/\\$file/Zakon\\_185\\_2001.pdf](http://www.mzp.cz/www/platnalegislativa.nsf/d79c09c54250df0dc1256e8900296e32/8FC3E5C15334AB9DC125727B00339581/$file/Zakon_185_2001.pdf), accessed 4<sup>th</sup> November, 2014

EU Directive 94/62. <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31994L0062>, accessed 20<sup>th</sup> October, 2014

Vyhlaška Brno; 2013. <http://www.staryliskovec.cz/files/OO/01%202013%20-%20OZP.pdf>, accessed 4<sup>th</sup> November, 2014

Vyhlaška Osek, 2014. [http://www.osek.cz/VismoOnline\\_ActionScripts/File.ashx?id\\_org=11298&id\\_dokumenty=7443](http://www.osek.cz/VismoOnline_ActionScripts/File.ashx?id_org=11298&id_dokumenty=7443), accessed 4<sup>th</sup> November, 2014

Waste Management Plan of the Czech Republic for 2003-2013, [http://www.env.cz/C125750E003B698B/en/waste/\\$FILE/waste\\_management\\_plan.pdf](http://www.env.cz/C125750E003B698B/en/waste/$FILE/waste_management_plan.pdf) accessed 28th October, 2014

### 7.3. On-line sources

ARF, 2014. Eco Green Living and All Recycling facts, “Reduce Reuse Recycle” Waste Hierarchy, <http://www.all-recycling-facts.com/reduce-reuse-recycle.html>, accessed 15<sup>th</sup> October, 2014

Benefits, 2014. The Benefits of Recycling, What is Recycling, <http://www.benefits-of-recycling.com/whatisrecycling/>, accessed 20<sup>th</sup> October, 2014

Ecocheese, 2014. About project (in Czech O projektu), <http://www.ecocheese.cz/>, accessed 10<sup>th</sup> November, 2014

Eko-kom, 2011a. Eko-kom, About Company and System EKO-KOM (in Czech O společnosti a systému EKO-KOM), <http://www.ekokom.cz/cz/ostatni/o-spolecnosti/system-eko-kom/aktualni-stav>, accessed 28<sup>th</sup> October, 2014

Eko-kom, 2011b. Eko-kom, History (in Czech Historie), <http://www.ekokom.cz/cz/ostatni/o-spolecnosti/system-eko-kom/historie>, accessed 25<sup>th</sup> October, 2014

Eko-kom, 2011c. Eko-kom, Current Situation (in Czech Aktuální stav), <http://www.ekokom.cz/cz/ostatni/o-spolecnosti/system-eko-kom/aktualni-stav>, accessed 30<sup>th</sup> October, 2014

- Eko-kom, 2011d. Eko-kom, Overview of Achieved Results (in Czech Přehled dosahovaných výsledků), <http://www.ekokom.cz/cz/ostatni/vysledky-systemu/vyrocnisshrnuti>, accessed 30<sup>th</sup> October, 2014
- Epa, 2014a. U.S. Environmental Protection Agency, Municipal Solid Waste, <http://www.epa.gov/epawaste/nonhaz/municipal/>, accessed 6<sup>th</sup> November, 2014
- Epa, 2014b. U.S. Environmental Protection Agency, Paper Making and Recycling, <http://www.epa.gov/osw/conserva/materials/paper/basics/papermaking.htm>, accessed 6<sup>th</sup> November, 2014
- Eurostat, 2014a. Environmental Data Centre on Waste, Municipal Waste, [http://epp.eurostat.ec.europa.eu/portal/page/portal/waste/key\\_waste\\_streams/municipal\\_waste](http://epp.eurostat.ec.europa.eu/portal/page/portal/waste/key_waste_streams/municipal_waste), accessed 26<sup>th</sup> October, 2014
- Expra, 2014. Overview, <http://www.expra.eu/en/about/overview>, accessed on 10<sup>th</sup> November, 2014
- Fulnek, 2014. Compost Containers for Free (in Czech Zdarma kompostéry na bioodpad? Podmínkou je dostatečný zájem), <http://fulnek.cz/zdarma-kompostery-na-bioodpad-podminkou-je-dostatecny-zajem/d-4576/query=kompost>, accessed 8<sup>th</sup> November, 2014
- IDEA, 2012. International District Energy Association, Sweden imports waste from European neighbors to fuel waste-to-energy program, <http://www.districtenergy.org/blog/2013/10/07/sweden-imports-waste-from-european-neighbors-to-fuel-waste-to-energy-program/>, accessed 3<sup>rd</sup> November, 2014
- Jakvid, 2014. Odpady kolem nás, Video Gallery (in Czech Videogalerie), <http://www.jaktridit.cz/cz/foto-a-video/videogalerie/serial-o-odpadech-na-ct>, accessed 12<sup>th</sup> November, 2014
- KO, 2010. Komunální odpad, Terms (in Czech Pojmy) <http://www.komunalniodpad.eu/?str=pojmy>, accessed 5<sup>th</sup> November, 2014
- ME, 2014a. Ministry of Environment, Waste Management (in Czech Odpadové hospodářství), [http://www.mzp.cz/cz/odpadove\\_hospodarstvi](http://www.mzp.cz/cz/odpadove_hospodarstvi), accessed 23<sup>rd</sup> October, 2014
- ME, 2014b. Ministry of Environment, Waste, <http://www.mzp.cz/en/waste>, accessed 23<sup>rd</sup> October, 2014

- ME, 2014c. Ministry of Environment, Waste (in Czech Odpady), [http://www.mzp.cz/cz/odpady\\_podrubrika](http://www.mzp.cz/cz/odpady_podrubrika), accessed 23rd October, 2014
- ME, 2014d. The Ministry of Environment, Municipal Waste (in Czech Komunální odpady), [http://www.mzp.cz/cz/komunalni\\_odpady](http://www.mzp.cz/cz/komunalni_odpady), accessed 23<sup>rd</sup> October, 2014
- Newsrab, 2012. Newsrab, How the Incinerator Work (in Czech Jak funguje spalovna), <http://www.newslab.cz/jak-funguje-spalovna/>, accessed 1<sup>st</sup> November, 2014
- NIH, 2014a. National Institute of Environmental Health Science, Reduce, Reuse, Recycle, <http://kids.niehs.nih.gov/explore/reduce/>, accessed 4<sup>th</sup> November, 2014
- NIH, 2014b. National Institute of Environmental Health Science, Reduce Waste, [http://kids.niehs.nih.gov/explore/reduce/reduce\\_waste.htm](http://kids.niehs.nih.gov/explore/reduce/reduce_waste.htm), accessed 4<sup>th</sup> November, 2014
- NIH, 2014c. National Institute of Environmental Health Science, Reuse, <http://kids.niehs.nih.gov/explore/reduce/reuse.htm>, accessed 4<sup>th</sup> November, 2014
- NIH, 2014d. National Institute of Environmental Health Science, Recycle, <http://kids.niehs.nih.gov/explore/reduce/recycle.htm>, accessed 4<sup>th</sup> November, 2014
- Pro-e, 2014a. Pro Europe, Overview, <http://www.pro-e.org/About.html>, accessed 21<sup>st</sup> October, 2014
- Pro-e, 2014b, Pro Europe, Legal basis, [http://www.pro-e.org/Legal\\_Basis\\_cz.html,%20http://www.ekokom.cz/cz/ostatni/o-spolecnosti/system-eko-kom/historie](http://www.pro-e.org/Legal_Basis_cz.html,%20http://www.ekokom.cz/cz/ostatni/o-spolecnosti/system-eko-kom/historie), accessed 21<sup>st</sup> October, 2014

## 8. List of figures and list of tables

### 8.1. List of figures

|  |    |
|--|----|
| Figure 1: A typical symbol for recycling.....  | 2  |
| Figure 2: The Green Dot symbol occurring on packages.....  | 3  |
| Figure 3: The map of countries involved in a packaging recovery organization.....  | 14 |
| Figure 4: The achieved level of recycling and packaging waste utilization in 2013.....   | 17 |
| Figure 5: Garbage truck and employees, collecting plastics at the picture.....   | 21 |
| Figure 6: Containers (from left to right: clean glass, colourful glass, liquid packaging board, plastics, paper, biodegradable waste)..... | 22 |
| Figure 7: ‘Popelnice’ in the past.....   | 22 |
| Figure 8: Sorting lines in Malešice .....  | 23 |
| Figure 9: The remains generated after burning the mixed waste.....   | 24 |
| Figure 10: A landfill .....  | 24 |
| Figure 11: Mass of paper in the recycling process.....   | 25 |
| Figure 12: Final version of paper, after cleaning and drying.....  | 25 |
| Figure 13: Compressed plastic bottles waiting to be transported to recycling centre.....   | 26 |
| Figure 14: Recycled plastic fibres.....  | 26 |
| Figure 15: Collected glass is waiting for a transport.....   | 28 |
| Figure 16: Construction boards made of recycled LPB.....   | 29 |
| Figure 17: Collecting metals in high volume containers.....  | 29 |
| Figure 18: Employee handling the clothing material.....  | 30 |
| Figure 19: A machine in compost centre.....  | 31 |
| Figure 20: High-volume waste container.....  | 32 |
| Figure 21: Employees working on recycling electronic waste.....  | 32 |
| Figure 22: Dangerous waste.....  | 32 |
| Figure 23: Ekocheese collecting containers for used batteries.....   | 32 |



|  |    |
|--|----|
| Figure 24: Company in Plzeň specializing in demolition and following sorting and crushing.....   | 33 |
| Figure 25: The timeline of number of responses.....  | 34 |
| Figure 26: What do you recycle? The relation of number of percent of people recycling the material.....  | 35 |
| Figure 27: Which material do you think should be more available and easier to recycle? The relation of number of percent of people recycling the material..... | 36 |
| Figure 28: If you had a chance to receive FREE of charge containers for waste separation into your flat, would you recycle more?.....                          | 36 |
| Figure 29: Did the stay abroad influence your view on recycling?.....  | 38 |
| Figure 30: What do you think? The Czech Republic compared with country abroad recycles:.....   | 38 |
| Figure 31: How do you see the future of the Czech Republic?.....   | 39 |

## 8.2. List of Tables

|  |    |
|--|----|
| Table 1: Comparison of production of important groups of wastes in EU and in the Czech Republic in 2001.....   | 11 |
| Table 2: Production and Overall Waste Management in the Czech R.....   | 11 |
| Table 3: Production and Municipal Waste Management in the Czech Republic in 2011-2013.....   | 12 |
| Table 4: The number of municipalities and inhabitants involved in EKO-KOM program in relation with the mass of utilized waste between 2009 and 2013..... | 17 |
| Table 5: The evolution of clients and their packaging involved in EKO-KOM system in the Czech Republic from 2009 to 2013.....                            | 18 |

# 9. Appendix

## Appendix 1: Questionnaire (01-08)

### Recyklace v ČR / Recycling in Czech Rep.

**01 Pohlaví / 01 Gender**

- Muž / Male
- Žena / Female

**02 Jsi student? 02 Are you a student?**

- Ano / Yes
- Ne / No

**03 Věk / 03 Age**

- Do 17 / Up to 17
- 18-21
- 22-29
- 30-39
- 40-59
- 60 a více / 60 and more

**04 Třídíš odpad? / 04 Do you recycle?**

- Ano
- Ne

**05 Myslíš, že třídění má smysl? / 05 Do you think sorting waste in order to recycle is worth it?**

- Ano / Yes
- Ne / No

**06 Kde bydlíš? / 06 Where do you live?**

- Kolej / Dormitory
- Byt / Flat
- Dům / House

**07 Víš, jaký je další proces s proříděnými surovinami, až je vhodíš do kontejneru?**

07 Do you know what happens next with sorted waste after you dump it in the container for recycling?

- Ano / Yes
- Ne / No

**08 Víš, že existují nádoby na použité baterie?**

08 Do you know you can find containers for used batteries?

- Ano / Yes
- Ne / No

## Appendix 2: Questionnaire (09-13)

### 08 Víš, že existují nádoby na použití baterie?

08 Do you know you can find containers for used batteries?

- Ano / Yes
- Ne / No

### 09 Do jaké míry cítíš, že třídíš odpad?

09 How much do you think you contribute to recycling?

- Hodně / A lot
- Středně / Average
- Skoro vůbec / Almost none
- Vůbec / Not at all

### 10 Co třídíš?

10 What do you recycle?

- Plast / Plastic
- Sklo / Glass
- Papír / Paper
- Tetra Paky / Tetra Paks
- Bioodpad / Biowaste
- Elektroniku / Electronics
- Nebezpečný odpad (barvy atd.) / Dangerous waste (paints etc.)

### 11 Jaký materiál, bys řekl/a, že by se měl třdit snadněji a dostupněji.

11 Which material do you think should be more available and easier to recycle?

- Plast / Plastic
- Sklo / Glass
- Papír / Paper
- Tetra Paky / Tetra Pak
- Bioodpad / Biowaste
- Elektronika / Electronics
- Nebezpečný odpad / Dangerous waste

### 12 Víš, že je zákonná povinnost třdit odpad?

12 Do you know you are obliged to recycle?

- Ano / Yes
- Ne / No

### 13 Kdybys měl možnost získat zdarma do domu nádoby na separaci odpadů (různé velikosti), třídil bys víc?

13 If you had a chance to receive FREE of charge containers for waste separation into your flat, would you recycle more?

- Yes / Ano
- Ne / No
- Třídím dostatečně / I recycle just enough

## Appendix 3: Questionnaire (14-16 and Czech version)

14 Myslíš, že kdyby tvé okolí třídilo víc, ty bys také třídil víc?

14 Do you think if people around you recycled more, you would recycle more?

- Ano / Yes
- Ne / No
- Třídím dostatečně / I recycle just enough

15 Myslíš, že recyklované výrobky šetří výrobcům peníze a suroviny?

15 Do you think recycled products are economically convenient (it saves money, raw materials)?

- Ano / Yes
- Ne / No

16 Jsi Čech / Češka nebo cizinec/ka?

16 Are you Czech or foreigner?

- Čech, Češka / Czech
- Cizinec, -nka / Foreigner

[Pokračovat >](#)

Jsem Čech / Češka.

Byl/a jsi někdy mimo ČR na delší dobu (3 a více týdnů)?

- Ano
- Ne

[< zpět](#)

[Pokračovat >](#)

Vyjel/a jsem do zahraničí na déle než 3 týdny.

Do jaké země jsi vyjel/a?

Ovlivnilo tě zahraniční pobyt v tvém pohledu na recyklaci?

- Neovlivnilo
- Pozitivně (tendence třídit víc)
- Negativně (tendence třídit méně)

Myslíš si, že v porovnání se zahraničím Česko třídí:

- Méně
- Více
- Stejně

## Appendix 4: Questionnaire (foreign version and last page)

### I am a foreign

and I stay in the Czech Republic

What is your country of origin?

Do you think your country of origin have any influence if you recycle or not?

- Yes
- No

Do you think the country of your origin excercises recycling more than Czech?

- Yes
- No, Czech recycles more
- Pretty same in both countries

[← zpět](#)

[Pokračovat](#)

### Poslední otázka / Last Question

.....

**Jakou vidíš prognózu do budoucna v ČR?**

How do you see the future of the Czech Rep.?

- Recyklace se zlepšuje. Ekonomicky se to rozvíjí. / Recycling is getting better. It is economically convenient.
- Nemá to smysl. / Recycling is not worth it.
- Recyklaci neřeším. Myslím, že je jedno, jestli se třídí nebo ne. / I don't care about recycling. I think it doesn't matter if someone recycles or not.
- Jiné:

[← zpět](#)

[Odejít](#)