

Waste Management Reform and Revision of Packaging and Packaging Waste EPR System

The Case of Finland

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Abstract

The packaging waste problem was realized a couple decades ago. The effectiveness of waste policy instruments and EPR schemes for packaging and packaging waste is still being discussed in Europe. Finland like other EU Member states has transposed EU waste legislation into the national law. An EPR system for packaging and packaging waste in Finland was introduced in 1997. Plenty of changes to this EPR scheme were set by the new Finnish Waste Act in 2012. The revised waste legislation tries to address defects of the primary EPR system. Unclear allocation of responsibilities between various involved actors, intensified recovery rather than recycling and free-riding problem are among those issues. This thesis aims to explain the development of the Finnish EPR system for packaging waste and to analyze the effectiveness of the scheme. Introduced changes and perceptions of various stakeholders are presented in this paper too. Finally, lessons that could be learned from Finnish case and good experiences from other European EPR systems that might be useful to know are discussed in the end.

Keywords: Extended Producer Responsibility, Packaging and Packaging waste, Finnish waste reform.

Executive Summary

In the last couple of decades in Europe, the need of effective waste management was recognized and a number of waste regulations and other policy instruments increased significantly. In Finland since 1995 plenty of waste-related laws were implemented too.

One of the principles of waste policy making developed in 1990s in Sweden was Extended Producer Responsibility (EPR)(Lindhqvist, 2000). Nowadays, the legal basis that includes EPR in waste management of different product groups can be found in plenty of EU directives and laws. Packaging and packaging waste is among those product groups. EU sets the targets for recycling and recovery of packaging materials and Member States have to take measures to reach the goals, whatever policy instruments or schemes they decide to implement (Packaging and packaging waste, 2011). The Extended Producer Responsibility system for packaging and packaging waste in Finland was introduced in 1997. The implementation of the EPR system for packaging and packaging waste in Finland was quite challenging and required a lot of coordination. One of the main tasks was the coordination with an existing waste municipal management system and allocation of responsibilities between producers and municipalities (Melanen et al, 2002). A so called “light model” of the EPR system, where the responsibilities of waste management are shared between producers, local authorities, and transporters, was implemented. The law did not define a clear division of the roles and it has caused some coordination challenges, as well as, dissatisfaction among different actors in the system. In 2012, when the new Finnish Waste Act was passed, there were plenty of changes introduced to the existing EPR system for packaging and packaging waste.

The existing EPR systems for packaging and packaging waste are rather diverse than uniform. Some countries managed to create and implement quite successful systems and had no major problems to achieve not only EU targets for recycling and recovery, but set even higher national targets, meanwhile, in some other states, EPR systems were not so effective (OECD, 2005). Recently there are plenty of discussions going on in Europe about different types of EPR systems and what are the key factors that influence the success of these systems (EPR Club, 2013).

In line with this development, the focus of this master thesis is put on the process of improvement of packaging waste management through the modifications of the Extended Producer Responsibility (EPR) system in Finland. It aims to examine and evaluate the Extended Producer Responsibility (EPR) scheme for packaging and packaging waste in Finland and to reveal the main factors and possible implications of the reformed EPR system since the new Finnish Waste Act entered into force.

The problem and question is why there was a need in Finland to reform the existing EPR system and what the implications are for the affected parties. So far there is not much internationally available research on the effectiveness of the Finnish EPR system for packaging waste, as well as, on the modified one, therefore, it is important to have some new insights if the reform is likely to give the anticipated outcomes, fix the deficiencies of the previous EPR scheme and improve the overall solid waste management in Finland.

Therefore, the overall research questions of this master thesis are the following:

RQ1: Why was the previous Finnish EPR system for packaging and packaging waste revised in 2012?

RQ2: How will the changes set in the new Finnish waste legislation change the previous scheme and what are the implications for the existing packaging waste management?

RQ3: How do affected parties perceive these changes?

In order to answer the research questions, there were several areas formulated for further examination:

- The context and the implementation of the EPR system for packaging and packaging waste and Finnish waste legislation and management, in a greater details;
- The division of responsibilities in packaging waste management among all stakeholders and their perception concerning the initial EPR system;
- Effectiveness and results achieved by the Finnish EPR system in terms of anticipated/unanticipated outcomes;
- The factors/reasons for the need to reform the existing EPR system and the perception by the effected stakeholders and preconditions for the improved effectiveness of the reformed one.

After answering these questions it was possible to outline plenty of problems related with previous EPR system and to have better understanding of how the reformed EPR system addresses these defects and the overall effectiveness of the solid waste management in Finland. Contacts with the involved actors in the packaging EPR system and their insights helped to understand the entire picture of current packaging waste management situation. Moreover, the stakeholders provided important information about the main concerns and possible challenges that the revised Finnish waste legislation might bring.

Undoubtedly, in the last decades Finland has progressed significantly in the environmental and waste management legislation. Introduction of the EPR system for packaging and packaging waste gave a beginning for the establishment of necessary infrastructure and administration, enhanced cooperation and involvement of the private sector into this waste stream management. The minimum targets set by the EU were fulfilled. Despite these positive improvements the Finnish EPR system and packaging waste related legislation lacked precision and concreteness. There was plenty of space left for interpretations of responsibility allocation. This led to the situation that proper collection services of certain packaging materials were not completely ensured. This is especially relevant for those materials, like plastics, that are not very economically profitable. Producers concentrated more on materials that are easier to recycling and that are more valuable. In addition to this, the existing waste management system failed to address the EU and also national waste hierarchy and objectives. The EPR system did not contribute to the packaging waste prevention goal. Reduction in waste generation was not achieved, only recovery was intensified. Overall, it appeared that flexibility in responsibility allocation between different actors in the EPR system in order to avoid additional costs and keep all expenses down not in all cases, like in Finnish EPR scheme, delivers only anticipated outcomes. This situation gave preconditions for the revision of waste laws, including, the EPR system for packaging.

The waste management and EPR reform in Finland introduced a number of changes that try to address previous deficiencies. Responsibility allocation between all actors in the system was clarified. Producers' responsibility from partial was changed to full. This change may mean that costs for producers and consequently for consumers will increase, therefore, packaging sector is trying to find the way to organize packaging waste collection in most economical manner. At the moment negotiations on the most optimal packaging collection network between producers and legislators is taking place. More attention, it seems, should be given to plastic waste which appeared to be the most problematic and it is not collected everywhere in Finland. Collection and transportation of small amounts of packaging waste in Northern rarely populated regions of Finland seems to remain of questionable effectiveness. Despite that, it

could be expected that consensus and the most efficient solutions for the collection network will be found. Revised waste legislation also tries to address materials efficiency. It is difficult to draw a direct line between the EPR scheme for packaging and packaging design changes and improved materials efficiency. In the Finnish case, these processes are also influenced by a combination of other policy tools, technological advance and consumers' demand.

Introduction of changes in an EPR system inevitably have impact on the different actors that are involved in the scheme. Apparently legislators and especially EPR monitoring institutions saw the need to improve existing legislation and, subsequently, overall packaging waste management and materials efficiency. On the other side, the packaging sector and producers are keen to avoid an increase of the cost they will have to carry. At the moment the concrete requirements and design of the packaging collection system is being negotiated. Often this process and final outcome can be influenced by stakeholders with greater power in negotiations. Apparently, the Finnish packaging sector is considerably good at pushing their interest forward. The outcomes of discussions between producers and legislators and the final design of the modified packaging EPR system should be known next year.

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Abbreviations

EEA- European Environmental Agency;

ELV- End of Life Vehicles;

ELY- Centre- Centre for Economic Development, Transport and the Environment for Pirkanmaa;

EPR- Extended Producer Responsibility;

EU- European Union;

EUR- Euros;

OECD- The Organization for Economic Co-operation and Development;

PALPA- Finnish deposit-refund system for beverage containers;

PET- Polyethylene Terephthalate;

PRO- Producer responsibility organization;

PYR - Environmental Register of Packaging;

SYKE- Finnish Environment Institute;

WEEE- Waste Electrical and Electronic Equipment.

1 Introduction

1.1 Background

In the last couple of decades, the need of effective waste management was recognized in Europe and the number of waste regulations and other policy instruments increased significantly (OECD, 2005). In Finland, the same as in other the European Union (EU) member states, since the accession in 1995, plenty of waste-related laws were implemented. In the beginning of 1994, the Finnish National Waste Act (1072/1993) and Waste Decree (1390/1993) entered into force. Later other laws were harmonized and waste-related EU directives were transposed into the national legislation.

One of the principles of waste policy making developed in 1990s in Sweden was to extend producers' responsibilities of products over all of the life cycle of the product, including the final treatment (Lindhqvist, 2000). Nowadays, the legal basis for this type of waste management can be found in plenty of EU directives and laws. The Packaging and Packaging Waste Directive was issued in 1994 and later in 2004 and 2005 updated. EU sets the targets for recycling and recovery of packaging materials and Member States have to take measures to reach the goals, whatever policy instruments or schemes they decide to implement (Packaging and packaging waste, 2011). The Extended Producer Responsibility (EPR) system for packaging and packaging waste in Finland was introduced in 1997. The implementation of the EPR system for packaging and packaging waste in Finland was quite challenging and required a lot of coordination. One of the main tasks was the coordination with an existing municipal waste management system and allocation of responsibilities between producers and municipalities (Melanen et al. 2002). A so called "light model" of the EPR system, where the responsibilities of waste management are shared between producers, local authorities, and transporters, was implemented. The law did not define a clear division of the roles and it has caused some coordination challenges, as well as, dissatisfaction among different actors in the system (Melanen et al, 2002). In 2012, there were plenty of changes introduced to the existing EPR system for packaging and packaging waste (Finnish Waste Act 195/2012).

The focus of this master thesis is the improvement of packaging waste management and waste prevention in the frames of the Extended Producer Responsibility (EPR) system in Finland. It aims to examine and evaluate the Extended Producer Responsibility (EPR) scheme for packaging and packaging waste in Finland and to reveal the main factors and possible implications of the reformed EPR system after the New Finnish Waste Act in 2012 entered into force.

The experience and lessons learned from the case of the Finnish EPR system for packaging waste may be useful when other existing schemes in Europe are examined, as well as, when other systems are set up in the future.

1.2 Problem Definition

Solid waste generation is a well-known problem not only because huge amounts of litter worldwide are aesthetically unattractive, but also because disposal of certain materials can cause significant harm to environment and human health. Landfilling requires valuable areas of land, pollutes air, water and soil, discharges carbon dioxide and methane to air, and various chemicals into the groundwater (Eurostat, Waste statistics, 2012). Developed countries with extensive consumption habits and comparatively high purchasing power generate significant amounts of waste. The European Union itself generates about 3 billion tonnes of wastes, where around 90 million tonnes of it is hazardous (Eurostat, Waste statistics, 2012). In Europe it was admitted that generation of waste shows that resources are used inefficiently,

and, therefore, prevention and improved waste management must be given the top priorities (EU Sustainability Strategy, 2006). Even if the type of waste and amounts generated differ from country to country, it was realized that packaging waste deserves special attention (Eurostat, Packaging waste statistics, 2011). Obviously, reusing and recycling of these packaging materials should prevent raw materials extraction and reduce waste generation. However, the question arises, how all packaging can be collected in a cost-efficient way and who should be responsible for the physical infrastructure, as well as, for the financing of the recycling systems. As previously stated, in order to improve waste management and materials efficiency, the concept of EPR systems was suggested and later implemented in European countries, as well as, elsewhere. The existing EPR systems for packaging and packaging waste are rather diverse than uniform. Some countries managed to create and implement quite successful systems and had no major problems to achieve not only EU targets for recycling and recovery, but set even higher national targets. Meanwhile, in some other states, EPR systems were not so effective (See Figures 5-1, 5-2). Recently there are plenty of discussions going on in Europe about different types of EPR systems and what are the key factors that influence the success of these systems (EPR Club, 2013).

Usually the functioning of the EPR systems and allocation of the responsibilities between different actors are not self-evident and often quite complex (OECD, 2005). Therefore, it is important to define and clarify this. EPR systems are diverse and, consequently, each research project can contribute to the existing knowledge and presumably could help to better understand the factors which determine the effectiveness of these systems and possible pitfalls.

In Finland, the New Finnish Waste Act introduced changes to the existing EPR system. The problem and question is why there was a need in Finland to reform the existing EPR system and what the implications are for the affected parties. So far there is not much internationally available research conducted on the effectiveness of the Finnish EPR system for packaging waste, as well as, on the modified one, therefore, it is important to have some new insights if the reform is likely to give the anticipated outcomes, fix the deficiencies of the previous EPR scheme and improve the overall solid waste management in Finland.

1.3 Objective and Research Questions

As addressed previously, the implementation schemes for the packaging and packaging waste management are quite diverse and achievements reported by different countries are uneven. Finland introduced an EPR system for packaging and packaging waste already for quite some time, however, it was decided to modify and improve it. Therefore, the overall research questions of this master thesis are the following:

RQ1: Why was the previous Finnish EPR system for packaging and packaging waste revised in 2012?

RQ2: How will the changes set in the new Finnish waste legislation change the previous scheme and what are the implications for the existing packaging waste management?

RQ3: How do affected parties perceive these changes?

In order to answer the research questions, there were several areas formulated for further examination:

- The context and the implementation of the EPR system for packaging and packaging waste and Finnish waste legislation and management, in a greater details;
- The division of responsibilities in packaging waste management among all stakeholders and their perception concerning the initial EPR system;
- Effectiveness and results achieved by the Finnish EPR system in terms of anticipated/unanticipated outcomes;
- The factors/reasons for the need to reform the existing EPR system and the perception by the affected stakeholders and preconditions for the improved effectiveness of the reformed one.

After answering these questions it should be possible to name the main problems related with the previous EPR system and to have better understanding how and if the reformed system will improve the overall effectiveness of the solid waste management and material efficiency in Finland.

1.4 Methodology

In order to comprehensively explore and answer the main research questions the selection of suitable methodology, data collection and framework for analysis is of the great importance.

1.4.1 The Case Study

The EPR system for packaging waste management in Finland was addressed and in principle analyzed using the single case study approach as a research strategy. The Finnish case then was discussed and compared in a broader European context. A case study strategy is often suggested as one of the most suitable in order to investigate a contemporary phenomenon within its real-life context (Yin, 2003). The case study method is often applied to answer the „how“ and „why“ type of research questions and helps to obtain more holistic view of the research object. The design of this method varies from single case with one analytical unit to multiple, comparative case studies. In this master thesis, a single-case design with multiple units of analysis suggested by Yin (2003) was chosen.

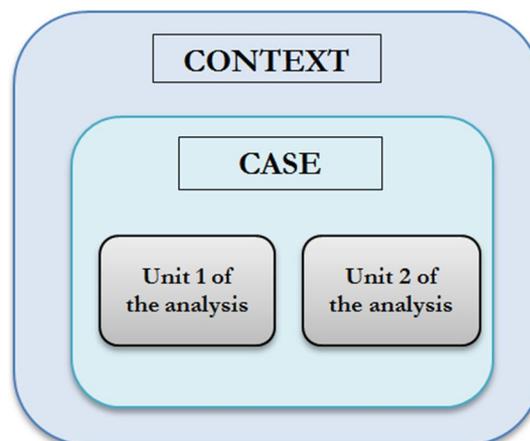


Figure 1-1 Embedded Single-case with Multiple Analysis Units Design Based on Yin (2003).

The case of the Finnish EPR system is being examined firstly in the context of the EU waste legislation. Subsequently, the EU waste-related directives translated into Finnish national laws and the overall development of the waste management in Finland is briefly presented. The Finnish EPR system for packaging and packaging waste is investigated by splitting it into two units of analysis – the primarily established system and the reformed system.

1.4.2 Data Collection and Analysis

In order to answer the main research questions about the chosen case, mostly qualitative research methods were employed. Available statistical data was used to illustrate or support some of the findings.

Data collection firstly was started with a search for relevant literature on EPR systems, studies of existing EPR programmes for various product groups. Subsequently, other information sources on packaging waste management legislation, both at national and at EU level, were analyzed. Factual and statistical data on packaging waste, recycling of materials streams and reports of the results in the EU were also accessed seeking to have a broader picture of the EPR programmes for packaging waste implementation. From May to August 2013 important information was received during direct contacts with affected stakeholders in the Finnish EPR system: legislators and responsible public institutions, representatives of the Finnish packaging sector.

The case of the initial Finnish EPR programme for packaging and packaging waste was analyzed according to a simplified version of an evaluation model developed by Tojo (2004) and environmental policies and programmes effectiveness criteria suggested by Mickwitz (2003), Vedung (2009) and others.

1.4.3 Analytical Framework for EPR Programmes Evaluation

In order to evaluate how effective the environmental policy instruments are and to understand how EPR programmes work, an analytical framework and selection of the evaluation criteria are needed.

Policy and policy programme analysis is because of its complexity and uncertainties often not an easy task. Once it comes to evaluation of environmental policy, the situation can become even more complicated. Environmental problems are complex, have a long time frame, cause-effect relationships are not always clear and uncertainties are great, involves different interests, values and goals (Mickwitz, 2003). Therefore, evaluation in this field appeared relatively late (Knaap and Kim, 1998b). Nowadays, however, there is plenty of work being done in many countries (e.g. Andersen et al., 1999; Bressers, 1995; Hildén et al., 2002; Jänicke and Weidner, 1995a), and also at the EU level (Mickwitz, 2003). There was plenty of work done regarding the EPR programmes for different products groups in different countries in the last decades too.¹

Environmental policy can be evaluated from different angles and disciplines. However, intervention theories have gained a special role in evaluations of environmental policy instruments. They can be applied to establish the intended effects of the instruments and the target area of each instrument and to determine which outputs, outcomes and causal links to collect data on. Intervention theory usually encompasses these elements and their causal links (Mickwitz, 2003):

- *Actors* – decision-making entities, like public authorities, companies, NGOs and individuals. (The actors include agencies implementing, the policy instrument and target groups, i.e. the targets of the instrument)

¹ Plenty of studies on various products groups, different countries and on EPR theory by researchers at IIIEE were conducted and they were overviewed while writing this paper, but are not presented in details in the thesis.

- *Inputs* – resources which are used by the administration to produce outputs. (Human resources, finance, also matters coming from the target groups that the agencies take into account or respond to)
- *Outputs* – matters that the target groups are faced with (an accreditation and its specific conditions)
- *Outcomes* – the actions taken by the target groups because they are faced with the outputs, but also the consequences of these actions.

There are three groups of criteria distinguished (Mickwitz, 2003):

- General (e.g. relevance, impact, effectiveness, persistence, flexibility, predictability);
- Economic (e.g. efficiency, cost-effectiveness);
- Democracy-related (e.g. transparency, legitimacy, equity);

Effectiveness is a criterion that can be limited to the anticipated effects in the target area in relation to the stated objectives. There are also plenty of public policy and programme evaluation models developed (Vedung, 2009). One of the oldest that could be used for effectiveness evaluation of public programmes is the goal attainment model.

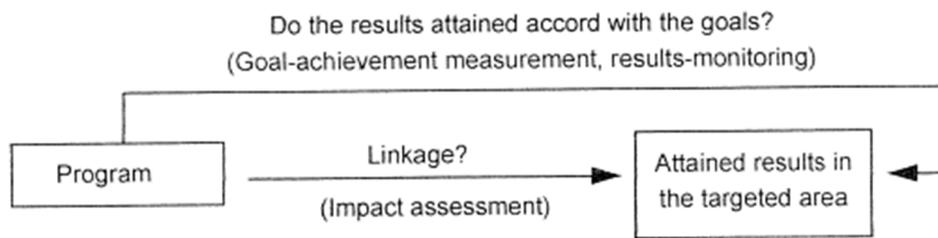


Figure 1-2 Goal-Attainment Evaluation Model

Source: Vedung (2009)

The latter criteria and effectiveness in terms of goal attainment is going to be used later to analyze Finnish EPR system for packaging, however, the unanticipated outcomes of the policy is also taken into account. The evaluation model that is regarded as suitable for the evaluation in this sense is the ‘side-effects evaluation’ (Vedung, 1997). In this model, the effects of the policy are divided into anticipated and unanticipated effects (Mickwitz, 2003).

A model for EPR programme evaluation, based on intervention theory, was developed by Tojo (2004) and the following simplified and adopted form of it is used in this thesis:

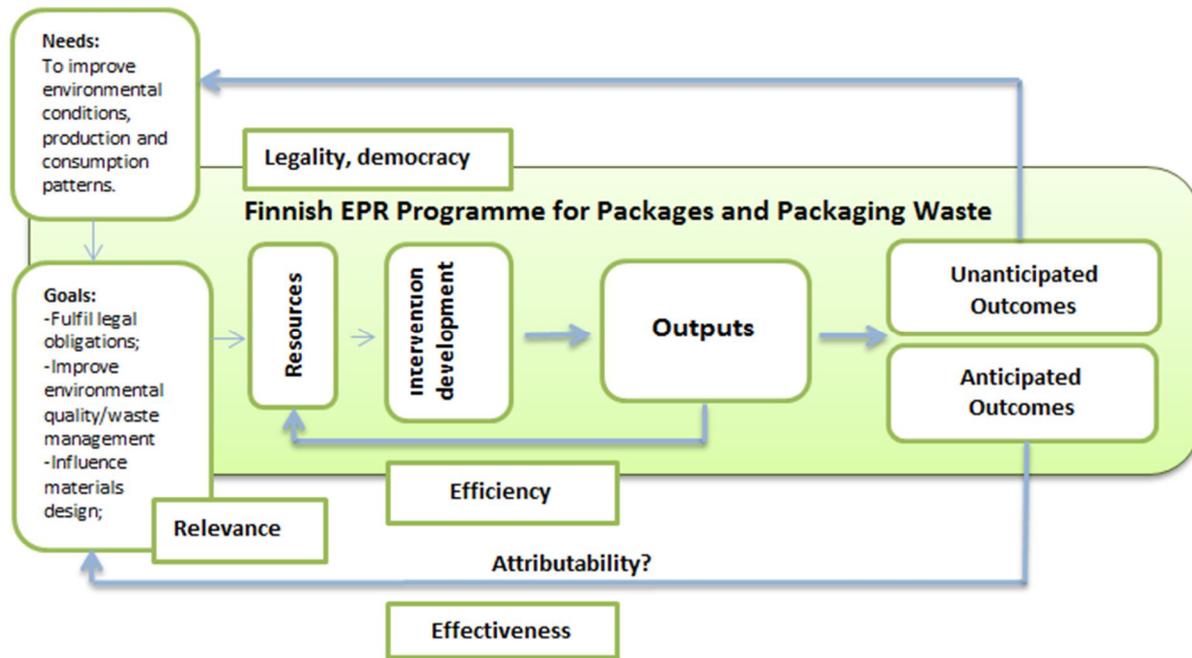


Figure 1-3 Simplified and Adapted EPR Evaluation Model for Finnish Case.

Source: Tojo (2004)

1.4.4 Stakeholder Analysis

In all democratic countries, the support of the stakeholders for any type of policy instruments is of the great importance. The higher the support for the policy is in the initial stage, the more likely it is that the implementation is going to be successful. Stakeholder analysis is often used by policymakers and can detect and act to prevent potential misunderstandings about and/or opposition to the policy or programme (Schmeer, 1999). Since the changes for the Finnish EPR system for packaging and packaging waste was just very recently introduced, a stakeholder analysis could be useful in order to find out the perception and opinions not only about the existing system, but also about the modified. Interviews with the legislators and those who were involved into drafting the new Finnish Waste Act can help to reveal their motivation and reasons to do so. Representatives of the supervisory institutions could provide information about the implementation process and reporting/ monitoring situation. Opinion of the packaging industries and other producers is also very useful as they are the ones who are the most affected by the changes introduced.

In some stakeholder analysis guidelines it is strongly advised to identify and to make a list of the key stakeholders and make a list of the priority ones (Schmeer, 1999). In this research, the stakeholders are considered all parties who one or other way are involved in the EPR system for packaging and packaging waste. The priority is given to the policy-making institutions (Finnish Ministry of the Environment, experts at SYKE), policy monitoring administrative bodies and producers. Consumers and local municipalities as well as waste management companies and recyclers are also very important and contribute for the success and effectiveness of the system. In some cases, it is essential to consider the differences of the stakeholders' opinions in different geographic or administrative areas (Schmeer, 1999). This aspect is quite important in Finland, since the North of the country is rarely populated and the distances of waste transportation are very long.

To choose the way of interviewing the stakeholders and the development of suitable questionnaires is the next step. In order to obtain the necessary information, the cultural context and the correct manner of communication is important (Schmeer, 1999). During this study, only open-ended questions were used and interviews were mostly semi-structured allowing the respondents to express their opinions on the EPR system for packaging and changes introduced and share their knowledge, which is very useful in addition to the secondary resources, analyzed previously during the preparation stage. Plenty of contacts were made by e-mail or telephone as it appeared to be a more acceptable and preferable way for the interviewees during the summer holiday time.

Finally, the stakeholders' responses and positions have to be analyzed. Literature on this method suggests translating information obtained into a stakeholders table or placing their positions in the spectrum from supporter to opponents of the policy or mapping their opinions and arguments.

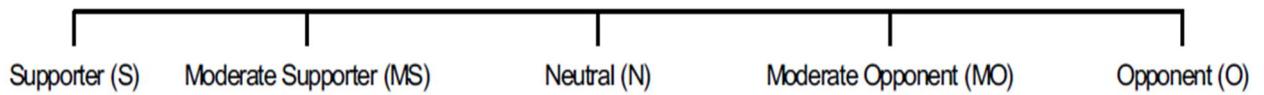


Figure 1-4 Spectrum of Stakeholder Positions

Source: Schmeer (1999)

This type of positioning was applied in order to sort and analyze stakeholders' arguments and opinions of the Finnish EPR system for packaging and packaging waste.

1.5 Scope and Limitations

The scope of this master thesis research is limited to EPR systems for one product group – packaging in Finland. The main focus is put on the explanation and understanding of the EPR system and responsibility allocation between various actors in the case of Finland. Effectiveness of the primarily implemented policy scheme for packaging waste management in the chosen case is evaluated and challenges are outlined. Secondly, the modifications introduced by the new Finnish Waste Act are presented and modifications made are analyzed. In order to have more successful and effective policies, support by the all affected parties is always of great importance. Therefore, the perception and opinions of the stakeholders on the previous and reformed EPR system is analyzed too. Upstream improvements of the packaging and product design change or materials efficiency stimulated by the EPR is touched upon, but not analyzed in greater details.

Due to still quite recent changes in packaging waste management, this is rather early insights and they should later be followed up by more comprehensive and detailed research. Future studies might also include larger number of stakeholders interviewed something that was not possible during the summer period.

1.6 Disposition

The structure of this thesis is the following:

Chapter 1 of the paper presents the main problem, research question and tasks. It describes the method and data collection process, analytical framework and criteria for the evaluation of

the EPR programme effectiveness, identifies research limitations and provides an outline of the thesis.

In Chapter 2 is addressed the legal basis for the packaging waste management in Europe and in Finland, as well as, the EPR concept and theory.

Chapter 3 is focused on the background of Finnish waste legislation.

Chapter 4 presents the main findings on the Finnish EPR system for packaging waste and recently introduced changes in details.

Chapter 5 presents the effectiveness evaluation of the Finnish EPR scheme and stakeholders analysis.

In Chapter 6 the Finnish packaging EPR system is shortly discussed in a broader European context.

In the end of the thesis, conclusions, reference list and appendices can be found.

2 Concept of EPR and Waste Policy Background

In order to understand better the EPR programme for packaging waste implementation and to evaluate the system's effectiveness in Finland, in this subsection the main concept of extended producer responsibility (EPR) and its development is overviewed. Policy instruments and possible schemes are shortly discussed.

2.1 EPR as a Policy Principle

Since the importance of waste prevention was realized and product life cycle thinking came into the agenda, there emerged a need to find effective and innovative policy tools for different waste streams' management rather than just environmental regulations. The better ways to separate, collect and treat the waste in the way that valuable materials could be recycled, reused or the energy from the waste would be recovered had to be found. The concept of Extended Producers Responsibility (EPR) was developed in Sweden in the 1990s by Lindhqvist and Lidgren (1990) and defined by Lindhqvist (1992) as environmental policy strategy:

Extended Producer Responsibility is an environmental protection strategy to reach an environmental objective of a decreased total environmental impact from a product, by making the manufacturer of the product responsible for the entire life-cycle of the product and especially for the take-back, recycling and final disposal of the product.

This approach was a shift from regulatory prescriptive policy instruments from command and control to more goal-oriented and incentives giving ones (Tojo, 2004). Usually a mix of policy instruments, including different types of administrative, economic and informative tools, has to be applied in order to achieve the overall goal of the more effective and efficient waste management ,waste reduction and downstream improvements as well as to encourage the design change of the products' upstream improvement (Tojo, 2004).

EPR system can have the form of take-back schemes or deposit-refund systems, can be mandatory or voluntary (Tojo, 2004). Producers and other responsible parties' financial and physical responsibilities are defined in national laws and can be implemented individually or collectively (Tojo, 2003). The selection depends on the context and situation in each individual country. The amount of historical waste, orphaned products, existing infrastructure of waste management systems, administrative division, level of technologies and financial capacity often vary, therefore, even if the main principles are introduced, existing EPR systems nowadays are quite diverse.

The underlying principle is to extend producers responsibility to the entire life-cycle of their products, however, EPR does not aim to blame or to put all responsibilities only on producers, but rather seeks to find reasonable and fair ways to divide responsibilities between different actors in the product chain in a way that the best solutions for problems would be found in the most effective manner. (Lindhqvist, 2013).

The EPR principle was applied for the end of life treatment of different types of products: batteries, end-of-life vehicles, electric and electronic equipment and packaging end-of-life treatment and set in the corresponding EU directives, which later are transposed to the national legislation.

The other anticipated outcome is the improvement of the packaging design and material efficiency. These upstream improvements are highly dependent of the producers of packages.

Packaging of the products have such functions as to protect the product during transportation, to preserve, to contain and to give information about the product and even to market the product. Producers and product designers can choose different materials: paper and cardboard, wood, plastic, metal or glass depending on what kind of function it is expected to deliver (Eurostat, Packaging waste, 2012). Latter materials can be reused and recycled if different types of packaging waste is collected separately and are clean, while efficient and effective infrastructure should be created and costs of the system should be adequately and fairly distributed among all stakeholders. Finally the last, but not the least, the system has to be convenient for consumers (householders, industries). They should be well informed and willing to participate in the system.

2.1.1 Division of Responsibilities in the EPR systems

The model for Extended Producer Responsibility by Lindhqvist (2000) suggests several types of responsibilities, which can be given for the producer: economic (financial), physical (infrastructure) and informative.

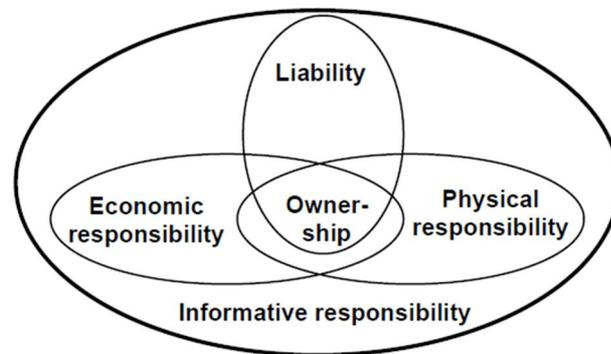


Figure 2-1 Model for Extended Producer Responsibility

Source: Lindhqvist (2000)

Liability in this model is defined as “the responsibility for proven environmental damages caused by the product in question. The extent of the liability is determined by legislation and may embrace different parts of the life cycle of the product, including usage and final disposal”. (Lindhqvist, 2000)

Economic or financial responsibility means that “the producer has to cover all or part of the expenses, for example, for the collection, recycling or final disposal of the products he is manufacturing. These expenses could be paid for directly by the producer or by a special fee“ (Lindhqvist, 2000).

Physical responsibility describes “the systems where the manufacturer is involved in the physical management of the products and/or their effects” (Lindhqvist, 2000).

Informative responsibility „requires the producers to supply information on the environmental properties of the products they are manufacturing“ (Lindhqvist, 2000).

In reality, as it was mentioned before, there exists combinations of the responsibilities divided among all involved actors in the EPR system – producers, retailers and producer organizations (PROs) if the collective way to meet obligation set in law is chosen, public

authorities (local, central, regional or interregional bodies etc.), consumers (householders, industries), waste management operators, transporters, recyclers etc. The design of EPR systems for packaging waste in Europe varies greatly and even if there was an attempt to harmonize it, the final result is quite diverse (IPC, Belgian experiences on the management of packaging waste, 2012). In some countries, there were deposit-refund systems for beer or other beverage drinks. The deposit-refund systems usually are established and managed by producers (e.g. breweries) and retailers. The intention of the deposit system is to give an incentive in the form of refundable deposit to return used drinks containers (Lindhqvist, 2000).

2.2 Waste Management Policy in Europe

The emergence of waste management and prevention policies in Europe can be traced back to the 1970s. The EU Waste Framework Directive on main principles of waste management was adopted in 1975, later complemented with other legislation and revised. Recently, the “waste hierarchy” is the basis of European Union waste policies, where prevention and recycling are the top priorities and landfilling and incineration are regulated more strictly and is the least preferable.



Figure 2-2 EU Waste Management Hierarchy

Source: Waste Framework Directive (2008/98/EC)

The EPR principle firstly was applied in individual countries, like Germany and Sweden, and after introduced in the broader EU context. The EU has regulatory laws on different waste streams: batteries, tyres, used cars, electrical and electronic equipment and packaging. First packaging waste orientated measures were introduced in 1980s. The Packaging and Packaging Waste Directive 85/339/EEC covered the packaging of liquid beverage containers, however, it was not very effective in the Members states. There was a need for a better legislation on packaging waste. The consultations with relevant EU institutions took place and the Directive 94/62/EC on Packaging and Packaging Waste was adopted in 1994. The latter directive seeks to harmonize national measures to prevent or reduce the impact of packaging and packaging waste and to ensure the functioning of the Internal Market (Packaging and Packaging Waste, 2012). Prevention, reuse of packaging and the recovery and recycling of packaging waste are in provisions of the Directive and reflect the overall principles on waste management (Packaging and Packaging Waste Directive 94/62/EC). The Packaging Waste Directive was reviewed once again in 2004. In the latter version of the Directive, the definition of ‘packaging’, the criteria, were clarified and the targets for recovery and recycling were increased.

Packaging is defined as “any material which is used to contain, protect, handle, and deliver and present goods. Glass bottles, plastic containers, aluminium cans, food wrappers, timber pallets, and drums are all classified as packaging.” (Eurostat, Packaging waste statistics, 2011). The EU targets (had to be met by 31 December 2008) were set the following (Packaging and Packaging Waste Directive 94/62/EC):

- 60 % by weight for glass;
- 60 % by weight for paper and board;
- 50 % by weight for metals;
- 22.5 % by weight for plastics, counting exclusively material
- 15 % by weight for wood.

Figure 2-3 EU Targets for Packaging Waste for 2008

Source: Packaging and Packaging Waste Directive (94/62/EC)

The revised EU Directive 2008/98/EC on waste has introduced the polluter pays principle and the Extended Producer Responsibility concept. The responsibility for producers to cover the costs of collection, sorting or treatment, and recycling or recovery of their products was introduced (Directive 2008/98/EC). The Waste Framework Directive also requires Members by 12 December 2013 to set up national waste management plans and prevention programmes (National Waste Prevention Programmes, 2012). New EU targets for all municipal waste are the following:

- 50% preparing for re-use and recycling of certain waste materials from households and other origins similar to households, recycling and recovery to be achieved by 2020;
- 70% preparing for re-use, recycling and other recovery of construction and demolition waste.

In order to reach these goals given to municipalities there is need to have a good collection of packaging from private households. The transposition of waste-related directives into national legislation as well as the duty to ensure the achievement of targets is obligatory for all EU Member States.

In the following chapter, the Finnish EPR system for packaging waste, the division of responsibilities and interaction between different stakeholders is explained in details.

3 The Case Study of Finland

Environmental regulations and other policies in Finland are not new. Oppositely, the country is known as environmentally aware. The standards of environmental requirements were quite high as compared with other countries since the 1980s (Sairinen, 2003). The accession to the EU enhanced the spread of environmental policy even more and a plenty of new policy tools were implemented.

3.1 Waste Legislation in Finland

Since Finland has joined the EU in 1995 and the European Communities' waste management regulations had also to be incorporated into Finnish national legislation as well.

3.1.1 General Waste Policy Principles

Finnish waste policy also reflects the main waste management principles introduced in the EU waste strategy and strategy on the prevention and recycling of waste:

- Prevention;
- The Polluter Pays;
- Producer Responsibility;
- The Precautionary Principle;
- The Proximity Principle;
- The Self-sufficiency Principle.

In Finland, the general objectives of waste policy are as outlined in the EU waste hierarchy, the priority is given for prevention and reduction and only secondly for the recovery of energy and materials from the waste (Waste policies, 2013). Reduction of the greenhouse gas emissions from landfilled waste is one of the main objectives too.

The main legal documents and laws Finnish waste legislation consists of are: Finnish Waste Act and its amendments, waste decrees, guidelines of the Ministry of Environment in the form of decrees and decisions, the National Waste plans and regulations set at the local municipal level.

The EPR principle in waste management was introduced by issuing decrees and decisions based on the corresponding EU legislation for the following waste streams:

- End-of-life vehicles (ELV);
- Tyres;
- Waste electric and electronic equipment (WEEE);
- Waste paper;
- Packaging and packaging waste.

The EPR system for packaging and packaging waste was defined in the Finnish Government Decision on packaging and packaging waste in 1997, where the minimum targets were set and responsibilities of certain actors were defined. The generalized Finnish waste policy legislation is illustrated in the following figure:



Figure 3-1 Finnish Waste Legislation

Source: Figure made by author, based on Finnish waste legislation.

In addition to the regulations outlined above, there are some taxes and fees for packaging applied too. The tax has to be paid for beverages, beer and other alcoholic drinks, depending on the type of packaging used. There is also a tax on disposable beverage packages, however, with exemption from tax for reusable packaging. This taxation system meant to encourage the re-use of drink containers and has been quite effective since 1970s (EU Commission, 2001).

3.1.2 Development of Packaging Waste Management Policy

The packaging and packaging waste EPR system was started in 1997. This step, in a way, was inspired by other European countries. Firstly, these systems were introduced in Germany and Sweden, and Finland followed by establishing producer responsibility systems for tyres, paper and packaging. Decrees and decisions corresponding to the EU Packaging Directive were issued and the minimum recycling and recovery targets were set.

The EU Directive for Packaging and Packaging Waste was transposed into Finnish legislation through the changes in the existing Waste Act of 1993, the Council of State decision on packaging and packaging waste in 1997 and the Council of State decrees in 2004 and 2005.

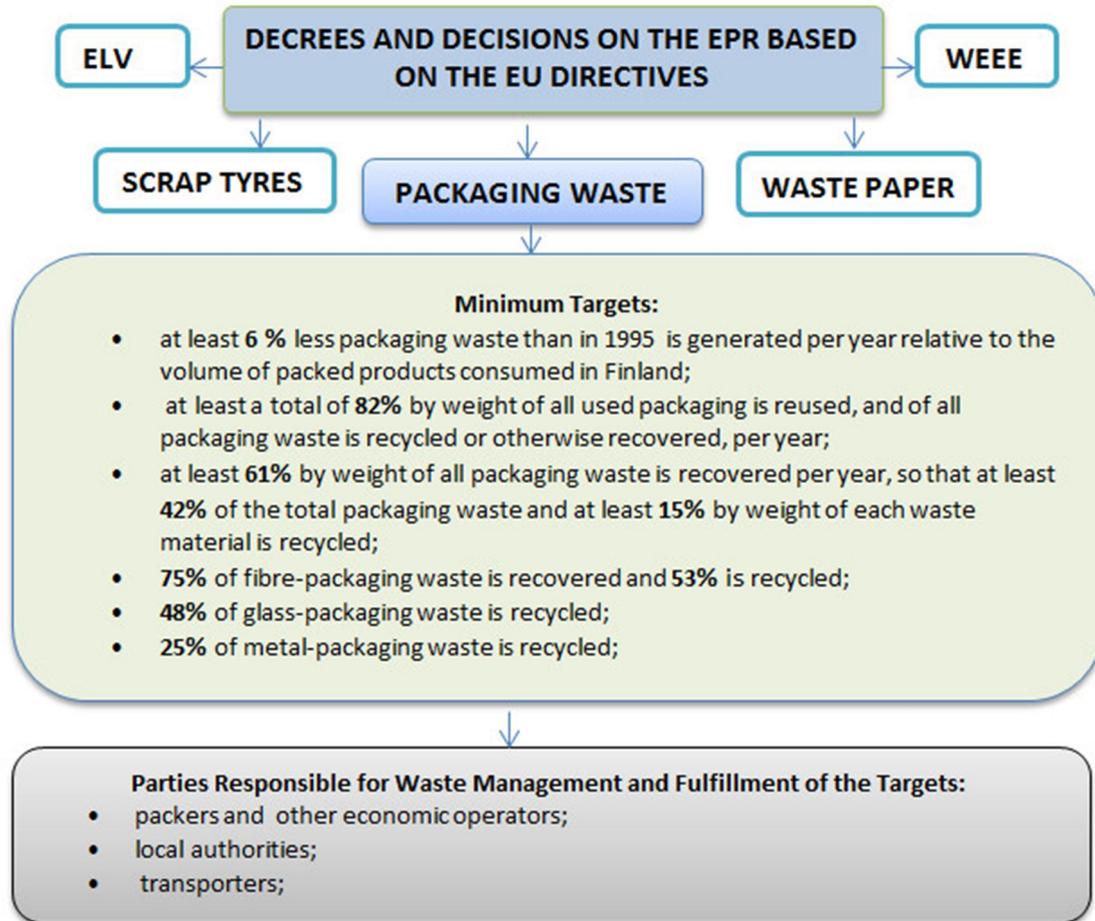


Figure 3-2 Finnish Targets for Packaging Waste Treatment set in 1997.

Source: Figure made by author, based on Finnish waste legislation and Government Decision for Packaging and Packaging Waste (962/97)

Finnish waste laws, including Waste Act, had plenty of amendments and were many times reviewed. In some legal acts, for example in the Government Decision for Packaging and Packaging Waste (962/97) terms (e.g. reuse) that are used in minimum targets setting section are not very clear.

In the following section, the most recent changes in Finnish waste management and EPR system for packaging waste are presented.

3.2 Waste Management and EPR Reform in Finland

In the last decade waste management in Finland improved. Targets set for recovery of different materials in the EPR systems were reached without major problems. Recovery of the waste was stimulated not only by EPR schemes, but also by taxes on the landfilled waste. A variety of market-based instruments and financial schemes for eco-innovations were introduced (OECD, 2009).

However, some goals set in the previous 1998 National Waste Plan remained unachieved. For example, regardless the advance in technologies and higher requirements, the incineration and use of waste for energy generation has not increased according to the objectives of the

previous National Waste Plan for 2005, but recovery in some sectors² and also at municipal level was low (The National Waste Plan for 2016, 2009). Recovery targets for most hazardous waste were not achieved and such waste was still placed in the landfills. The situation with biowaste recovery was in a particularly bad situation and was still landfilled.³ In addition, there was a lack of monitoring, and costs-effectiveness of policies and plans were not sufficiently addressed and assessed (OECD, 2009). According to OECD (2009), Finland should include material efficiency into the scope of energy recovery, review economic instruments in terms of effectiveness and efficiency and continue to promote environmentally friendly innovations and improve waste sorting at source in order to improve recycling. Prevention of waste, as one of the top priorities in the EU waste hierarchy, as well as, in Finnish waste management policy, also had to be improved as by that time existing policy instruments were neither supporting it nor gave the desired results. According to some studies conducted by the Finnish Environmental Institute, even if targets for recovery for certain materials in the EPR systems were successfully achieved, some concerns were with plastic and metal packages. In general, the EPR system for packaging and packaging waste appeared to be the most problematic (Melanen et al. 2002). The major issues were with the system's coordination with the already existing waste management schemes at municipal level. In the legislation, the allocation of responsibilities between municipalities and producers was not clearly and precisely defined. These uncertainties have caused continuous negotiations between the private sector and local institutions. The other problem which appeared with the EPR system was an issue with free-riders (Melanen et al. 2002).

3.2.1 New Waste Plan

There was still plenty of space for improvement of waste management and therefore further actions took place in Finland. In 2008, the Government of Finland had adopted a new National Waste Plan for 2016. The main objectives and principles of the new Waste Plan are the following (Towards a recycling society.The National Waste Plan for 2016., 2009):

- Prevention of the waste generation through improved material efficiency in production and consumption;⁴
- Promotion of recycling;
- Decreasing hazardous chemicals in waste;
- Reduction of harmful effects on the climate from waste management;
- Reduction of risks for health and the environment from waste management;
- Development and clarification the organization of waste management;
- Improvement of waste management.

Obviously, Finnish legislative authorities took into account problems and deficiencies in waste management and measures for improvement were included in the new Waste Plan. The material efficiency in production will be addressed through agreements and cooperation between different industries and Government. Materials efficiency will also be addressed in private companies, public institutions and households.

² Waste recovery stayed below targets in oil, chemical and base metal industries, in the construction, energy sectors and in particular in pulp and paper. (OECD, 2009)

³ Some of the landfills were closed in 2007, however, there was one landfill not in compliance with the 1999 EU Landfill Directive (OECD, 2009).

⁴ Material efficiency of products will be promoted by incorporating material efficiency criteria in product standards, implementation provisions and criteria for ecolabels and public procurement (Towards a recycling society.The National Waste Plan for 2016., 2009).

Other important aspect in the new Waste Plan is that the clarification of the responsibilities in waste management and in the EPR systems has to be included (Towards a recycling society. The National Waste Plan for 2016., 2009).

In addition to these general objectives, the targets for the volume waste generation and management were set:

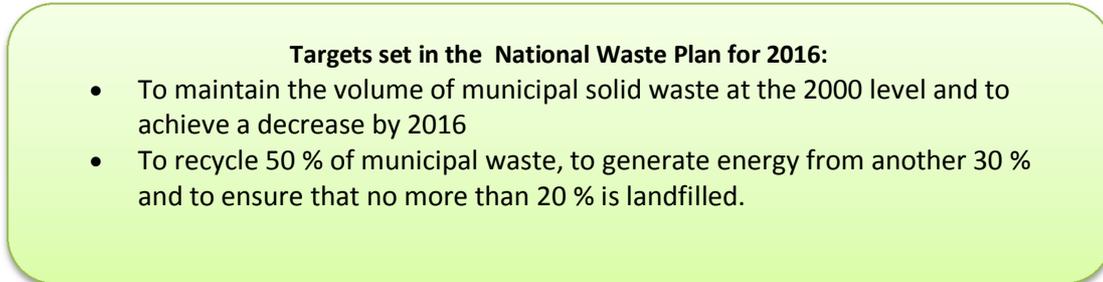


Figure 3-3 Finnish Waste Management Targets for 2016

Source: The National Waste Plan for 2016 (2009)

The overall target is at least 50% by weight of municipal waste has to be recycled by 2016. Industries and service companies, also other businesses, waste holders and municipalities are obliged to fulfill this objective by collecting separately biowaste, paper, cardboard, glass, metal and plastic (Points on Waste Reform, 2013). Landfilling is going to be even more restricted.

3.2.2 New Waste Act

The New Waste Plan for 2016 sets objectives and targets in order to improve the situation of general waste management in Finland. The following, in 2012 the waste legislation was supplemented with the new Waste Act, the Government Decree on Waste (179/2012) and amendments to the Environmental Protection Act (647/2011) and Environmental Protection Decree (180/2012). This legal reform in the Finnish waste sector should take place in the period of 2012-2014.

The Waste Act in the first paragraphs provided detailed and clear definitions of what is municipal waste⁵, mixed municipal waste⁶, waste producer⁷, waste holder⁸ and other relevant concepts. In the Chapter 6 on EPR, allocation of responsibilities between all actors in the system was clarified.

This new Waste Act (646/2011) has provisions on producer responsibility and has brought a number of important changes to the EPR system.

⁵ “Waste generated in permanent dwellings, holiday homes, residential homes and other forms of dwelling, including sludge in cess pools and septic tanks, as well as waste comparable in its nature to household waste generated by administrative, service, business and industrial activities;”(Waste Act (646/2011))

⁶ “The municipal waste remaining after specific waste fractions have been separately collected at source”;(Waste Act (646/2011))

⁷ “Anyone whose activities produce waste or anyone who carries out pre-processing, mixing or other operations resulting in a change in the nature or composition of such waste”, (Waste Act (646/2011))

⁸ “The waste producer, property holder or anyone in possession of the waste” (Waste Act (646/2011))

3.2.3 Changes in the EPR System

In Chapter 6 of the new Waste Act there are provisions on producer responsibility. According to this, since May 2013⁹ producers will be given much broader responsibilities in waste management, including packaging waste. Producers will have to take over the existing waste management system from municipalities and will have to bear the costs. The aim was to have more a unified collection system and to avoid overlapping of functions. However, it is important to point out that the law still allows for other operators to establish parallel collection or reception systems, but this has to be coordinated with producers (Waste Act (646/2011, Section 47/1). Municipalities will continue to take care of the non-EPR waste from households and municipal waste from the public sector. Local authorities may supplement producers with transportation.

⁹ Postponed at least for one year;

4 Findings

This chapter of the thesis presents the main findings on the Finnish packaging EPR system: all actors involved their responsibilities allocation in the system and achieved results. Secondly, changes brought by the new Waste Act (646/2011) and the reallocation of duties and responsibilities, concerns on the implementation of the new packaging waste regulations and proposals put forward by various stakeholders are presented.

4.1 Finnish EPR System for Packaging Waste

Inspired by the examples of the Swedish and German EPR systems, in 1997 Finland set up the EPR schemes, firstly for used tyres and, shortly after, for other product groups, including packaging. The main formation and establishment of the EPR system took place in the 1990s and had the following basic features and aims (Hildén & Kautto, 2009):

- “The lightweight model” of EPR, where producers or producers’ organizations were given the right to decide to what extent they want to take advantage of municipal waste collection if at all (no clear responsibility allocation and division);
- Expectations and willingness to avoid the increase of costs (for producers and importers);
- Shift in the administration in a large extent from the public to the private sector;
- Search for collective solution in some areas and establishment of producer organisations;
- Lack of supervision and monitoring (especially before the 2004 reform of the Waste Act, when supervisory role was given to Pirkanmaa Regional Environment Centre);
- Free-riding.

4.1.1 Main Actors and Responsibilities Allocation

As it was previously outlined, the light-weight EPR model was chosen in Finland. Responsibilities were not allocated and defined very precisely, and according to law they were shared between municipalities, producers and transporters (Government Decision on Packaging and Packaging Waste (962/1997), Section 11). Producers and industries bear the costs of packaging waste recovery, meanwhile, the municipalities are responsible for separate collection and their expenses should be compensated (Government Decision on Packaging and Packaging Waste (962/1997), Section 5). The obligation is not applicable for producers or other economic operators which have less than 5 million Finnish¹⁰ marks turnover (Government Decision on Packaging and Packaging Waste (962/1997), Section 2).

The following figure visually illustrates the relationship and responsibilities between different stakeholders in the packaging waste EPR system and overall waste management:

¹⁰ 841 000 EUR

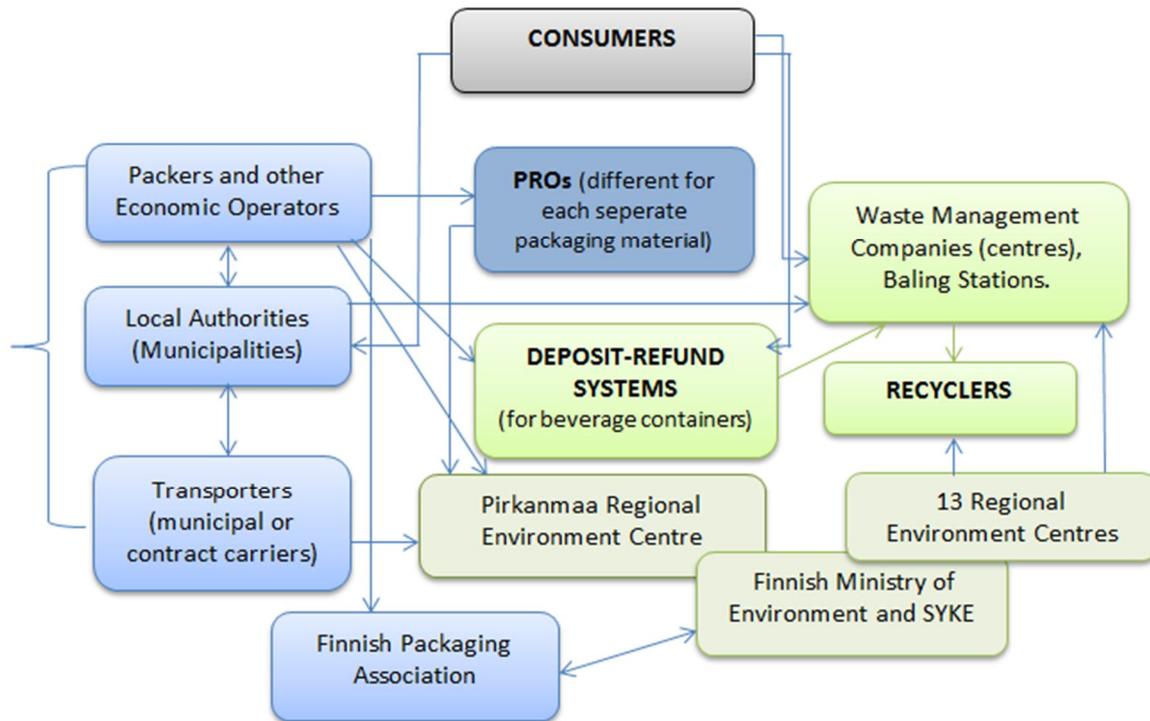


Figure 4-1 Responsibilities Allocation in Finnish EPR System and Packaging Waste Management

Source: Figure made by author, based in Finnish packaging waste legislation.

As it was already mentioned, the Government Decision, as well as other EPR-related legislation, does not provide very clear definitions and allocation of responsibilities. The arrows in Figure 4-1 aim to show possible ways how various actors can be involved in the system. According the latter Government Decision, packers and importers of the packaged products, municipalities and transporters had to cooperate in packaging collection organizations with each other. In this case there is plenty of space left for these actors to organize themselves and there are not very precise instructions. Producers have the right to choose whether to assume responsibility individually or collectively through the producer organizations (PROs). They might also join deposit-refund systems. Packers and other economic operators have to report to Pirkanmaa Regional Environmental Centre, where statistics about EPR schemes, including packaging, is collected. Information responsibility should also be shared and local authorities, producers or retailers and contractual transporters are obliged to cooperate with each other (Government Decision on Packaging and Packaging Waste (962/1997), Section 17).

4.1.2 Producers Organisations and PYR

Producers might choose to join the producer organisations in order to fulfil their obligations. In Finland there are different PROs for separate packaging materials:

- Corrugated cardboard packaging;
- Industrial fibres;
- Carton packaging;
- Carton liquid packaging;
- Plastic packaging;
- Glass packaging;
- Metal packaging;

- Deposit beverage packaging;
- Wooden packaging.

The packaging sector is quite a big and important branch of industry in Finland. There is the Finnish Packaging Association established, which has about 220 members. The association's main function is to represent the whole packaging chain and deals with different companies and organizations, including Ministry of Environment, that are, one or another way, related to packaging (PYR, 2013).

In addition to the possibility to join some producer organization, producers of packaging can meet their obligation by signing a contract with the Environmental Register of Packaging (PYR). PYR is non-profit organisation jointly owned by Finnish businesses and packaging industry (PYR, 2013). Producer organisations and PYR, as it is illustrated in the next picture, work quite closely with each other:



Figure 4-2 Recovery of Packaging.

Source: *Packaging and the Environment*, Leppänen-Turkula (2007, p19).

According to the law, all producers of packaging have to report to the authorities about the quantities of packaging they sell and provide information about collection of their end-of-life products and quantities of recovered materials. The organisation of recovery and relationship between all actors are illustrated in the following picture:

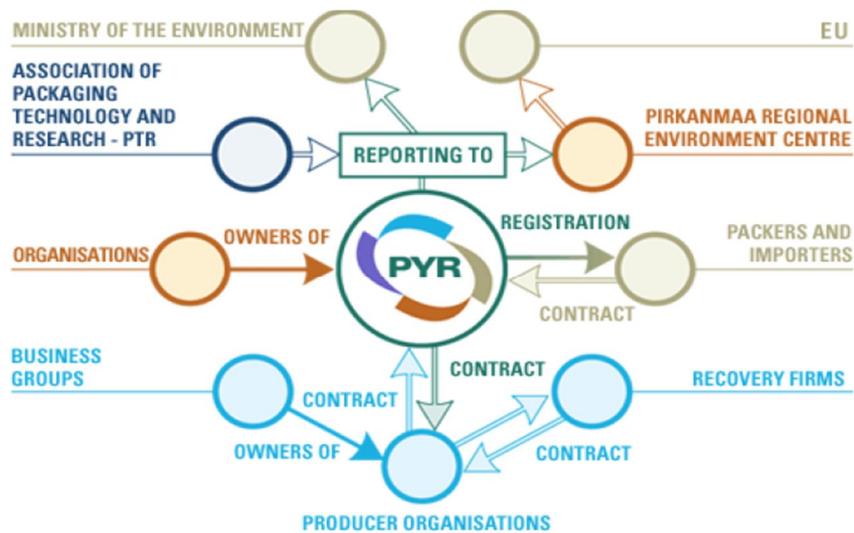


Figure 4-3 Organization of Packaging Recovery

Source: *Packaging and the Environment*, Leppänen-Turkula (2007, p. 20).

If the company joins PYR, it also goes into the PRO for the packaging and does neither have to individually organize the recovery nor report to the monitoring authorities. Packaging companies which have contract with PYR pass all obligations for the PROs. This means that firms do not have to organize and pay for the treatment of the packaging they place on the market. Registered firms have to pay registration and annual fee depending on the company's turnover, however, some discount is applied depending on the location (PYR, 2013). Fees for 2013 are the following:

Table 4-1 PYR's Fees for 2013

Fee category	Firm's/ company's turnover EUR m	Location based	
		registration fee EUR + VAT	annual fee EUR + VAT
A	over 17	223	696
B	1.7 - 17	155	457
C	1.0 - 1.7	68	228
D	under 1.0	40	-

Source: PYR (2013)

Both PROs and PYR are non-profit organizations. PYR is funded by the latter fees. Recovery of packaging is financed through recovery fees billed by PYR and deposited without deductions to PROs (PYR, 2013). The recovery prices in the next table are based on the packaging quantities for 2012 reported to PYR:

Table 4-2 PRO's Recovery Fees

Material	EUR/tn + VAT
Corrugated cardboard packaging	2.0
Industrial wrapping and sacks	18.0
Cores	18.0
Carton packaging and paper wrapping	24.0
Carton liquid packaging	38.5
Plastic packaging	21.0
Deposit recyclable PET bottles and trays	-
Aluminium packaging	24.0
Tinplate packaging	24.0
Steel packaging	5.0
Deposit beverage cans	-
Deposit glass bottles	-
Non-deposit glass packaging	10.0
Wooden packaging	0.5
Other	-

Source: PYR (2013)

To assume responsibilities through PYR and PROs is a quite easy way for producers to meet the obligations set in legislation. PYR gives the right to use the trademark to the registered companies that can be used on the packaging, in websites for advertising or other purposes (PYR, 2013).

4.1.3 Monitoring

Initially before the beginning of waste management reform and especially before 2008, there was lack of monitoring observed and this situation had to be improved.

Generally, the fulfilment of the obligation and meeting the targets for recovery and recycling is monitored by the following supervisory bodies: the Finnish Ministry of Environment, its subordinate the Finnish Environment Institute and Pirkanmaa Regional Environmental Centre are responsible for the waste management and monitoring of the compliance. External auditing also might be applied. Environmental permits to waste management operators and recycling centres were issued by the regional environmental centres. In 2010 the regional administrative reform in Finland took place and the previous Pirkanmaa Regional Environment Centre was reorganized to the Centre for Economic Development, Transport and the Environment for Pirkanmaa. Since this reform, the responsibility for environmental permits belongs to the Regional State Administrative Agencies.¹¹ The Centre is located in Tampere- one of the most populated regions in Finland. The Centre's environmental as well

¹¹ Previously 13, now 3.

as producer responsibility related work is guided the by the Ministry of the Environment and partly by the Ministry of Agriculture and Forestry.¹²

In general legislative, monitoring and controlling institutions cooperate with the private sector in order to have more effective results. The Ministry of the Environment granted the permission to PYR to control the register of packed and imported products in Finland. Centre for Economic Development, Transport and the Environment for Pirkanmaa is the other authority that monitors the implementation of producer responsibility schemes and gathers the statistics. The Centre cooperates with PYR. Every year PYR has to report packaging statistics and provide the list of companies which have contract with PYR. Producers that are not registered with PYR have to report the quantities of the products put into the market, its collection and reuse or recovery to Centre for Economic Development, Transport and the Environment for Pirkanmaa individually.¹³ This obligation to provide information is regulated by the Finnish Waste Act. Information about paper, packages, and used tyres was gathered already from 1990. The end of life vehicles, electrical and electronic equipment statistics are collected from 2005 and about batteries from 2009. The Centre has also to report collected data to the EU Commission (Finnish Ministry of the Environment, 2013).

4.2 Municipal Waste Collection

For the waste streams that not covered by the EPR schemes, municipalities are obliged to provide waste collection for households. Usually there are separate containers near the blocks of flats for paper, carton, biowaste, energy and mixed waste. Private houses owner usually have two or three containers, depending if they decide also to have one for composting. The general approach of Finnish waste treatment system is based on source separation and illustrated in the following scheme:

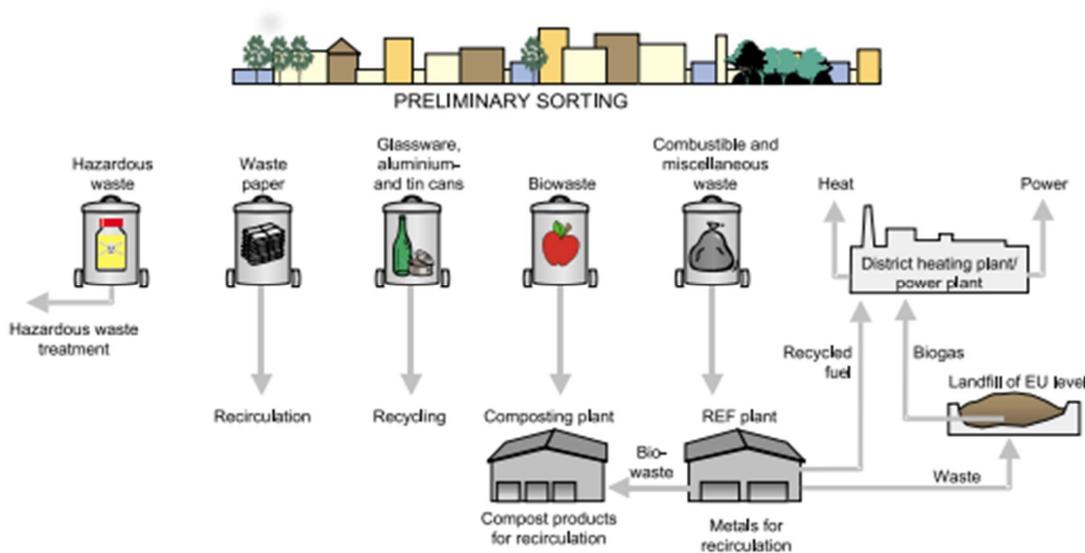


Figure 4-4 Finnish Waste Treatment System's Approach

Source: Wilén et al (2004)

Municipalities can decide how to organize waste collection and often these services are outsourced and tendered (Salo, 2009). Waste that are not suitable to be thrown to any of

¹² Exception of the autonomous Åland Island.

¹³ The obligation will have to be fully fulfilled from 2014

those containers near people's home, householders have a possibility to bring to the regional collection centres that are often located near the supermarkets or shops and provide service for larger area. Here there are containers for non-deposit glass containers, small metals, clothes etc. For bulky, big size, contaminated and hazardous waste there are local collection yards and waste treatment centres, where householders can arrive and leave these wastes. Expired medicine is accepted in pharmacies. The municipalities have a waste collection fee for households. In Finland a volume-based waste charge and annual fixed fee is applied based on the type of house (e.g. single family house, apartment block etc.) (Salo, 2009). According to the waste legislation, consumers have to pay for municipal waste management; however, the exception is EPR systems, where the costs partly are covered by producers. Charges that households pay to the municipality are used to cover the costs of establishing, running the waste management system and transportation of waste. The intention with these charges was to encourage recovery of the waste. Local authorities usually should apply lower price for well-sorted waste as compared with mixed.

4.2.1 Transportation of Collected Waste

The transport of already collected waste to the final treatment location is the other important aspect of waste management schemes. Inefficiently organized transportation might have not only negative environmental impact, but also increase the costs.

According to legislation, the obligation to cooperate and organize waste transportation is shared between municipalities, producers and transporters (Government Decision on Packaging and Packaging Waste (962/1997), Section 11). Municipalities or transport companies, which have a contract with local authorities to take care of waste transportation, are responsible that packaging waste would be managed so that minimum targets of recovery would be achieved and all other obligations are fulfilled (Government Decision on Packaging and Packaging Waste (962/1997), Section 7, 9). Once packaging waste is delivered to the packaging recovery location, the obligation to take care of the following treatment belongs to the producer (Government Decision on Packaging and Packaging Waste (962/1997), Section 12).

4.2.2 Regional Municipal Cooperation in Waste Management

In order to ensure and improve the municipal waste management, there were regional waste treatment organizations established. This regional cooperation was supposed to improve the effectiveness of waste collection route planning and help to establish more cost-effective collection of different waste streams, like packaging waste or biowaste. The obligation of informational responsibility to increase consumers awareness might also be improved in the regional level, especially if the waste legislation in the broader areas is unified (European Commission Report, 2012). There are about 30 regional organizations in Finland (Salo, 2009).

4.2.3 Waste Taxes and Charges

As it was mentioned previously, in Finland in 2009 there was still plenty¹⁴ of waste landfilled, however, this situation had to be improved and measures to reduce landfilling had to be introduced. According the Finnish Tax Act (1126/2010), tax is applied to all landfilled waste, which are listed in the law (Tax Act 1126/2010). There are several exceptions to these taxes for the hazardous waste or waste which it is not worth or technically impossible to utilize in other way than landfilling. Landfill tax is paid by the waste landfill companies regardless if the operator is private or public. The tax is not applied if recycling or other type of treatment is

¹⁴ About 20% (Salo, 2009).

taking place in the landfill. In the 2011 the tax payable was €40/t of landfilled waste, however, this year it has increased to €50/t (Waste Taxes and Charges, 2012).

In order to reduce more the landfilling of valuable materials and to promote the reuse, in Finland there is also a tax applied on the packaging of beverages such as alcohol drinks, water and other soft drinks. The tax is €0.51/l and is not applied if the drink packaging is in the deposit-refund system, which ensures the collection of these beverage containers for reusing or recycling (Waste Taxes and Charges, 2012).

4.3 Finnish Deposit-refund Systems

There is a specific legislation in Finland for reusable and refillable beverage packaging. Deposit-refund system of drinks packaging (previously mostly bottles) is not new and it was introduced as early as the beginning of 20th century. This tradition has a lot to do with historically long existing state monopoly of selling beer and other the alcohol drinks (Recycling of Beverage Packaging, 2013). Back then, there were mostly used reusable glass bottles. Aluminium cans were not used in the large amounts, however, in the last decade the use of cans and other one-way packaging has been increasing significantly (Nurminen, 2012).

Initially there existed four main deposit-refund systems in Finland:

- PALPA (beverage cans and one-way PET bottles);
- Ekopullo (for refillable brewery packages);
- Alko (one-way glass bottles of alcoholic beverages) overtaken by PALPA from 2012(Suomen Palautuspakkaus OY PALPA, 2013);
- A-pullo (refillable glass bottles of alcoholic beverages) stopped functioning from 2012).

4.3.1 Organization and Functioning

One of the main deposit-refund system, which acts also as a coordinator and as a platform for development of the systems is PALPA, established in 1996. The ownership of PALPA is shared in equal parts between trade and breweries. The company is responsible for the beverage cans and since 2008 for one-way plastic bottles. There are 14 000 collection points in PALPA system. At these collection points aluminium cans and plastic bottles are packed into the bags or boxes and then transported to the recyclers and baled. Recyclers recover materials and new products are produced (Nurminen, 2012). The following picture illustrates the basic operating and materials flow in the deposit-refund system:

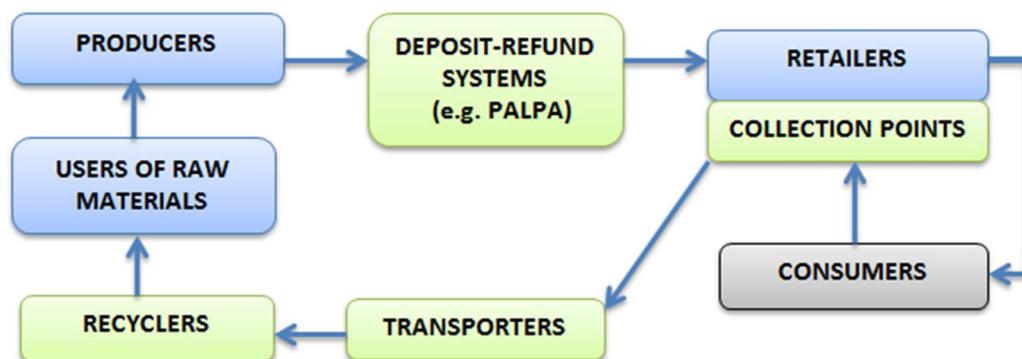


Figure 4-5 Materials Flow in the Finnish Deposit-refund System

Source: Scheme made by author, partly based on information by Nurminen (2012)

In order to have an effective and efficient deposit-refund system, it is also very important with allocation of financial and informational responsibilities. The system should be fair for all actors and if needed some cost has to be compensated. In Finnish deposit-refund systems (e.g. PALPA) a producer pays the deposit and provides information about the amount of packages produced/sold. Retailers pay the deposit to producers, which is included into price of the product and pay the refunded amount to consumers. Consumers pay the deposit in price to the retailer and get refund when empty packages are returned to the vending machines. Deposits for returned bottles are 10 cents for small 0.5 litre plastic bottles and for most of glass bottles, 15 cents for cans regardless the size and 40 cents for large 1.5 litre and bigger plastic bottles. Bottles that do not have deposit sticker and are not recognized usually are accepted, but classified as non-deposit and refund is not paid. Not suitable beverage containers are not accepted by machines and returned back to consumer. In this way, it is avoided to pay for imported bottles for which deposit was not paid.

In addition to this main deposit-refund flow, the system has other costs, which are presented the following:

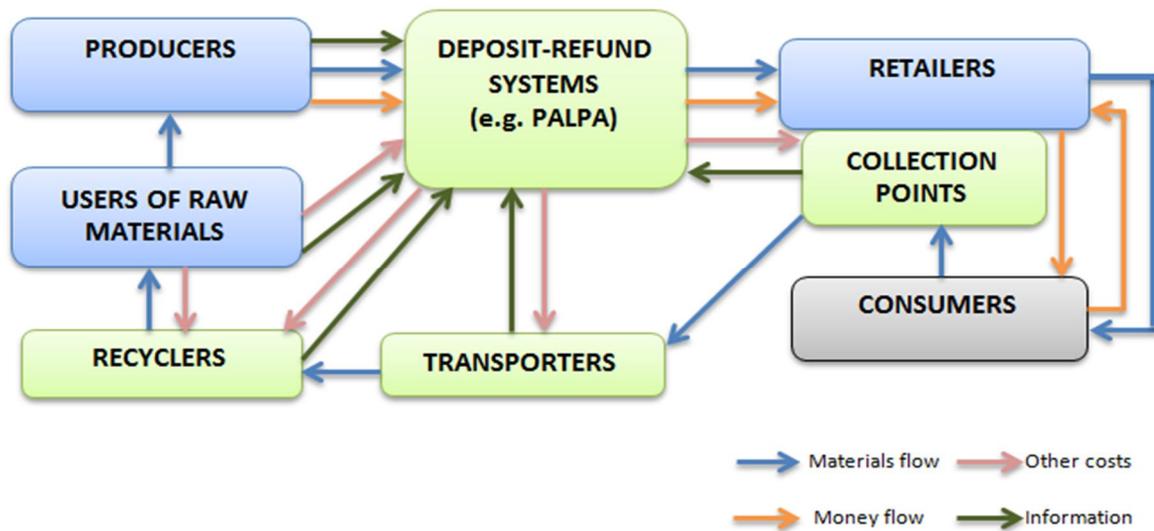


Figure 4-6 Finnish Deposit-refund System

Source: Scheme made by author, partly based on information by Nurminen (2012)

Retailers have costs related to the upkeep of collection points; therefore, PALPA pays to the retailers in order to cover these expenses. Bottles that are collected through vending machines are packed in different colour plastic bags or different size containers. All necessary information must be provided in them that PALPA could know how much and whom to compensate. PALPA also pays to transporters and recyclers, but receives some income from the users of raw materials. It is very important for the deposit-refund system that all flows in the system would be well monitored. For this reason, producers, transporters, recyclers and materials utilizers have an obligation to report this information to PALPA. The company also receives information about quantities of consumer-returned packaging from collection points.

Alko was the other deposit-refund system in Finland which operates since 1995 and is designed for one-way glass bottles of alcohol drinks. Refillable alcohol containers are managed by Ekopullo. There are 350 collection points of alcohol beverage packaging.

To join PALPA or other deposit-refund system is one of the easiest ways for producers to meet the obligation set by the waste laws. Recent changes in the Finnish deposit-refund system are discussed in the Subsection 4.5.2.

4.4 Performance of the Packaging EPR System

In general, the establishment of the EPR system in Finland has not caused significant problems. Most of the initial targets were achieved, even if, according to some studies made by SYKE, plastic and metal industries had some concerns (Melanen et al., 2002).

In the following subsection, the results and performance of packaging waste management are outlined and discussed.

4.4.1 Results of Packaging Waste Treatment

As noted previously, PYR together to Centre for Economic Development, Transport and the Environment for Pirkanmaa is responsible for gathering the statistics on packaging quantities placed on market and monitoring the compliance with targets set by law. The information collected and reported in the last decade covers about 90% of packages consumed by households and businesses in Finland. The total results and by separate material recycling¹⁵ rates is in the following table:¹⁶

Table 4-3 Recycling of Packaging 1998-2011

YEAR	TOTAL	FIBRE	GLASS	METAL	PLASTIC	WOOD
1998	45 %	57 %	62 %	16 %	10 %	
1999	50 %	61 %	78 %	19 %	13 %	
2000	50 %	62 %	64 %	25 %	14 %	
2001	47 %	58 %	50 %	39 %	15 %	
2002	49 %	61 %	50 %	46 %	15 %	
2003	41 %	63 %	61 %	50 %	14 %	7 %
2004	40 %	70 %	55 % *)	55 %	15 %	7 %
2005	43 %	79 %	63 % *)	54 %	14 %	5 %
2006	49 %	86 %	74 % *)	59 %	16 %	8 %
2007	52 %	88 %	81 % *)	70 %	18 %	10 %
2008	56 %	93 %	80 % *)	75 %	23 %	20 %
2009	56 %	95 %	45 %	84 %	25 %	21 %
2010	55 %	96 %	61 %	78 %	26 %	18 %
2011	59 %	97 %	88 %	80 %	25 %	18 %

Source: PYR (2013)

According to collected data by relevant institution, Finland has fulfilled EU targets for 2001 and for 2008 packaging and packaging waste recovery and recycling. From 1998 to 2011 the

¹⁵ Recycling rate is the amount of packaging material recycled divided by the amount of packaging material placed on the market (PYR, 2013)

¹⁶ *) The difference between the recycling rate and recovery rate of glass packaging is due to a decision by the authorities stating that the use of glass packaging waste as material in construction work is counted as recovery but not as recycling. 32 234 tonnes of glass was stored up for recycling in 2009.(PYR, 2013)

total amounts of recovery packaging waste was increasing and just minor fluctuations can be observed. There were plenty of waste to energy technologies developed in Finland that make these results possible. Energy waste separation at source is not difficult, because most of the dry matter can go in this fraction and later be turned into fuel. The total recovery of packaging and by separate materials results are the following:¹⁷

Table 4-4 Recovery of Packaging 1998-2011

YEAR	TOTAL	FIBRE	GLASS	METAL	PLASTIC	WOOD
1998	56 %	72 %	62 %	16 %	20 %	
1999	60 %	72 %	78 %	19 %	30 %	
2000	60 %	72 %	64 %	25 %	36 %	
2001	62 %	74 %	50 %	39 %	44 %	
2002	61 %	75 %	50 %	46 %	38 %	
2003	67 %	72 %	61 %	50 %	37 %	84 %
2004	68 %	77 %	58 % *)	55 %	34 %	78 %
2005	68 %	88 %	65 % *)	54 %	15 %	76 %
2006	77 %	96 %	77 % *)	59 %	29 %	81 %
2007	84 %	95 %	88 % *)	70 %	43 %	90 %
2008	90 %	106 % **)	81 % *)	75 %	49 %	99 %
2009	88 %	113 % **)	45 %	84 %	45 %	96 %
2010	85 %	112 % **)	61 %	78 %	45 %	84 %
2011	90 %	106 % **)	88 %	80 %	47 %	97 %

Source: PYR (2013)

Recovery¹⁸ rates in Finland are quite high as compared with recycling. The gradual increase of recovery for all packaging materials can be observed.

¹⁷ *) The difference between the recovery rate and recycling rate of glass packaging is due to a decision by the authorities stating that the use of glass packaging waste as material in construction work is counted as recovery but not as recycling.

***) These figures also include recovery not under the recovery scheme as such, e.g. packaging from companies with an annual turnover of less than EUR 1m, internet sales and free-riders. The recovery of plastics for 2005 only includes recycling as material. 32 234 tonnes of glass was stored up for recycling in 2009. (PYR,2013)

¹⁸ The recovery in PYR calculations means that packaging waste constitutes both the recovery of packaging to make raw material for new products and recovery as energy. Recovery rate is the amount of packaging material recovered divided by the amount of packaging material placed on the market.(PYR, 2013)

Table 4-5 Reuse of Packaging 1998-2011

YEAR	TOTAL	FIBRE	GLASS	METAL	PLASTIC	WOOD
1998	66 %	4 %	84 %	90 %	70 %	
1999	64 %	4 %	83 %	90 %	69 %	
2000	63 %	3 %	81 %	89 %	67 %	
2001	62 %	3 %	81 %	88 %	69 %	
2002	66 %	3 %	80 %	91 %	71 %	
2003	71 %	3 %	80 %	90 %	71 %	81 %
2004	71 %	3 %	78 %	90 %	73 %	78 %
2005	71 %	3 %	74 %	90 %	72 %	78 %
2006	74 %	3 %	77 %	93 %	74 %	79 %
2007	73 %	3 %	76 %	93 %	74 %	78 %
2008	71 %	4 %	65 %	93 %	69 %	76 %
2009	69 %	6 %	62 %	91 %	68 %	76 %
2010	68 %	6 %	47 %	91 %	67 %	75 %
2011	67 %	6 %	42 %	90 %	68 %	75 %

Source: PYR (2013)

As was addressed previously, deposit-refund systems and reuse¹⁹ of glass packaging have very deep roots in Finland, however, in terms of reused glass the situation has change radically. Reuse of glass halved, from 84% in 1998 to 42% in 2011. In last decade producers shifted to aluminium cans and PET bottles. Presumably, this tendency together led to plenty of changes also in the deposit-refund system of the glass packaging. However, according to PYR, Finland has quite good systems for reuse of packaging, therefore, the overall reuse results are high. Detailed reuse results²⁰ of packaging in Finland are presented in Table 4-5 above.

4.5 Reformed Waste Management and EPR System for Packaging Waste

Even if Finland has comparatively good waste management and results, plenty of changes in environment and waste-related legislation were introduced in 2010. The reason for this was that, despite the fact that Finland managed to fulfil²¹ both 2001 and 2008 targets for recycling and recovery of packaging waste some measures had to be taken in order to prevent and reduce packaging waste generation. The major problem in Finland and in the EU is that consumption of packages and generation of packaging waste in the last decade was gradually increasing:

¹⁹ The reuse in the PYR calculations means that a packaging is used in the same form after cleaning. According to the Commission Decision 2005/270/EC, providing reuse data is voluntary, however, according to PYR, it is very important for Finland to give this data, because there are well working industrial/commercial reuse systems in place and more than 2/3 of Finnish packaging is reusable and it is reused in existing systems.(wood is included in calculations) (PYR, 2013)

²⁰ When a refillable/reusable packaging is used the first, it is calculated as packaging entering the Finnish. After the reusable packaging is in the commercial/industrial refilling-loop, where it is counted every time when it is filled. Producers report their use of refillable packaging according to the packaging type, the weight of packaging and its filling times. (PYR, 2013)

²¹ Finland fulfilled the targets according the rates calculated by the chosen method. Packaging definition in Finland is broad and households and industrial packaging rates are calculated together. If there would be other and uniform calculation methodology applied in all Member states the Finnish results might be different;

Table 4-6 Finnish Packaging Waste Statistics for the Years 2003-2011 (Total materials)

	Packaging waste placed on the market = packaging waste generated (1)	Recycling of materials (2)	Recovery (3)	Recycling rate (4)	Recovery rate (5)	Reuse (6)	Reuse rate (7)
Total materials	t	t	t	%	%	t	%
2003	616 000	251 400	413 300				
2004	649 500	259 300	442 463	40	68	1 603 900	71
2005	688 820	297 400	467 000	43	68	1 652 100	71
2006	677 000	332 700	524 200	49	77	1 910 100	74
2007	695 715	361 225	582 600	52	84	1 905 851	73
2008	700 799	397 603	630 420	57	90	1 721 155	71
2009	653 796	362 811	575 300	55	88	1 432 662	69
2010	708 241	392 421	602 287	55	85	1 500 334	68
2011	709 642	416 372	635 902	59	90	1 455 495	67

Source: ELY-Centre (2013)

The development of packaging and packaging waste of different materials can be found in the end of the thesis. (See Appendix No. 1) EPR system for packaging waste were functioning, however, because of very vague definitions and overlapping responsibilities among municipalities and producers, as well as, the intensified recovery rather than reuse or reduction of waste, it was decided to come up with modifications that are presented in the next subsection.

4.5.1 Main Actors and Responsibilities Allocation in the Revised EPR System

The overall reform of Finnish waste legislation has brought significant changes to the EPR system for packaging waste. The new Waste Act and its chapter six on the producer responsibility has not only clarified the responsibilities of different stakeholders in the waste management system and set new targets (50% recycling of municipal waste in 2016), but also introduced much broader responsibilities for producers. Producers will have to organize free-of-charge and convenient reception points for their end-of-life products and cover transportation costs, including the expenses of transport from distributors' reception points (Waste Act 646/2011, Section 49). In addition to this, producers will be obliged to provide all necessary information for consumers about the location, working hours of reception points and products which are accepted there. Cooperation with local municipalities or other waste management operators in terms of informational responsibility will be also possible (Waste Act 646/2011, Section 51). As it was discussed previously, measures for the reuse of the products rather than just recycling and recovery should be promoted. Producers will have to provide the information on possibilities to reuse some parts or to repair products (Waste Act 646/2011, Section 52).

New packaging waste regulations extend producers' responsibility to take care of the households' packaging waste in the next upcoming years. In practice, it means that producers will have to take over the majority of responsibilities from municipalities, including the existing waste collection points, and set up a new reception points network. The general

reallocation of responsibilities in the EPR system and relationship between various actors for packaging is presented below:

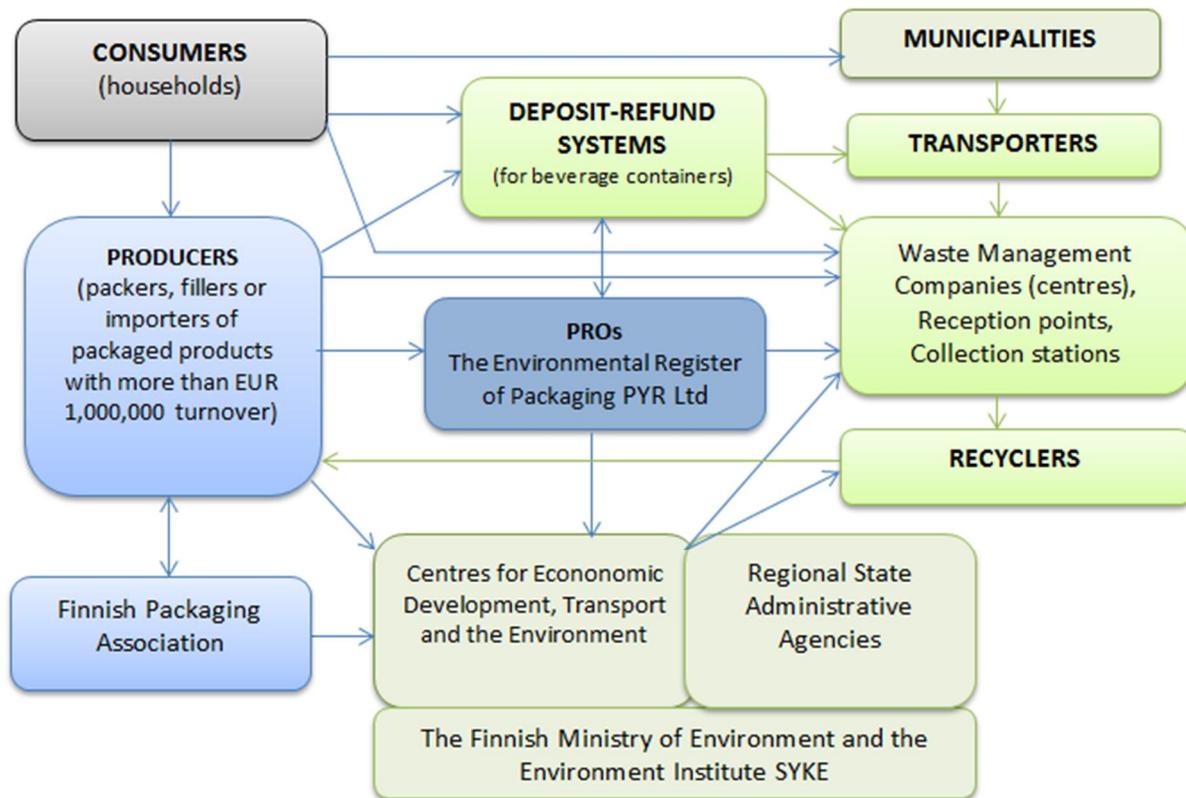


Figure 4-7 Responsibility Allocation in the revised Finnish EPR System and Packaging Waste Management

Source: Scheme made by author, based on Finnish waste and EPR legislation.

In order to come up with the best solutions on the specific requirements for packaging waste collection, the Ministry of Environment and its supervisory institutions, together with other involved parties, have had and still have negotiations. PYR is providing necessary information for the Ministry. The packaging branch has been working a lot to prepare for the upcoming changes and have done studies on the environmental effects and costs of different systems. The geographical differences between the density of population and long distances are perceived as some of the greatest challenges for packaging sector in the new waste legislation. Important questions were how to design the system, how many reception points to set up and where are the best locations for them. The environmental effects and costs must be taken into consideration when the take-back system is designed, especially when discussing to what extent consumers should have a right to have a reception point close to home in sparsely populated areas and transportation of small amounts of packaging waste (Leppänen-Turkula, 2013).

PROs for packaging, PYR, the Finnish Food Marketing Association, the Federation of Finnish Commerce, the Finnish Food and Drink Federation and the Finnish Solid Waste Association have launched a pilot study for reception ecopoints' scheme in Pirkanmaa region (Tampere and Kangasala) and in Kuopio together with Lapinlahti. The main aim of this pilot study was to investigate the effectiveness of ecopoints and reception points in different regions, running costs, content of materials returned to these facilities and its handling, options for the best logistics and consumers' attitude towards the convenience of this

packaging waste collection model. As it could have been anticipated, the biggest amounts of packaging waste were collected in the reception points near the biggest supermarkets, shopping malls and secondly in the towns' centres, meanwhile, the worst collection results were from the residential districts and rarely populated areas. Technological solution for collection and treatment of packaging waste is also important in order to cut the transportation costs. According to this study, in whole Finland it should be enough to have 450 ecopoints network. The sparsely populated regions still remain the most challenging in terms of collection systems' cost-effectiveness (Heikkinen, 2013).

The Ministry of Environment considers and suggested much bigger number of reception points (Kauppila, 2013). For this reason, legislators of packaging waste regulations had to take into account all waste collection aspects in the Northern regions such as collection logistics, transportation costs and environmental implications compared with the benefits of recycling. The Ministry of Environment, namely, Finnish Environmental Institute has also conducted life-cycle assessments where the packaging waste collection in the sparsely inhabited parts of Finland (Lapland provinces and two municipalities in Northern Ostrobothnia), its impact on climate change, the extraction of the scarce natural resources and societal cost was evaluated. The interpretations of results are different as those provided by previously mentioned research conducted by producers. According to this study, despite the emission released during the long-distanced transportation in Northern Finland and consumed resources, benefits of recycling packaging waste exceed the costs. Plastic and fibre packaging can be used together with mixed waste for energy production. Recycling and energy recovery appeared to be substantial during the interpretation of life-cycle assessment results. The conducted study also points out that, environmental benefits, regardless the inevitably high expenses that occur during the separate collection of packaging waste and the fact that waste recovery does not deliver enough of the financial savings to cover the transportation costs, are obvious. The most important is that the logistics of the collection system and waste receiving points would be organized in the most efficient manner, for example, where people are coming anyway - some business areas or similar (Moliis et al, 2012).

Results obtained should provide necessary information for drafting the decree for packaging waste and to support legislators' wish to have bigger number of reception points than that suggested by producers. The decree which is being prepared will provide more detailed requirements for packaging sector and producers on the density of reception point network etc. (Moliis et al, 2012).

Initially there should have been this new Government Decision on packaging and packaging waste prepared this year, however, the process might take some time because there are more than thirty new statutes related to the new waste legislation and only some of them are already ready. The Ministry simply is lacking human resources to complete drafting sooner and at the moment the aim is that the decree will come into force in spring 2014 (Leppänen-Turkula, 2013).

At the moment, the preliminary draft decree for packaging waste is out for public comments. There should be also a compromise reached about the number of collection points to be established (Kauppila, 2013).

4.5.2 Changes in Deposit-refund Systems

Changes in the legislation will also have implication to the Finnish deposit-refund systems. The main general challenges representatives of PALPA points out are (Nurkunen, 2011):

- More changes in legislation;
- Consumer behavior and attitude;
- Efficient communication;
- Non-deposit packages;
- Harmonization of the deposit-refund systems.

The vision for the future of Finnish beverage containers collection systems is likely that all at the moment existing systems will be integrated into one. This principle of one reception point for all kinds of packaging should make easier returning for consumers. If to address other tendencies, the increase of one-way packaging such as cans and PET bottles (replacing the refillable glass bottles) could be expected. Even one-way glass packaging is increasing, however, refillable beer bottles should not disappear (Nurkunen, 2011).

The harmonizing and merging process of deposit-refund systems had already started in 2011-2012. From February 2012 Alko deposit-refund system stopped functioning as it was not meeting legal requirements. PALPA is setting up a new glass bottle recycling system (KLP) to replace Alko. According to recent legislation, beverage packaging has to be received at the sale points, meaning by producer or retailer. The whole glass packaging deposit-refund network is expanding from 350 to many more, as it was a clear demand from the consumers (PALPA, 2011). Businesses or other organizations, such as restaurants, hotels, cafeterias or places for some public events, who themselves buy big quantities of packaging with deposit, can sign a contract with PALPA to be registered as a reception point (Receiving Points -Return locations, 2013).

Previously existed A-pullo deposit-refund also terminated recycling of refillable alcohol bottles. EcoPullo will continue its operations. PALPA is overtaking many functions of the previous system (PALPA, 2011).

In the future, the aim is that all customers would have equal and as convenient as possible access to reception points. It is expected that there will be a centralized deposit-refund system, where consumer could return all beverage containers, also to reduce the costs. Only retailers who have individual deposit-refund system, such as Lidl, may remain.

4.5.3 Materials Efficiency and Packaging Design

Among the overarching reformed waste management goals is improved materials efficiency. This aim is reflected in the new Finnish National Waste Plan, as well as, in other waste regulations. For this purpose Finnish Ministry of Environment together with the Ministry of Employment and Economy in 2008 established the Material Efficiency Centre –Motiva, which is supposed to consult consumers, businesses and public sector on possible ways to improve materials efficiency (Motiva, 2013).

Design of the products is an important factor if to address materials efficiency. Once it comes to packaging design, the first and the main role of packaging is to contain something in the way that the product would be protected during distribution, transportation and reach the end consumer without changes in product qualities. Packaging of the product is also important for selling and advertising purposes. However, choices on materials by producers and designers of packaging have a great impact once packages become waste. The requirements for the composition of packaging were written down even in the Government Decision for Packaging Waste. In the annex of this Decision, it is indicated that manufactured packages should be as small and light as possible, but should also ensure that standards of hygiene and safety are met. Packages should be designed in such a way that it would be easy to recover, recycle, reuse and should not contain any hazardous substances which might cause environmentally harmful

effects (Government Decision on Packaging and Packaging Waste (962/1997), Annex). The waste legislation which came later placed even greater attention these features.

Paper manufacturing sector in Finland is an important branch of industry. The studies show, that in the last decade producers of paper and paper packaging have done plenty of design changes in their products in order to improve materials efficiency. In 2000 Technical Research Centre of Finland suggested ideas how to reduce paper weight and use as little fibres as possible. Technologies for recycling traditional paper and much lighter carton material for packaging have been developed. Lighter and smaller packaging need less space, therefore, transportation becomes easier and delivers less environmental harm. The main driver for forest and paper industry to go for more environmentally sound design of the products and innovations is the consumers' needs and demands and secondary environmental regulations. (Kivimaa, 2007)

If addressing the materials packaging is produced of, in 2010 there was a huge increase of packages made of wood, such as pallets, box pallets, platforms, crates, boxes, barrels etc. 223 000 tonnes was put to market and it is 15% more than one year back. According managing director of wood PRO Puupakkausten Kierrätys PPK Oy, wooden packaging appeared to be effective in the logistics. He also considers that it is good that in the legislation repairing is taken into as recycling account. (Salonen, 2013)

The new Government Decision for packaging and packaging waste is under preparation, therefore, for the time being, it still too early to state that changes in the new Finnish waste legislation will have an impact on design of the packages and materials efficiency, however, some members from packaging sector suspect this might affect the packaging design and there would be a lot of additional costs on some materials due to the required recovery obligations (Leppänen-Turkula, 2013). Contrary, the ELY-Centre consider that new legislation should give more incentives for producers to rethink packages design and use less materials, because they will have to carry all costs of their product end-of-life treatment (Virtanen, 2013).

4.6 The Key Points of Revised EPR System and Implementation

This subsection sums up the new Finnish packaging waste legislation and the revisions brought to the EPR system, as well as, it presents various proposals and concerns of different stakeholders about the implementation of these regulations.

4.6.1 Changes, Challenges and Expected Improvements

There were plenty of changes in the waste legislation recently and there are still a number of uncertainties about future improvements. The summarized general changes, challenges and actions already taken are outlined below:

- Producers will be given broader responsibility for organizing waste management (primary role);
- No parallel collection systems (without cooperation with producers);
- Full responsibility for producers of taking back household packaging waste free-of-charge and in the most convenient way;
- Measures to stop „free-riders“;
- Landfilling waste will be restricted;
- More ambitious overall waste collection and recycling targets;
- Improved monitoring;
- Challenges for the packaging waste collection in the remote and rarely populated areas;

- Pilot studies conducted on „Ecopoints“ scheme-network of and research on environmental effects and collection effectiveness of used consumer packages in the Northern Finland;
- Continuous cooperation and preparation for precise instructions for packaging waste collection;
- Measures to improve materials efficiency.

4.6.2 Impact on the Stakeholders

In order to have successful regulations and laws put into practice, it is always important that concerns, opinions and proposals on the implementation put forward by different stakeholders would be taken into account. As it was already discussed, in Finland, once it was decided to introduce important changes in the EPR system and reform the whole waste management, negotiation and cooperation with various involved actors took place and still continues.

Producers. Once it comes to packaging and packaging waste management and EPR systems, one of the most affected key stakeholders is the packaging sector. Therefore, it is very important to find out how packaging industry-packers and fillers, and also including importers of already packed products- perceive the changes brought by the new waste legislation.

According to representatives of the packaging sector and PYR, previously, packers and fillers had an obligation to reach the recovery and recycling targets as required in the Government Decisions (962/1997, 987/2004 and 817/2005), meanwhile, local municipalities were responsible for household waste management, including packaging waste. In Finland, industrial, commercial and consumer packaging waste is not separated into different categories, because they all are treated in the same industrial processes. Before the reform, most of previous packaging collection was from industrial packaging waste, but not from households. Industries and trade provided well sorted, clean and easy to recycle packaging waste. There are bring back points for consumer carton and deposit-refund system ensures very clean, well separated aluminium, PET and glass packaging. If to compare the primary EPR system for packaging waste with the new one, the whole packaging sector considered the old system to be good. According to them, local municipalities were also satisfied with existing waste management. For this reason, the packaging sector perceives this reform and modification of the EPR system as purely political will, which was mainly pushed forward by ‘green’ politicians and the Ministry of Environment. Representatives of the packaging industry do not believe that overall waste management will be improved because of the new packaging waste regulations and requirements. In their opinion, municipalities are not likely to reduce the fees for the households, despite the fact that producers will cover the costs of packaging waste handling and treatment. It is more probable that these expenses will be added to product price and the cost will be transferred to consumers (Leppänen-Turkula, 2013). According to the Finnish Packaging Association, these changes from partial to full producer responsibility will add costs as compared with previous collection system, however, there are still plenty of open questions and it will be clearer in the future (Bagge, 2013).

Representatives of the plastic packaging sector, namely, producer organization Suomen Uusiomuovi Oy, points out that this year no major changes are expected, because they still operate according to the previous Waste Act. To increase plastic packaging prices this year is not seen as a good option; however, in the future prices for consumers is likely to increase. Despite these changes, the plastic sector is quite positive about its future perspectives (Rasmussen, 2013). Huge amounts of packaging waste are generated by fast food industries, where easy and quick to use plastic packaging is very conveniently collected. Because of the present intense and rapid lifestyle, according to studies, this tendency is likely to remain and

therefore, it is important that packaging would be as recoverable as possible (Aarnio, 2008). There are plenty of plastic recovery companies established in Finland, in particular focused on energy recovery; however, the plastic packaging producers keep in mind the need to encourage recycling and improvements in materials efficiency (Rasmussen, 2013).

Metal packaging sector also does not expect any significant changes and the sector was in the last years quite stable. Before the new Waste Act came into force the sector has had consultations and took part in planning. Metal packaging producers' organization is planning to set up reception points for metal packaging (there is already some experience from Helsinki region) and part of the other metal packaging waste will be going to the incineration plants, where metal will be separated from the ash for recycling. There are already established and functioning scrap yards, so the new legislation will not affect their operations (Sievänen, 2013).

Legislators and supervisory institutions. Obviously, Finnish political institutions have to react to the EU recommendations and fulfil the requirements set by the European legislation. In addition to this, there are plenty of national plans and strategies with overarching needs and goals to improve the state of environment, as well as, to improve waste management in line with the waste hierarchy. For this reason, there exist a political will for these reforms that are taking place at the moment in Finland. In order to come up with the best solutions that would be acceptable to all involved actors, negotiations and cooperation with all stakeholders seem to be a common and widely used practice. In the EPR for packaging waste revision and drafting of the new regulation, the legislators communicate with the packaging sector. At the moment the Decree on packaging waste is available for public comments. The greatest debates and discussions on the number of collection points to be established in order that the packaging waste collection network would be sufficient. The Ministry of Environment wants to have from 1500 to 2000 collection points, meanwhile, producers would be satisfied with about 400 reception centres (Kauppila, 2013). It is very obvious, that producers are concerned about extra costs and poor cost-efficiency of the system that the Ministry has proposed. According to a representative of the Finnish Environmental Institute, since the packaging sector considers the planned system too big, there should be some compromise on the number of collection points or otherwise there could be an option to remove the EPR system for packaging waste and leave this responsibility to municipalities. The municipalities would handle the waste management and also carry the costs. In this case, it would be financed as part of the municipal waste fee (Kauppila, 2013).

Despite the proponents of the revised EPR system, there are other opinions in the Ministry of Environment and institutions under it. According to a representative of the Finnish Environmental Institute, this reform of the EPR scheme for packaging and revisions that are going to be introduced will add plenty of additional costs, however, there will be no gains in terms of the waste hierarchy. There exists also a certain political problem. The industry and especially paper producers want to keep EPR system in some kind of form. The reason behind this willingness is that in this way they can keep the monopoly for collected paper to be used as a raw material. In the opposite scenario, the paper producers would have to buy raw materials for the market price. So EPR for packaging in a way might be seen as a certain subsidy for the paper industry, where the costs are put on the consumers (Kauppila, 2013). The Centre for Economic Development, Transport and the Environment for Pirkanmaa is one of supervisory institutions that has to work directly with EPR and therefore has faced the system's defects in practice. This authority has outlined the main problems, especially related with allocation of packaging producers responsibilities, free-riding issue, failures to pay, defects in the collection network and initiated the overall revision and reforms in this field. In addition to expanding and improving the free-of-charge packaging waste collection network, there was suggested also to improve monitoring (Kautto et al, 2009). The informant from

ELY-Centre, recently also confirmed and repeated the same problem with previous legislation that it was not clear enough to define the responsibilities of different stakeholders and therefore it did not fulfil the basic principles of good legislation. However, the main problem was that separate collection of packaging waste was no-one's responsibility- neither municipalities nor producers. Some municipalities collected packaging waste on voluntary basis, but plenty did not. The service of good quality for end users were not guaranteed anywhere. When the changes in legislation are introduced and producers will be responsible to run the collection network and waste management, it should be possible to ensure a consistent service level. In addition, it is expected that when producers have to carry the expenses of packaging waste collection, it gives incentives and puts more pressure to design better packaging and to use less materials (Virtanen, 2013). A representative from ELY-Centre strongly disagreed with the claim that modification in the system will increase the running expenses. The costs depend on the amount of collection points, but not on who is responsible. If there are about the same number of collection points like previously, this should become even cheaper due to the fact that there is only one player and more efficient logistics than before. It is true that it is more expensive for producers, but the overall waste management costs will depend only on the design of collection network. At the moment the Government Decision is on the stakeholders consulting round and so far it seems that the total amount of collection points might stay the same as at the moment, except for plastic collection where there should be more reception points than before and they should be more evenly distributed than now (Virtanen, 2013).

Deposit-refund system. As it was already previously discussed, deposit-refund systems are facing certain changes in last years. However, in terms of EPR concept, for example, PALPA has been operating under the full producer responsibility since the beginning of 1986. PALPA is owned by producers, namely beverage producers and retail. The system never relied in anyway or worked together with municipal waste management scheme. With its about 13 000 collection points PALPA takes care of recycling from the very beginning to the final stage. For this reason, from PALPA's point of view, there is not going to be any changes directly related with extending producers' responsibility to full responsibility. One challenge in the new waste legislation is that there will be requirement for deposit labels on all packages. This is a problem with imported products, for example, wine from Chile, as it is impossible to request this from producers there. However, this question is more related with new Beverage Packaging Act than with EPR itself. The changes in the EPR system rather will affect deposit glass, metal and fibre systems and the major concern is the quantity of collection points. According to the informant from PALPA, the required collection network would mean significant increase of costs for PROs and this will lead to substantial increase in recycling fees. At the same time it is very questionable and uncertain if these changes introduced will result in the overall benefits for environment (Nurminen, 2013).

4.6.3 Consumers' Awareness and Attitude

Generally, if judging from the given recycling and recovery rates, Finnish consumers are quite used to sort their waste if to compare with some other Member states²². As studies carried out recently indicate, Finns are following the instruction for separate collection, but there must be precise and concrete instructions provided.

According to the primary results of the Eco-points pilot studies, the paper, carton and glass waste fractions were clean enough and of the quality needed to be recycled. With metal waste returned to the collection containers the situation was that half of the content thrown there

²² For example Baltic States or Poland;

was not metal packaging, however there were not so much impurities as for example compared with plastic. As it was found out, only one third of plastic bins contained plastic packages. In this case, the waste is suitable only for energy recovery or recycled fuel. This situation happened, it is guessed, because of different instruction given for consumers in the ecopoints (Koivisto, 2013). There was a consumer survey conducted and according to the responses to the questionnaires, the use of ecopoints is increasing, especially if they are located nearby shopping centres and stores, where they are already used to return beverage containers to the deposit-refund system's machines. It is also expected sufficient quantities of waste returned (Heikkinen, 2013).

However, there appeared also not so successful cases with ecopoints operations. In the Oulu area this summer ecopoints had serious problems to be managed and even had to be closed. For example, the Pateniemi point had to be closed even if it was cleaned the previous week. The new containers were full with mixed bags, household appliances and other items that should not be thrown there. It is likely that cleaning up will end up in the increase of waste charges for everyone, even those who do follow the given instructions (Jurkko, 2013).

5 Analysis

The aim of this chapter of the thesis is to analyze and evaluate the Finnish EPR system for packaging and packaging waste according to the criteria of environmental policy evaluation outlined in the introduction. Following the anticipated outcomes of the initial „light model“ EPR are discussed and preconceived conditions for the successful implementation of the reformed system are analyzed.

There were three general groups of criteria outlined by Mickwitz (2003) and others from which criteria for the evaluation of Finnish packaging EPR system were selected:

- General effects (relevance, impact, effectiveness, persistence, flexibility, predictability);
- Economic effects (efficiency, cost-effectiveness);
- Democracy-related or distributional effects (e.g.transparency, legitimacy,fairness, equity);

Effectiveness is one of the most common criteria to evaluate EPR programmes. Therefore, the analysis of the Finnish packaging EPR system is focused on the latter. The thesis framework model (See Figure 1-3, p. 6) reflects the way the Finnish EPR programme is analyzed.

The main needs and goals of introduction of this environmental policy scheme were outlined in the previous chapters. The relevance in model means if the goals set really come from the needs and if it can be justified. Resources are the means and capacity to develop the policy, in this case-EPR programme as an output.

The outcomes do not always have direct correlation with outputs; therefore, attributability problem has to be kept in mind.

Efficiency means if the goals were achieved at the lowest costs, however, in the environmental policy field, most of the time, the overall effects of policy instrument should be taken into account. Measures introduced and applied should contribute to the net increase of well-being of society/environment.

This evaluation of effectiveness of Finnish EPR for packages is based on these major indicators (European Environment Agency, 2005):

- Changes of total quantities of packaging waste generated during the last decade;
- Total recovery rates and per separate material;
- Total recycling rates and per separate material.

Anticipated outcomes are often divided into immediate, intermediate and final. According to the evaluation model based on intervention theory developed by Tojo (2004), which here is in a simplified form applied to evaluate the Finnish EPR system for packaging waste, the immediate outcomes are design change, organized infrastructure or enhanced dialogue between upstream and downstream. The intermediate can be the improved overall waste management and closing materials loops that leads to the final outcome- the improvement of the whole life cycle of the product (Tojo, 2004)

Finally, democracy-related legal criteria for evaluation are used. The latter is very important in order that policy instrument would lead to a successful implementation. Involvement of various actors and stakeholders is critical to have support for a certain policy. Cooperation and

negotiation is also especially crucial when some changes in legislation are prepared and already existing schemes/systems are reformed. The latter criterion in Finland is fulfilled without problems. There is a tradition of communication, cooperation and negotiations between various stakeholders. There exist strong unions that advocate certain sectors or groups in the society. There is no problem to access legislation or other official documents. For this reason, the democracy or legality related effectiveness is not discussed anymore.

5.1 Effectiveness

Effectiveness evaluation is one the most commonly used criteria for policy evaluation. Effectiveness in the most simplified way might be addressed as the attainment of goals set by certain policies and fulfillment of initial needs and intentions. However, it is also important to address not only expected results, but also unanticipated outcomes.

In the following subchapters, the Finnish EPR system for packaging waste is analyzed in terms of targets achievement and both positive and unexpected outcomes.

5.1.1 Goals Attainment

In Finland, the same as elsewhere in other European countries, the general initial need for setting up the EPR programme was to improve the quality of the environment by affecting production and consumption patterns, and shifting them into more environment friendly ones. The reasons behind these needs were worsened environmental conditions: water and soil contamination, air pollution and many others.

The main goals for setting up the EPR system for packaging waste for Finnish environmental policy makers were to fulfil the obligations specified in the EU Directives, to react to the recommendations given by the EU and also to achieve national targets for recycling and recovery of waste. By doing so the final result should be improved overall solid waste management and materials efficiency in Finland.

Apparently, EU targets for packaging waste recovery for Finland have not caused any major problems to achieve and recovery results are among the highest when compared with other EU Member States.²³

²³ According to the Finnish method of calculating recycling and recovery rates Finland fulfils the targets. The problem is that each country has its own calculation methodology and the definition of packaging waste varies that makes comparisons quite complicated.



Figure 5-1 Recovery Rates for All Packaging 2010

Source: Eurostat - Data Centre on Waste (2013)

However, recycling targets for 2008 Finland were just barely fulfilled. Targets for set for 2001 were generally very low, therefore, later on they were updated. The following picture illustrates Finland’s recycling achievement compared with other EU countries.



Figure 5-2 Recycling rate for All Packaging 2010

Source: Eurostat - Data Centre on Waste (2013)

Finland falls into the first group of countries that were obliged to reach at least target of 55% total recycling rate and 60% of recovery by 2008.

Year	RECYCLING PER MATERIAL						
	Recovery incl. energy recovery %	Recycling total %	Fibre %	Glass %	Metal %	Plastic %	Wood %
2010 (FI)	85	55	96	61	78	26	18
2008 REQUIREMENT (FI)	61	55	60	60	50	22,5	15
2008 REQUIREMENT (EU)	60	55 – 80	60	60	50	22,5	15

Figure 5-3 Packaging Waste and its Recovery 2011 EU's and Finland's Requirements 2008

Source: PYR (2013)

Recovery targets were achieved without major problems; meanwhile, the total recycling percentage is lower and satisfies just minimum targets set by the EU. As it was mentioned previously, the Finnish EPR system has caused certain dissatisfaction because of intensified recovery rather than recycling (Melanen et al, 2002). This situation, when recovery technologies were developed and plenty of incinerators were built, was familiar also in other European countries (Lindhqvist, 2000). In Finland waste is separated at source and one of the fractions is combustible and miscellaneous, so called energy waste, which is not quite suitable for recycling, but it is easy to burn and it is relatively cheaper. Finland during the last decade has developed plenty of leading recovery technologies, that also might be one of the factors that influenced the high rates of recovery. In 2008 the recovery rate in Finland was one among the highest, about 90% and in 2011 still remained the same.

The total recycling rate in Finland in 2008 was just 57% and in the next couple of years increased only to 59%. If the progress is so slow it might be difficult to achieve the total recycling target of 50% by 2016, therefore, additional measures should be considered.

Reuse rates had dropped from 71% in 2003 to 69% and this overall decrease is clearly influenced by the significant decline in the reuse of glass packages from 80% in 2003 to just 42% in 2011. The major reason for this tendency is that traditionally used refillable glass bottles for beer and soft drinks were replaced by aluminium cans and plastic PET bottles, because they are easier to handle and treat as well as to transport as compared to glass packages.

If looking at the results by separate material, recovery and recycling of fibres and metals has been very successful. In 2011 metal recycling and recovery was 80%, reuse-90%, meanwhile, the target is just 50%. Paper, cardboard and carton recycling in 2011 was 97% and recovery 106%. The reuse of paper in 2011 was 6%; however, this number is not significant because of the natural qualities of this materials and little possibilities to reuse paper and paper like packaging. Recovery of wood packaging in 2011 was 97% and recycling just 18%, however, as much as 75% was re-used. In general, the consumption of wood packaging was steadily increasing in Finland (ELY-Centre, 2013).

The most problematic material in Finland, as well as in many other countries, is plastics. Finland has achieved 22.5% target, however, as previously presented in Chapter 4, Eco-

points' pilot studies revealed that in containers for plastic packaging waste the sorting were the worst, they often contained something else than plastics, were dirty and of little or no value if to be recycled. However, Finland expects that this situation should improve once precise and harmonized instructions for Finnish consumers will be provided and convenient reception points network will be established.

As Lindhqvist (2000) has pointed out, the separation at source improves recycling and produces materials that more easy to use later on. Despite this, the incomes from sold materials (especially if amounts are small) hardly ever cover the expenses for the separate collection and running the system and therefore often has to be subsidized, whether by waste charges or certain taxes (Lindhqvist, 2000). This issue was already broadly discussed as one of the major problems for revised packaging EPR system in the sparsely populated Northern Finland, where the quantities of packaging materials collected are going to be small, meanwhile, the distances for transportation are very long. One of the options Finland might have considered is geographically limited producer responsibility. This idea was suggested in Sweden and the reasoning for it was that environmental as well as economic benefits of packaging waste collection in the major cities and other more populated regions would never be the same as in rarely inhabited North (Lindhqvist, 2000, p 62). On the other hand, in Finland it has been plenty of times pointed out that everybody should have equal access and level of convenience for waste collection, therefore, some system's design solutions have to be found in order to keep the cost at the reasonable level. It might be the shift in selection of materials for packaging (Lindhqvist, 2000) or looking for different technological waste collection solutions in the rarely populated areas.

Effectiveness of Deposit-refund System. Deposit-refund systems can be natural or artificially created. Natural one usually appears because of producers' willingness to have valuable refillable packaging back for reuse. If the deposit is high enough the refund rates are usually very high- up to 100% (Lindhqvist, 2000)

One of the main deposit-refund systems PALPA is reporting and is proud, that in Finland refunds rates are very high and reaching as much as 90 % (PALPA, 2013).

There were not any major problems for consumers with the deposit-refund system as it has long tradition in Finland. However, consumers' wish to have one uniformed system rather than plenty separate ones for different types of packaging sounds reasonable, because, previously beverage packages had to be returned to different collection points and it was not very convenient.

As noted by Lindhqvist (2000), the economic reasons to use refillable bottles have diminished, because of technological advance in production, increase in transportation costs etc., and have step by step disappeared. This tendency is also very clear in Finland, where the natural long time existing deposit-refund system for glass bottles was gradually replaced by an artificial one handling mostly aluminium cans and plastic PET bottles.

Despite the achieved collection and refund rates, the system failed to address the waste reduction and prevention goal and total amounts of packaging consumed are increasing.

5.1.2 Outcomes

Since one of the key objectives of this thesis was to find out why there appeared a need to reform the initial EPR system, as outlined in the analytical framework, anticipated and unanticipated outcomes have to be addressed.

The immediate anticipated outcome expected that ERP programme will deliver is design change. (Tojo, 2004, p.52) Plenty of environmental outcomes related to product design can outlined (OECD, 2005):

- Durability of product;
- Reparability of product;
- The product is designed for remanufacturing;
- The product is designed for reuse of components;
- The product is designed for recycling;
- The product is designed for recovery or easy waste disposal.

Plenty of the latter outcomes were expected by the reformed Finnish waste legislation and provisions that address these needs are stated in the laws. As it was mentioned in the previous chapter, changes in packaging design and especially beverage containers, took place in the last couple of decades. Aluminium cans and PET bottles are often considered to be better for environment, because they are light and easier to transport. Besides, they are easy to recycle. On the other hand, each packaging has some advantages and disadvantages if looking from the life cycle perspective (EU Commission, 2012). According to representatives of the packaging sector, for the moment, it is still uncertain what changes the reformed EPR system can bring to packages design and choices of materials, however, it might be expected that producers will have to reconsider what to use in order to avoid an increase of costs (Leppanen-Turkula, 2013). The durability, reparability or reuse of the components was taken into account by metal and wood packaging producers.

If to address other immediate outcomes, the infrastructure and organization of the packaging collections was built. Communication between producers and waste management companies and recyclers apparently was also established. In general, it looks like that in Finland dialogue between various actors in the packaging EPR system is quite common routine.

One among intermediate outcomes is improved waste management in general. The overall waste management by all means improved in Finland in the last decades. The recycling and recovery rates were increasing, plenty of new and more advanced technologies were developed, and landfilling is decreasing, even if slowly.

To round up, the Finnish EPR system in general in terms of initial targets attainment was effective enough. There could be a number of positive outcomes to point out (anticipated outcomes):

- Main infrastructure for recovery and recycling was created and waste collection network established;
- Better overall waste management country wide (less landfilling or improved handling of waste);
- Development of new production and waste treatment technologies and solutions;
- Establishment of waste management administration by private sector (PROs);
- Improvement in monitoring and waste statistics.

Despite the fact that the Finnish packaging EPR system has achieved plenty of positive outcomes, there appeared several unexpected drawbacks and defects. These unanticipated outcomes created preconditions for the revision of the Finnish EPR for packaging legislation and introduced changes. The main problems were:

- Failure to prevent the total waste generation and increase the reduction;
- Intensified recovery and incineration;

- Unsatisfaction by various actors because of the unclear responsibility allocation;
- In some cases inadequate waste collection;
- Failures to pay/compensate;
- Free-riding;
- Overlapping and not uniform waste collection systems.

The latter situation gave the reason and created preconditions for the revision and reform of the EPR system. At this point a very important question about the effectiveness of the new measures introduced appears:

- If the new EPR legislation will be able to address the previous drawbacks and inefficiencies?
- Is it likely that the latter packaging waste legislation will lead to more successful implementation than compared with the existing EPR system?

The total generation of waste presumably has close correlation with the overall consumption patterns in the society. In order to answer, if the waste policy instrument, including the EPR system, can influence the reduction and prevention of packaging waste generation in households, thorough additional research had to be made. There could be certain possibilities of reusing the packaging promoted. There are plenty of packages suitable for storage of winter supplies in the freezer or that could be remade and used in the household for decoration purposes. On the other hand, there is a number of processed, packed food packaging that is not suitable for reusing because of its design to take away and after throw away. Repairing as an option might be used for some industrial packaging, but not for consumers.

Secondly, the unclear allocation of responsibilities in the previous EPR system has caused discontent among different stakeholders. This problem was quite properly addressed in the new Waste Act. The responsibilities are much clearer defined as compared with previous legislation. There are different perceptions on these changes by involved actors that are discussed in this thesis separately.

In the Finnish deposit-refund systems plenty of reforms are already taking place at the moment and there are clear efforts to harmonize and unify the systems into one and make it convenient for customers. PALPA is taking over plenty of functions of previously existing deposit-refund systems, such as Alko. Lidl in Finland is running its own deposit-refund system, however, this should not be very confusing or inconvenient, because this German super-markets chain is orientating toward certain segment of consumers who presumably do shopping mostly there and therefore, can return Lidl containers back to the same place. PALPA machines accept also unknown unregistered beverage containers, however, in most of the cases the deposit is not refunded.

Free-riding is an other problem the Finnish EPR system has faced. In the new legislation, this issue is addressed and severe monetary sanctions are introduced in order to deal with it (Kauppila, 2013).

5.2 Efficiency

Efficiency if generally defined is an achievement of the goals and fulfillment of the needs at the lowest cost (EEA, 2005). According Lindhqvist (2000), many main decisive factors of an EPR system's efficiency are rooted in the design of the system. The poor efficiency of the systems might be determined by complicated, too big and therefore resource demanding administrative system, and lack of competition between different stakeholders in the scheme (Lindhqvist, 2000).

The aim of the „light weight“ EPR model in Finland was to keep the establishment and running costs of the system as low as possible (Kautto, 2013). The intention also was to minimize administrative costs. Plenty of questions were left to decide for stakeholders themselves and adequate precise allocation of responsibilities were not defined. For this reason, there were conflicts between actors, their responsibilities and the division of costs. This factor influenced the overall development of system. In some cases the collection network neither has ensured sufficient quantities of products collected nor the possibility and right for consumers to return the product to the collection network (Kautto et al, 2009).

Collection of too small quantities of packaging waste rarely can be cost-efficient unless the collection technology is well adopted it. For example, a portable cardboard compactor has been tested in Lapinlahti and Kirkkonummi. The investment could be about EUR 20 000, however, using this equipment significant amounts of money can be saved for transportation. Conventional containers have to be emptied almost every day meanwhile the latter compactor needs to be emptied at five to six weeks intervals (Kilpeläinen, 2012).

Challenges of the cost-effective collection of metal waste in Finland are again influenced by the low material waste amounts, because of quite low consumption of metal packaging. In Finland population density is very low- 5 persons/km² in more than 90% of the territory.

Other problems that appear in some countries, including Finland, are import/export imbalance in terms of quantities. For example with glass packaging, there could be a surplus of green glass. Both lack and surplus might influence prices and costs. Traditionally plenty of alcohol packaging to Finland comes from Estonia.

In general it is quite difficult to address economic efficiency in the Finnish EPR system for packaging waste management, because it is too complicated to trace all costs and benefits various stakeholders had. As the responsibilities were not clearly defined in some regions and municipalities' packaging waste was collected, in some not.

5.3 Evaluation of Stakeholders Perceptions

In order to sum up and evaluate stakeholders' perceptions on the previous EPR system and current changes, it is useful to try to place their opinion on the scale from the biggest supporters to opponents (See Figure 1-3).

As it became evident after research and information received from contacted representatives of stakeholders, there exist a number of opinions and perceptions. It seems that in Finland all involved parties tend to cooperate and look for a certain consensus, therefore, there was no stakeholders that would radically oppose the suggested changes. The negotiation and concerns are rather based on rational calculations of the costs. The questions about the increased expenses appeared among all producers and representatives of the packaging sector, however, this is not a surprise, because packaging producers are not non-profit organizations and are keen to keep costs down. In general it seems that the packaging sector is quite good in lobbying and putting their requests forward.

The cost-effectiveness question was also raised by the informant from Finnish Environment Institute. There were quite skeptical opinions expressed about the benefits in terms of the waste hierarchy that any waste policy instruments should aim for. However, there was a clear need for certain changes and improvements, especially on issues pointed out by the ELY-Centre that is working directly with EPR and collecting information and monitoring the situation. The ELY-Centre is a strong proponent for the modifications of the system and

expects these changes will improve the packaging waste management and not necessarily increase the overall cost. The other important force that pushed the reform was political will.

There were plenty of quite neutral opinions, that nothing should really change or there could be just minor changes that should not cause significant challenges.

At the moment, the most important task for legislators and producers is to find the consensus on the number of collection points to be established and the means of the most cost-effective transportation of already collected waste and equipment in the rarely populated areas. This might be not very easy process as different parties have obtained plenty of evidence and arguments to support their suggestions. However, if to take into account that negotiations and cooperation in Finland is quite common practice the consensus is likely to be reached.

6 Discussion

This chapter of the thesis is the discussion on the findings in the Finnish case compared with other EPR systems in the European context. It discusses about some good experiences and systems with very high results that Finland might find beneficial to have knowledge about. The end part of this section shortly outlines possibilities for further research as this one was conducted at quite an early stage and all legislation was not passed yet.

As it was mentioned in the very beginning of the thesis, EPR systems in Europe are quite diverse and the design of schemes depends on a number of factors. In addition to different arrangement of EPR systems, the effectiveness and costs-efficiency is also not the same. Not all good lessons and experiences can be directly applied for an individual case, however, knowledge about factors that determine high effectiveness and successful implementation is always valuable.

As it can be seen, in the beginning the Finnish EPR system was designed in quite a flexible way. Producers were given only partial responsibility and plenty of spheres were not regulated or clearly defined whose responsibility is to take care of that. Legislators in this way expected to avoid the increase of costs, however, in reality the legislation failed to provide a basis for comprehensive all types of packaging waste collection services. For example, it seems that no one was interested (with an exception of some municipalities) to take care of the plastic waste and usually vast quantities of plastic packaging end up in the energy waste fraction. Despite the fact that producers were considerably satisfied with the existing situation and the minimum targets were fulfilled, the legislators and especially monitoring institutions realized that this legislation was not formulated adequately and it had to be improved.

Packaging waste management in some of European countries is the responsibility of municipalities. In some other states, like Finland, Ireland and Italy duties are divided between local authorities and producers (Cahill, 2012). Close cooperation between producer organizations and interregional municipalities and other local authorities has been established in Belgium too. Belgium EPR system and packaging waste management recently is reported among those with the highest effectiveness not only in terms of goals set by the EU achievement, but also in cost-effectiveness. However, in the Finnish new waste legislation it was decided to extend producers' responsibilities to full and to reduce the role of municipalities in packaging waste management. It seems that legislators expect in this way to address the materials efficiency goal and presumably to come closer to the priorities of waste hierarchy as well as to improve the overall packaging waste collection services in all country.

Lack of proper monitoring and measures for free-riding or non-compliance was observed in Finland too. One of the reasons that there is a number of actors involved in the system, including many different PROs, that make the whole monitoring process more complex. In Belgium there are two PROs- one for industrial packaging and one for household packaging that covers all territory of the country. There is a government authority formed of representatives from all three regions (the Interregional Packaging Commission) which regulates and monitors the packaging recycling achievements and compliance (Article 22 of the Cooperation Agreement). In case of non-compliance with obligations set in the Cooperation agreement, sanctioning and penalties can be applied (IPC, Vos Emballages, 2010). In Finland after the reform of Pirkanmaa Centre for Environment monitoring was improved. PYR is working together with PROs and monitoring institutions in packaging data collection. In the new legislation it is also planned to introduce quite severe sanctions, especially to fight the free-riders.

In Finland in the new waste legislation there are also more ambitious targets set for households waste management. Quite large amount of household waste are different types of packaging, therefore, the management of this waste stream has to be addressed and significantly improved. There are some example in Europe that higher national targets can contribute to better results. Belgium that recently shows one of the best rates of packaging waste recycling and recovery, not only fulfilling the requirements set by EU, but it is far beyond the compliance (EC Report, 2012). Austria, Belgium (especially Flanders) and the Netherlands exceeded the EU maximum targets. Norway, despite not being an EU Member, has introduced EPR system and higher targets than those in the EU Packaging and Packaging Waste Directive (Røine& Lee, 2006). These countries usually have set tough national targets compared with to most Member States (Cahill et al, 2012). In general EU targets are quite low, because there were plenty of EU Members that needed longer period to achieve even these recovery and recycling targets. The Directive for Packaging and Packaging Waste (2005/20/EC) set a later deadline to achieve the targets for the Czech Republic, Estonia, Cyprus, Latvia, Lithuania, Hungary, Malta, Poland, Slovenia, and Slovakia (Summaries of EU legislation, 2011). In this context, Finland has showed not the worst performance, however, there is still plenty of space to seek for better.

Other problematic issue in Finland was intensified recovery rather than reduction or prevention. Despite the fact that prevention of waste generation is a priority set in the waste legislation, it was poorly promoted and implemented by public authorities and private organizations. Initial waste policy contributed mostly for recovery and especially incineration. According the EEA, it looks like that there is a tendency in Finland to build overcapacities for incineration. This fact might negatively influence the increase of the recycling and fulfillment of the 50% recycling of municipal waste target by 2016 as it is set in the newest National Waste Plan. So far the progress in recycling rates in Finland was considerably slow (Fisher, 2013). There could be several reasons behind this tendency. For example, Finnish pulp and paper industry can use the wood and fibre waste to produce energy for their own processes. Usually they also have their own landfilling places and they do not pay any taxes for it as well as for incineration. Measures to increase prevention were omitted also in waste management plans and also in environmental permits (Lodenius et al, 2009). In opposite, Flanders gradually tried to tighten incineration (no new facilities were allowed to be built) and to encourage prevention but not recovery. In the last 2008-2015 plan landfilling is banned. In addition, there are plenty of informational measures targeting households and consumers' consumption promoted by PROs and local authorities too. On the other hand Belgium is a small country, which is quite densely populated and had plenty of badly contaminated areas, which makes certain waste treatment forms either very expensive or not acceptable (OECD, 1998). This factor might have influenced very strict policy towards landfilling and incineration in Flanders, meanwhile, in Finland the low population density, large territory and long distances are the major challenges for cost-efficient waste collection. It seems that geographical, infrastructure and social factors also influence the effectiveness EPR scheme and the policy instruments that are the best to use.

To finalize this chapter, some uncertainties and recommendation for future research are discussed. Sometimes recycling and recovery of packaging waste statistics reported by different countries has to be compared carefully. One of the reasons is that the definition of packaging was not clearly defined in the packaging directive. Secondly, national methods for calculations vary too. For example, Denmark has a broader definition of packaging and therefore reports bigger quantities (EEA, 2005). In Finland, as it was outlined, industrial and household packaging is not separated and monitored, calculated altogether, meanwhile, in Belgium in this sense there is a clear distinction etc. For this reason it is always useful to check meta-data and explanations on the calculation of the statistics. Often the recovery and

recycling rates in different EU countries cannot be compared, because it is calculated using different methods and for this reason it is not easy to say which EPR scheme is the most cost-efficient or the best in reaching the targets(EPR Club, 2013, June 27).

Secondly, this research on modified EPR system for packaging and packaging waste in Finland was made in quite an early stage and plenty of laws are still under preparation. Initially, it was expected that drafting of concrete requirements for packaging waste will be finished this year, however, at the moment it is postponed to 2014. The further investigation could be done once the consensus among all stakeholders is found and all regulations are passed.

7 Conclusions

The question how to manage packaging waste in the most effective manner is very relevant in Europe and in Finland too. Other important issues are how to design environmental and waste policies and how to apply suitable policy instruments in order not only to improve packaging waste treatment, but also to enhance reduction and prevention. The responsibilities of packaging waste management in Finland were divided between producers and local authorities. However, the overall waste management reform and new Finnish Waste Act in 2012 has introduced plenty of changes for the existing EPR system.

The main aim of this thesis was to address and answer the following question related with modification in the EPR system for packaging and packaging waste:

RQ1: Why was the previous Finnish EPR system for packaging and packaging waste revised in 2012?

RQ2: How will the changes set in the new Finnish waste legislation change the previous scheme and what are the implications for the existing packaging waste management?

RQ3: How do affected parties perceive these changes?

After the research it is possible to indicate the main problems related with the previous EPR system and to explain how it is expected that the reformed system will improve the overall effectiveness of the packaging waste management in Finland. To sum up all information, the following conclusion can be made:

Undoubtedly, in the last decades Finland has progressed significantly in the environmental and waste management legislation. Introduction of an EPR system for packaging and packaging waste gave a beginning for necessary infrastructure and administration establishment, enhanced cooperation and involvement of private sector into this waste stream management. The minimum targets set by the EU were fulfilled. Despite these positive improvement, the Finnish EPR system and packaging waste related legislation lacked precision and concreteness. There was plenty of space left for interpretations in responsibility allocation. This led to the situation that proper collection services of certain packaging materials were not completely ensured. This is especially relevant for those materials, like plastics, that are not very economically profitable. Producers concentrated more on materials that are easier to recycle and that are more valuable. In addition to this, the existing waste management system failed to address the EU and also national waste hierarchy and objectives. The EPR system did not contribute to the packaging waste prevention goal. Reduction in waste generation was not achieved, only recovery was intensified. Overall, it appeared that flexibility in responsibility allocation between different actors in the EPR system in order to avoid additional costs and keep all expenses down not in all cases, like in Finnish EPR scheme, delivers only anticipated outcomes. This situation gave preconditions for the revision of waste laws, including, the EPR system for packaging.

The waste management and EPR reform in Finland introduced a number of changes that try to address previous deficiencies. Responsibilities allocation between all actors in the system was clarified. Producers' responsibility from partial was changed to full. This change in general means that costs for producers and consequently for consumers will increase, therefore, the packaging sector is trying to find the way to organize packaging waste collection in the most economical manner. At the moment negotiations on the most optimal packaging collection network between producers and legislators is taking place. More attention, it seems, should be

given to plastic waste which appeared to be the most problematic and it is not collected everywhere in Finland. Collection and transportation of small amounts of packaging waste in Northern rarely populated regions of Finland seems to remain of questionable effectiveness. Despite that, it could be expected that consensus and the most efficient solutions for the collection network will be found. Revised waste legislation also tries to address materials efficiency. It is difficult to draw direct line between EPR scheme for packaging and packaging design changes and improved materials efficiency. In Finnish case, these processes are also influenced by a combination of other policy tools, technological advance and consumers' demand.

Introduction of changes in EPR system inevitably have impact on the different actors that are involved in the scheme. Apparently legislators and especially EPR monitoring institutions saw the need to improve existing legislation and subsequently overall packaging waste management and materials efficiency. On the other side are the packaging sector and producers that are keen to avoid the increase of the cost they will have to carry. At the moment concrete requirements and design of packaging collection system is being negotiated. Often this process and final outcome can be influenced by stakeholders with greater power in negotiations. Apparently, Finnish packaging sector is considerably good at pushing their interest forward. The outcomes of discussions between producers and legislators and the final design of the modified packaging EPR system should be known next year.

Bibliography

Books, Articles, Reports and Other Electronic Sources

Aarnio, T., & Hämäläinen, A. (2008). Challenges in Packaging Waste Management in the Fast Food Industry. *Resources, Conservation and Recycling*, 52(4), 612.

Cahill, R., Grimes, S., & Wilson, D. (2012). *Extended Producer Responsibility for Packaging Wastes implementation And The Role Of Local Authorities Across Europe And WEEE - A Comparison Of Waste Management & Research*, 29(5), 455-479.

Clift, R., & France, C. (2006). *Extended Producer Responsibility in the EU*. *Journal of Industrial Ecology*, 10(4), 5-7.

ELY-Centre (Pirkanmaan ELY-keskus). (2013, June 26). *Euroopan komissiolle raportoituja tilastoja vuosilta 2003-2011 (materiaalit yhteensä)*. Retrieved from <http://www.ymparisto.fi/download.asp?contentid=133918&lan=fi>

ELY-Centre (Pirkanmaan ELY-keskus). (2013, June 26). *Euroopan komissiolle raportoituja tilastoja vuosilta 2003-2011*. Retrieved from <http://www.ymparisto.fi/download.asp?contentid=133917&lan=fi>

EPR Club. (2013). *News*. Retrieved from <http://www.eprclub.eu/news>

EPR Club. (2013, June 27). *EPR and Packaging: Comparing European Systems*. Retrieved from http://www.eprclub.eu/upload/public/27%20June/Summary%20of%20discussions_%20EPR%20Club%20Seminar%2027%20June.pdf

EU Commission (2006). *Renewed EU Sustainable Development Strategy*. Brussels.

EU Commission (2011). *Summaries of EU legislation*. Retrieved from http://europa.eu/legislation_summaries/environment/waste_management/121207_en.htm

EU Commission. (2001). *The Finnish Packaging Tax. In Study on Environmental Taxes and Charges in the EU* (pp. 222-227).

EU Commission. (2012). *National Waste Prevention Programmes*. Retrieved: <http://ec.europa.eu/environment/waste/prevention/legislation.htm>

EU Commission. (2012). *Use of Economic Instruments and Waste Management Performances, European Commission Final Report*. Paris

EU Commission. (2013). *Life Cycle Thinking and Assessment for Waste Management*. Retrieved from http://ec.europa.eu/enterprise/policies/innovation/policy/lead-market-initiative/files/waste_mng_leaflet_en.pdf

European Organization for Packaging and Environment. (2007). *Packaging and Packaging Waste Law in Europe, Beverage Containers Policy*.

Eurostat. (2012). *Waste statistics*. Retrieved from http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Waste_statistics

Eurostat.(2012). *Packaging Waste*. Retrieved from http://epp.eurostat.ec.europa.eu/portal/page/portal/waste/key_waste_streams/packaging_waste

Eurostat-Data Centre on Waste. (2013, April). Recovery Rates for All Packaging 2010. Retrieved from http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=env_waspac&lang=en

Eurostat-Data Centre on Waste. (2013, April). Recycling rate for All Packaging 2010. Retrieved from <http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=ten00063&plugin=1>

Finnish Ministry of the Environment. (2012). Waste Taxes and Charges. Retrieved from <http://www.ymparisto.fi/default.asp?node=18450&lan=en>

Finnish Ministry of the Environment. (2013). *Recycling of Beverage Packages*. Retrieved from <http://www.ymparisto.fi/download.asp?contentid=16253>

Fischer, C.(2013). *Municipal Waste Management in Finland*. European Environment Agency (EEA).

Heikkinen, L. (2013). *From Ecopoints towards a Functional Take-back Point Network*. Retrieved from <http://info.pyr.fi/from-ecopoints-towards-a-functional-take-back-point-network/>

Hildén, M., Kautto, P., Lehtoranta, S. (2009). *Päästökauppa ja tuottajavastuu* Suomen Ympäristökeskus

IPC (2012). Belgian Experiences on the Management of Packaging Waste. Retrieved from <http://www.eprclub.eu/upload/public/events/Seminar%20Oct%202012/Marc%20Adams%20-%20Belgian%20experiences%20on%20the%20management%20of%20packaging%20waste.pdf>

IPC. (2010). Vos Essemblages, Vous en etes responsable.

Jurkko , K. (2013). *Ekopisteiden sotkeminen on karannut käsistä*. Retrieved from http://yle.fi/uutiset/ekopisteiden_sotkeminen_on_karannut_kasista/6716833

Kautto, P. (2006). *New Instruments – Old Practices? The Implications of Environmental Management Systems and Extended Producer Responsibility for Design for the Environment. Business Strategy for the Environment (John Wiley & Sons, Inc), 15(6), 377-388.*

Kautto, P., Kauppila, J., Lonkila, K. (2009). *Jätehuollon tuottajavastuujärjestelmien toimivuus*. Helsinki: Ympäristöministeriö. Ympäristöministeriön raportteja 15/2009.

Kilpeläinen, J. (2013). *Waste Palette under the Magnifying Glass*. Retrieved from <http://info.pyr.fi/waste-palette-under-the-magnifying-glass/>

Kivimaa, P. (2007). The Determinants of Environmental Innovation: the Impacts of Environmental Policies on the Nordic Pulp, Paper and Packaging Industries. *European Environment: The Journal of European Environmental Policy (Wiley), 17(2), 92-105.*

- Lifset, R., & Lindhqvist, T. (2008). Producer responsibility at a turning point? *Journal of Industrial Ecology*, 12(2), 144-147.
- Lilja, R. (2009). From Waste Prevention to Promotion of Material Efficiency: Change of Discourse in the Waste Policy of Finland. *Journal of Cleaner Production*, 17(2), 129-136.
- Lindhqvist, T. (1998). What is Extended Producer Responsibility? In T. Lindhqvist & K. Jönsson (Eds.), *Extended Producer Responsibility as a Policy Instrument - what is the Knowledge in the Scientific Community?*. Stockholm.
- Lindhqvist, T. (2000). *Extended producer responsibility in cleaner production: policy principle to promote environmental improvements of product systems*. 2000:2, International Institute for Industrial Environmental Economics (Internationella miljöinstitutet), Lund University, Lund.
- Lindhqvist, T. (2013). *EPR for Packaging lecture material*. Lund: Unpublished.
- Lodenius, M., Heino, E., & Viljakainen, S. (2009). *Introducing a New Model for Material Savings in the Finnish Paper Industry*. *Resources, Conservation and Recycling*, 53(5), 255-261.
- Manomaivibool, P. (2011). *Advancing the frontier of extended producer responsibility: the management of waste electrical and electronic equipment in non-OECD countries*. 2011:1, International Institute for Industrial Environmental Economics, Lund University, Lund.
- Mayers, K., & Butler, S. (2013). Producer Responsibility Organizations Development and Operations. *Journal of Industrial Ecology*, 17(2), 277-289.
- Melanen, M., Kautto, P., Saarikoski, H., Ilomäki, M., & Yli-Kauppila, H. (2002). *Finnish Waste Policy—Effects and Effectiveness*. *Resources, Conservation and Recycling*, 35(1–2), 1-15.
- Mickwitz, F. I. (2003). *A Framework for Evaluating Environmental Policy Instruments, Context and Key Concepts*. Sage Publications, Vol 9(4): 415–436.
- Moliis, K., Dahlbo, H., Retkin, R., & Myllymaa, T. (2012). *Pohjois-Suomen pakkausjätteiden hyödyntäminen Elinkaaren aikaiset ympäristö- ja kustannusvaikutukset*. Helsinki, Finnish Ministry of the Environment. Retrieved from http://www.ym.fi/fiFI/Ajankohtaista/Julkaisut/Raportteja_RA/YMra262012_PohjoisSuomen_pakkausjatteide%287302%29
- Nurminen, P. (2012). *Deposit Systems for Beverage Packages in Finland*. Finland: Suomen Palautuspakkaus Oy Ekopulloyhdistys ry.
- OECD. (2001). *Extended Producer Responsibility: a Guidance Manual for Governments*. Paris: OECD.
- OECD. (2009). *Environmental Performance Reviews. Finland*. Paris: OECD
- PALPA- Suomen Palautuspakkaus OY. (2011). *Kierrätyslasijärjestelmän infopaketti Yhteispalautuspisteille*. Retrieved from <http://www.palpa.fi/files/palpa2011/KLP/KLP%20Info%20yhteispalautuspisteille%2020111028.pdf>
- PYR-The Environmental Register of Packaging. (2013). *PYR*. Retrieved from <http://www.pyr.fi/eng/pyr.html>

- Røine, K., & Lee, C. Y. (2006). With a Little Help from EPR? Technological Change and Innovation in the Norwegian Plastic Packaging and Electronics Sectors *Journal of Industrial Ecology*, 10(1-2), 217.
- Sairinen, R. (2003). *The Politics of Regulatory Reform: 'New' Environmental Policy Instruments in Finland*. *Environmental Politics*, 12(1), 73.
- Salo, M.(2009). *Municipal Solid Waste Management in Finland*.
- Salonen, I. (2013). *Growth in Wooden Packaging*. Retrieved from <http://info.pyr.fi/growth-in-wooden-packaging/>
- Salonen, I. (2013). *Steady Development Expected*. Retrieved from <http://info.pyr.fi/steady-development-expected/>
- Schmeer, K. (1999). *Guidelines for Conducting a Stakeholder Analysis*.
- Suvanto, P. (2013). *The Packaging Sector is Active Lobbyist*. Retrieved from <http://info.pyr.fi/the-packaging-sectors-active-lobbyist/>
- The Environmental Register of Packaging. (2012). *Statistics on the Recovery of Packaging*. Retrieved from <http://www.pyr.fi/eng/statistics/recovery.html>
- The Environmental Register of Packaging. (2012). *Statistics on the Recycling of Packaging*. Retrieved from <http://www.pyr.fi/eng/statistics/recycling.html>
- The Environmental Register of Packaging. (2012). *Statistics on the Reuse of Packaging*. Retrieved from <http://www.pyr.fi/eng/statistics/reuse.html>
- Tojo, N. (2003). *EPR Programmes: Individual versus Collective Responsibility, Exploring Various Forms of Implementation and their Implication*. Lund.
- Tojo, N. (2004). *Extended Producer Responsibility as a Driver for Design Change - Utopia or Reality?* 2004:2, The International Institute for Industrial Environmental Economics, Lund, University, Lund.
- Valovirta, V., Hyvönen, J. (2011). *Julkisen sektorin innovaatioprosessit ja innovaatiojohtaminen*. Retrieved http://www.hare.vn.fi/upload/Julkaisut/15733/4716_SETU_9-2011.pdf
- Vedung. (2009). *Public Policy and Program Evaluation*. New, Brunswick, New Jersey: Transaction Publishers.
- Wilén, C., Salokoski, P., Kurkela, E., & Sipilä, K.(2004). *Finnish Expert Report on Best Available Techniques in Energy Production From Solid Recovered Fuels*. Helsinki, Finnish Environmental Institute.
- Yin, R. K. (2003). *Case Study Research: Design and Methods*. (Vol. 5). Thousand Oaks, California: Sage Publications.

Legislation

EU Commission Decision (2005/270/EC)

EU Directive 2008/98/EC on waste (Waste Framework Directive)

EU Directive on Waste (2008/98/EC)

Finnish Waste Act (1072/1993)

Finnish Waste Act (646/2011; amendments up to 195/2012 included)

Finnish Waste Tax Act (1126/2010)

Government Decision on Packaging And Packaging Waste (962/1997)

Law on Alcohol Excise (1471/1994)

Law on Soft Drinks Excise (1474/1994)

Packaging and Packaging Waste Directive (1994/62/EC)

Packaging and Packaging Waste Directive. Amended (2004/12/EC)

The Council of State Decisions on Packaging and Packaging Waste (962/1997, 987/2004 and 817/2005)

Towards a recycling society. The National Waste Plan for 2016. (14/2009) Helsinki, Finland: Ministry of the Environment.

Appendices

Appendix 1: Packaging and Packaging Waste Statistics for 2003-2011²⁴

	Packaging waste placed on the market = packaging waste generated (1)	Recycling of materials (2)	Recovery (3)	Recycling rate (4)	Recovery rate (5)	Reuse (6)	Reuse rate (7)
	t	t	t	%	%	t	%
Glass	Target 60 %						
2003	61 700	37 900	37 900	61	61	242 100	80
2004	67 400	37 000	39 363	55	58	241 400	78
2005	83 900	53 000	54 500	63	65	240 800	74
2006	67 000	49 600	51 800	74	77	221 000	77
2007	69 300	56 171	60 790	81	88	220 997	76
2008	60 645	48 391	49 090	80	81	114 795	65
2009	58 275	26 269	26 269	45	45	94 642	62
2010	64 585	39 564	39 564	61	61	58 076	47
2011	66 448	58 393	58 393	88	88	48 352	42
Plastic	Target 22,5 %						
2003	89 400	12 800	32 800	14	37	218 800	71
2004	89 900	13 100	30 600	15	34	247 200	73
2005	100 100	13 600	14 500	14	14	254 800	72
2006	96 900	15 400	27 700	16	29	276 100	74
2007	98 555	18 124	42 385	18	43	276 736	74
2008	115 373	26 175	56 341	23	49	251 778	69
2009	112 341	28 478	50 848	25	45	236 452	68
2010	116 244	30 508	52 509	26	45	236 336	67
2011	117 126	29 768	54 768	25	47	254 340	68
Paper, cardboard, carton	Target 60 %						
2003	269 200	169 000	193 800	63	72	8	3
2004	244 700	171 900	189 400	70	77	8	3
2005	247 700	195 900	217 700	79	88	8	3
2006	261 900	225 400	251 000	86	96	8	3
2007	265 393	232 616	253 398	88	95	8	3
2008	256 074	238 468	272 162	93	106	10 101	4

²⁴ (1) Packaging waste can be considered as the same amount of packaging placed on the market in the same year (Commission Decision 2005/270/EC of art. 2)

(2) Recycled material includes both home and abroad recycled packaging waste.

(3) Recovery rates contain both at home and abroad recovered packaging waste.

(4) Recycling rate: recycled packaging waste, divided by the amount of packaging placed on the market.

(5) The recovery rate: the amount of packaging waste recovered divided by the amount of packaging placed on the market.

(6) When the reusable packaging placed on the market for the first time, it is calculated in the column "packaging placed on the market". After each use / refill is calculated separately, and is in the column headed "re-used".

2009	241 978	229 208	272 509	95	113	14 128	6
2010	251 748	242 238	281 438	96	112	15 002	6
2011	255 051	246 876	270 376	97	106	16 151	6
Metal	Target 50 %						
2003	42 200	21 200	21 200	50	50	369 000	90
2004	42 300	23 100	23 100	55	55	383 300	90
2005	44 700	23 900	23 900	53	53	404 900	90
2006	44 800	26 400	26 400	59	59	628 700	93
2007	47 390	33 306	33 306	70	70	633 613	93
2008	50 807	38 294	38 294	75	75	654 028	93
2009	46 251	38 983	38 983	84	84	469 638	91
2010	51 774	40 362	40 362	78	78	536 331	91
2011	53 999	43 125	43 125	80	80	498 667	90
Wood	Target 15 %						
2003	152 600	10 500	127 600	7	84	638 800	81
2004	204 300	14 200	160 000	7	78	723 600	78
2005	205 600	11 000	156 400	5	76	742 900	78
2006	205 600	15 900	167 300	8	81	775 200	79
2007	214 234	21 008	192 721	10	90	765 325	78
2008	217 205	46 275	214 532	21	99	689 344	76
2009	194 307	39 873	186 690	21	96	616 609	76
2010	223 141	39 749	188 414	18	84	653 399	75
2011	215 934	38 210	209 240	18	97	636 683	75

Source: ELY-Centre (2013, June 26)

Appendix 2: The Contacts List

Date	Organization	Position	Contacted person
May 20, 2013	Finnish Packaging Association, Ritarikatu 3 A FIN-0017 Helsinki, Finland Tel. +358-9-68403421	Managing director	Roger Bagge E-mail: roger.bagge@pakkaus.com
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<p>May 28, 2013 August 16, 2013</p>	<p>The Finnish Environment Institute (SYKE), Environmental Policy Research Centre, Policy Studies Unit Mechelininkatu 34, FIN-00251 Helsinki, Finland Tel :+358 400 148848 Fax: +358 9 5490 2391</p>	<p>Senior Research Scientist</p>	<p>Kauppila Jussi E-mail: jussi.kauppila@ymparisto.fi</p>
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<p>August 20, 2013</p>	<p>Palautuspakkaus Finland Oy - PALPA (Finnish Return Packaging LTD, PALPA Glass LTD) Pasilanraitio 9 B, FIN-00241, Helsinki Finland. Tel. +358 9 868 9860</p>	<p>Managing Director</p>	<p>Pasi Nurminen E-mail: pasi.nurminen@palpa.fi</p>
<p>September 2, 2013</p>	<p>Centre for Economic Development, Transport and the Environment for Pirkanmaa. Yliopistonkatu 38, P.O.Box 297, FI-33101 Tampere, Finland Tel.+358 50 402 4207</p>	<p>Senior Advisor</p>	<p>Teemu Virtanen E-mail: tuomo.aunola@ely-keskus.fi</p>