European Commission

Framework Contract No. (PPF Phase 2) 2003/005-026.01.02

Letter of Contract: Reference

Date of Commencement: 09/05/04

Mission initiated by: Programme Officer, Mr Rainer Rohesalu

Transition Facility Project
Development of the nationwide packaging waste collection and recovery system
Estonia

FEASIBILITY STUDY

August 2004

Submitted by:

KAMPSAX

FWC Coordination Office

Avenue des Celtes 10

B-1040 Brussels (Belgium)

Tel: +32 27 63 37 98

Fax: +32 27 63 38 08

E-mail: kampsax@kampsax.be

Contents

Executive Summary

The Ministry of Environment has been actively pursing the implementation of the EU Directives on waste and economic instruments based on the producer responsibility principal. The Packaging Act has been amended this year to enable recovery of packaging and packaging waste. At least 50% of the total weight of packaging waste must be recovered and at least 25% recycled, within this a general target of at least 15% of the total weight of each packaging material has been set. New targets for 2012 will also have to be met whereby 60% of packaging must be recovered and between 55% and 80% of the materials recycled. Estonia recycled 15% of the packaging placed on the market in 2001. This was mainly through the implementation of the packaging excise duty, which is applied to beverage packaging unless at least 60% is recovered, and motivates companies to collect and recover their packaging. The majority of packaging waste is landfilled as there is no national collection system and for many areas no other alternatives. Landfill practices are changing with the implementation of new regulations and many of the local sites are being closed with new improved facilities for sorting and transfer of waste being established. The counties of Estonia have prepared waste management programmes for these changes and they have now to be implemented within the municipalities.

Packaging and packaging waste will be targeted as one waste stream that can be diverted using the producer pays principle from the 10-12,000 obligated companies. Packaging waste management is a complicated interaction between a large number of organisations; including Government, waste management companies, manufacturers, distributors and retailers; non-governmental organisations and the public. The private sector has two key roles to play, namely as producers of packaging wastes, and as service providers for the recycling and recovery of packaging wastes. Packaging waste compliance schemes, need to be established by companies to ensure that their obligations are met. A range of facilities will also be required for the management of packaging wastes including collection, recovery and re-processing. For a selective collection system to work well, the active cooperation of municipalities, waste management companies, re-processors and of course the householder is essential.

In a voluntary ‘bring’ system the householder takes the packaging and packaging waste materials to a collection facility. The bring schemes are a useful approach when there is no defined kerbside collection and are suitable for multiple residency buildings and smaller communities that are difficult to service with direct collection. The packaging waste still requires collection and to be sorted, compacted and sent to the reprocessing centres.

Packaging waste in Estonia represents approximately 20-30% of the solid municipal waste by weight and the total quantity of packaging produced in 2002 was about 120,000 tonnes or 85 kg/year/person. A Microsoft Excel spreadsheet model was developed to derive the current and future packaging waste in each of the municipalities and for Estonia as a whole and hence provide recovery targets. The data was also linked to the population density for each area and used to determine the number of collection sites. The scheme for collection would require the locating of 1931 container sites, as single multiple material banks or grouped material collection containers, on municipal ground throughout the municipalities at a cost of €5,401,000.

Integration of the collection scheme with other measures for institutional strengthening, raising public awareness and reporting of the data will also be required and a framework for each of these areas has been developed. Information on the organisations involved within the packaging chain was used to determine the number of personnel and the type of training required. 90 personnel were identified from 8 groups requiring a total of 291 training days and a budget cost of €39,285. The additional public staff equate to 2 full time positions within the Ministry of Environment, 2 positions in the Inspectorate and 2 positions in the Estonian Environment Information Centre. The annual resource budget for the additional positions is €102,000 plus a short-term expenditure over three years of €108,000 for additional PR personnel. Raising public awareness is essential for the success of the scheme. Good practice was identified from other country schemes and a mechanism and cost derived. It is recommended that a 3-year programme costing €1,554,000 be put in place with a full time manager and temporary assistants to deliver national and local campaigns and media advertisements.

The EU Directive has specific monitoring and reporting requirements for packaging and packaging waste. A database must be established to provide information on the recovery and recycling by the producers and linked to the existing Packaging Register held at the Estonian Environment Information Centre. This database of the producers, materials and other requirements will be based on an Internet system for data entry which would be verified by the producer responsible schemes prior to submission to the government centre. The cost for developing the reporting requirement is €20-35,000 for hardware and for a further €35,000 cost to develop the software applications.

1 Introduction

The management of waste is a dynamic process that is continually improving as new environmental standards; equipment and levels of funding are introduced. Traditionally waste was managed at a local level with landfill being the most common route for disposal. More recently with EU policy this has moved to regional approaches and encouraged recycling and recovery from wastes when landfill will no longer be seen as the most economic or best environmental option. The introduction of packaging regulations across the EU member states has provided a platform for further improvement through the producer pays principle placing the burden of cost on the packaging waste producer. Packaging is essential to the producer to transport, protect and display the product, but this equated to in excess of 58 million tonnes for the EU market in 1997 when the Directive on Packaging was drafted. In order to further promote waste prevention, reuse and recovery this report describes a Feasibility Study for Estonia supporting their development of a nationwide packaging waste collection and recovery system.

1.1 Background

Estonia currently does not recover packaging and packaging waste in a systematic manner other than for beverages and requires the development of a system for collection and recovery of all types of packaging waste. The European Commission allocated the means from the Phare programme to begin this process. In 2001 URS Dames and Moore analysed the existing packaging situation and provided suggestions for amending the packaging act and measures to strengthen and control the recovery of packaging and packaging waste. This together with studies completed by the Estonian Sustainability Institute on packaging waste constituents and existing recovery provided a basis for further developing a strategy.

1.1.1 Commission

In May 2004 the Ministry of Environment commissioned Kampsax to provide a short feasibility study into aspects of upgrading the national packaging and packaging waste collection and recovery system in Estonia through the effective management and monitoring of packaging and packaging waste. This identifies packaging waste collection systems and some of the needs for institution building and investment activities for a nationwide packaging waste collection and recovery system in line with the requirements of the EU Directive 94/62/EC and amendments.

1.1.2 Ministry of Environment

The Estonian Ministry of the Environment formulates national policies and regulates the protection the environment. The Waste Department within the Ministry is responsible for

waste management, including packaging recovery. The Department guides and co-ordinates development and implementation of policy related to its area, prepares draft legislation in the field of waste management, manages the selection of waste-related investment projects, and organises in-service training and waste counselling. The Department's also harmonises Estonia's waste acts with the relevant EU legislation and planning of necessary implementation measures.

1.1.3 Process

The accession negotiations with Estonia were successfully concluded on 13 December 2002 and the Treaty of Accession was signed on 16 April 2003. In a referendum held on 14 September 2003, a majority of Estonians expressed their support for membership of the European Union. Following ratification of the Treaty of Accession, Estonia joined the EU on 1 May 2004.

For packaging waste management, the *acquis* has been transposed. A new Waste Act and Packaging Act have been adopted, addressing landfill of waste and recovery of packaging to replace the existing acts. Administrative capacities have been put in place and function, but more staff is needed at ministerial and regional levels. While a national waste management plan has been adopted, some regional and municipal plans need to be revised and implemented. The establishment of collection systems and recovery and disposal facilities needs to continue and a producer responsible organisation established to achieve this. As regards waste management, Estonia needs to strengthen administrative capacity at ministerial and regional levels. Regional and municipal waste management plans need to be completed.

1.1.4 Duty through legislation

The aim of the EU Directive 94/62/EC is to harmonise national measures on the management of packaging and packaging waste, in order to minimise any environmental impacts of packaging and packaging waste and to avoid any distortions of competition in the internal market. The Directive lays down measures aimed, firstly, at preventing the production of packaging waste and, additionally, at increasing the re-use, recovery and recycling of such waste. These measures include minimum standards for packaging materials and targets for the recovery and recycling of packaging waste. The new Member States have a binding agreement to adopt the numerous EU acts applied prior to their joining the EU within an agreed time period.

1.1.5 Phare

The Phare programme is one of the three pre-accession instruments financed by the European Union to assist the applicant countries of Central and Eastern Europe in their preparations for joining the European Union. Phare's objectives are to strengthening public administrations and institutions to function effectively inside the European Union, promoting convergence with the EU extensive legislation (the acquis communautaire) and promoting economic and social cohesion. The specific project focuses on the development of a nationwide packaging and packaging waste collection and recovery system - TA for Feasibility Study on the Transition Facility Project "Supporting the Development of the Nationwide Packaging Waste Collection and Recovery System". The work is to be carried out under the Phare Programme "Project Preparation Facility for EU Assistance (PPF Phase 2) 2003/005 026.01.02".

1.2 Project Aims

The overall objective is to upgrade the national packaging and packaging waste collection and recovery system in Estonia through the effective management and monitoring of packaging and packaging waste. This project will prepare a feasibility to identify some of the needs for institution building and investment activities for a nationwide packaging waste collection and recovery system in line with the requirements of the EU Directive 94/62/EC.

1.2.1 Objectives

This main goal, will be achieved through several specific objectives:

- To undertake an analysis of the current Estonian situation with regard to packaging waste collection and recovery;
- To develop collection schemes for packaging waste, (number of containers and collection stations at a municipality level) for packaging waste;
- Specify equipment and materials for establishing collection stations including analysis and cost estimates.
- To determination the key organisations, capacity and training requirements required to fulfil the overall objective with cost estimates;
- To determine a strategy for public awareness activities to raise public knowledge of packaging wastes collection and recovery with cost estimates;
- To review the requirement, specification and cost for Internet based monitoring and reporting of packaging waste data.

1.2.2 Information Provision

This report reviews the current situation for packaging waste arisings, policy and implementation plans for the future. The requirements for improvements, additional mechanisms and tools to ensure packaging recovery are discussed and waste profiles at a municipality level developed, with prices for equipment/materials required for establishing collection stations. The institutional strengthening and training requirements and costs for Ministry, Estonian Environment Information Centre, Packaging Commission, County Environment Departments, Environmental Inspectorate and the Recovery Organisation are identified and the typical PR campaigns needed to ensure organised recovery. An assessment of the need for the development of a reporting and monitoring scheme for packaging waste and specifications for reporting and monitoring is also included.

1.3 Overview of Estonia

Estonia lies along the Baltic Sea, just south of Finland and is sparsely populated. Tallinn, Estonia's capital city is about 80 km south of Helsinki, across the Gulf of Finland. Sweden is Estonia's western neighbour across the Baltic. Russia lies to the east, Latvia to the south. The country is mostly flat, with many lakes and islands although in the south there are small hills. In the east of Estonia, Lake Peipsi, the 4th largest lake in Europe, forms a natural frontier with Russia. Across Estonia, much of the land is farmed or forested, with industrial production concentrated around Tallinn and in the Northeast. Estonian local government units differ considerably in both area and in the size of the population. This makes the management of packaging waste more difficult as dense communities and sparse areas have to be considered.

1.3.1 Regions

Estonian local government is divided into 15 Counties, which has a County Government that is led by a Governor, and the counties are further sub-divided into 241 rural municipalities (of which 202 parishes and 39 towns).

Counties of Estonia:

- Harju County
- Hiiu County
- Ida-Viru County
- Järva County
- Jõgeva County
- Lääne County
- Lääne-Viru County
- Pärnu County
- Põlva County
- Rapla County
- Saare County
- Tartu County
- Valga County
- Viljandi County
- Võru County

This used to provide traditional waste management, locally organised with each municipality having it's own landfill. With the requirement for landfill conditioning, segregation of wastes, recovery and recycling (including packaging and packaging waste) a regional approach is now used and benefits from the economics of scale.

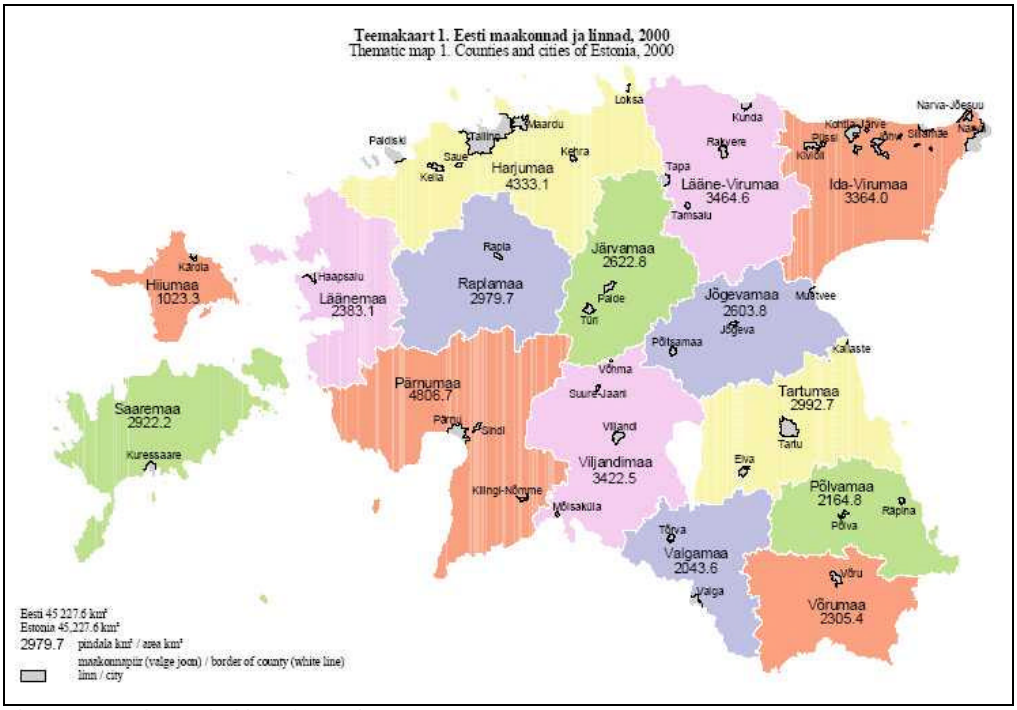


Figure 1 Counties and Cities of Estonia

1.3.2 Rural

Many of the rural municipalities have few inhabitants, for example Ruhna Vald has only 98 inhabitants over 12 km^2 and Illuka Vald has 548 over 1,235 km^2.

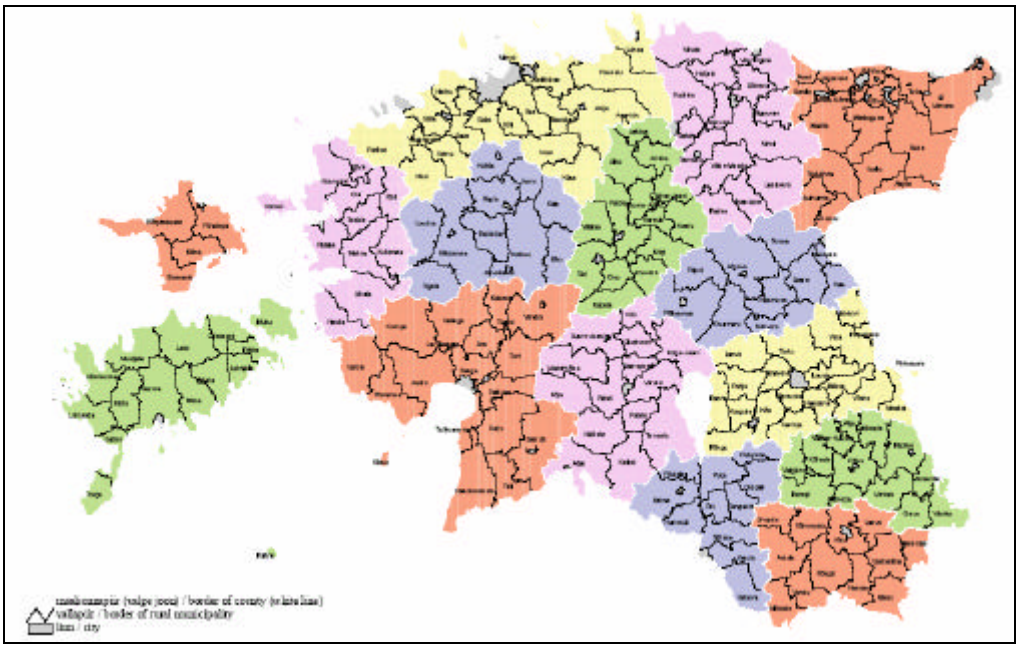


Figure 2 Municipalities of Estonia

Many of these municipalities are dominated by the natural conditions of large wetlands and forest areas. The distribution of housing in such areas is often not typically concentrated in villages but dispersed and of a ribbon nature, sometimes with poor access and unsuitable for heavy vehicles. There are 30 municipalities with less than 1000 inhabitants. Included in the Municipalities are also a number of islands that also will have special requirements for the recovery of packaging waste.

1.3.3 Urban

About 70% of the population live in urban areas, and 48.4% live in the five largest cities, Tallinn 389,642; Tartu 101,240; Narva 69,158; Kohtla-Järve 44,901 and in Pärnu 43,654. A review of the towns show that 13 towns have a population of greater than 10,000 inhabitants and 23 in total have a population greater than 5,000 inhabitants.

The scale of urban population centres is very important in determining factors such as collection points and the viability of local sorting centres for recycling.

Figure 3 Cities and Towns in Estonia

Cities and towns in Estonia:

- Abja-Paluoja
- Antsla
- Elva
- Haapsalu
- Jõgeva
- Jõhvi
- Kallaste
- Karksi-Nuia
- Kehra
- Keila
- Kilingi-Nõmme

- Kiviõli
- Kohtla-Järve
- Kunda
- Kuressaare
- Kärdla
- Lihula
- Loksa
- Maardu
- Mustvee
- Mõisaküla
- Narva
- Narva-Jõesuu
- Otepää
- Paide
- Paldiski
- Põltsamaa
- Põlva
- Pärnu
- Püssi
- Rakvere
- Rapla
- Räpina
- Saue
- Sillamäe
- Sindi
- Suure-Jaani
- Tallinn
- Tamsalu
- Tapa
- Tartu
- Tõrva
- Türi
- Valga
- Viljandi
- Võhma
- Võru

1.3.4 Population

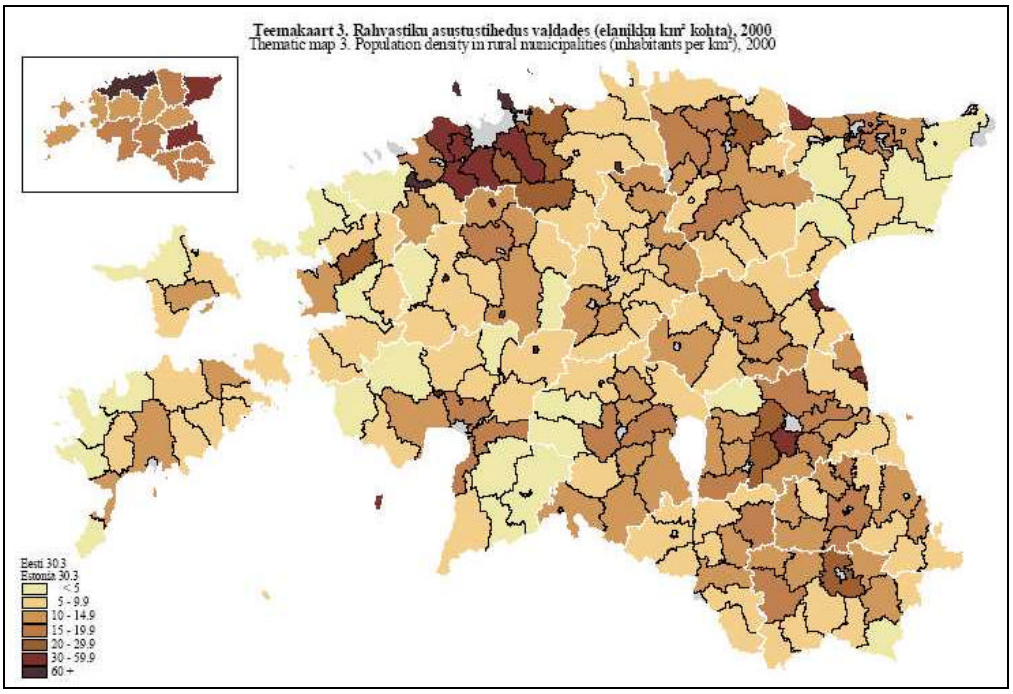


Figure 4 Population Density in Rural Municipalities – inhabitants per km^2

Estonia is one of the smallest countries in Europe with a territory of 45,227 km^2 and population of 1,365,265 *(Ref: Association of Estonian Cities, Jan 2004).* The average population density is 30.2 inhabitants/km^2 and 7.7 settlements on average in 100 km^2. In rural areas population densities of less than 5 inhabitants/km^2 are encountered, the lowest for any municipality being 2.26 inhabitants/km^2. There are 25 municipalities with less than 5 inhabitants/km^2 and 100 with less than 10 inhabitants/km^2. Mid Estonia, West Estonia and the area between Viljandi and Tartu all have a very low population.

In contrast the highest population densities are found in the major cities of Tartu 2,579 inhabitants/km^2 and Tallinn 2,462 inhabitants/km^2 and some 60% of the population is concentrated in the north of Estonia. There are 15 towns with a population density of greater than 1000 inhabitants/km^2 with a further 13 towns with a population density greater than 500 inhabitants/km^2.

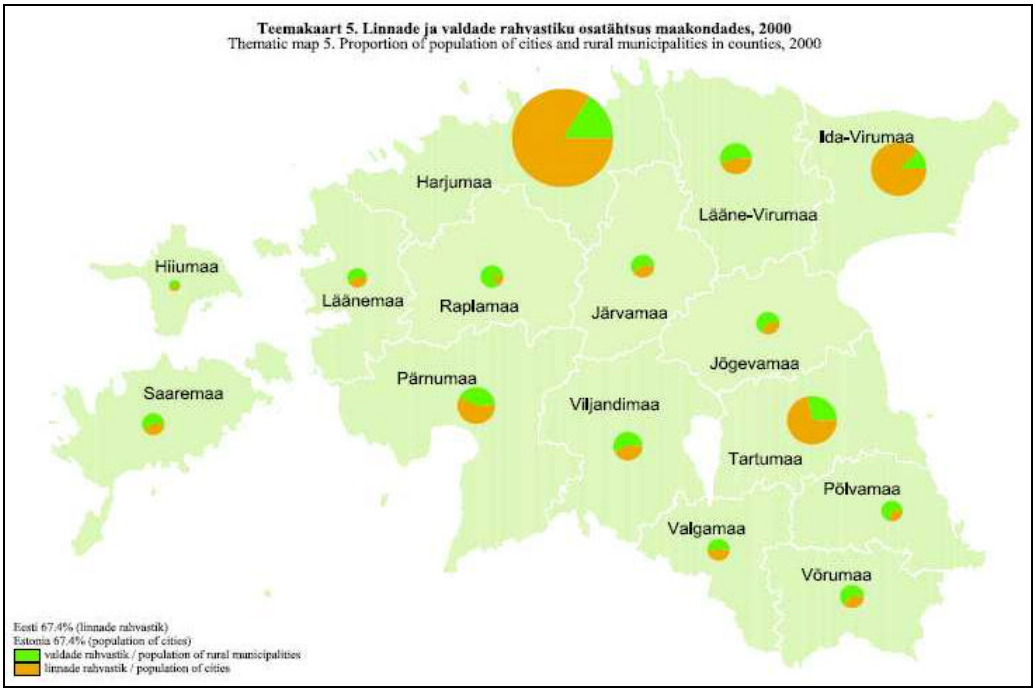


Figure 5 Proportion of Population of cities and rural municipalities in counties

1.4 Transport

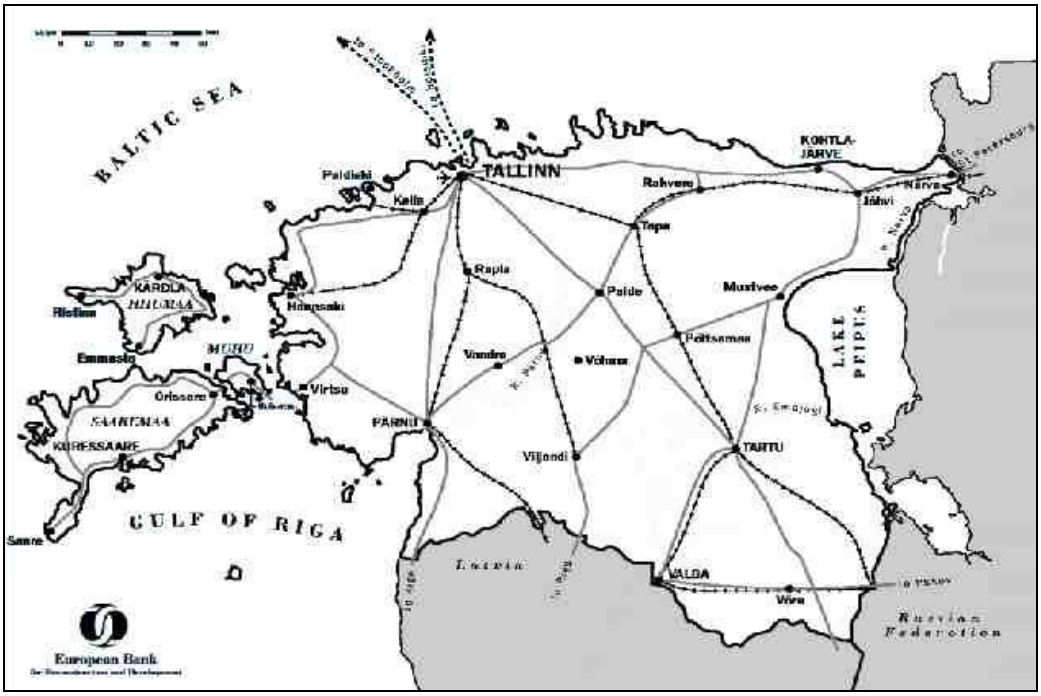


Figure 6 Major Road and Rail Links

1.4.1 Road

The volume of road transport within Estonia has increased dramatically in recent years. The Via Baltica Highway (Tallinn-Pärnu-Ikla) handles about 40% of Estonia's lorry transport, and the Tallinn-Nareva highway, which continues to St. Petersburg, handles 45%. The total length of all Estonian roads is nearly 30,000 km. Around half of this consists of public roads, 55% of which are paved. Road quality has deteriorated since independence and, as traffic volumes increase, the road network will need to be upgraded and modernised. The highest traffic volumes and its changes occur in Tallinn and the surrounding area. Estonia has a high density of roads although there are few major highways. Travel times north to south are in the region of 4 hours by car and shorter for an east to west journey across Estonia

The transport of packaging waste will involve primarily the movement of collected materials from a collection centre to a transfer station where the material can be sorted, bulked and moved to a re-processor. As such the individual routes of householders in rural areas are not affected by the packaging collection as these areas will be predominately served by 'bring schemes' and not part of a collection route. In urban areas collection does add to traffic congestion with the lorries covering the collection rounds.

1.4.2 Rail

The total length of the railway in Estonia is 1,024 km including 132km of electrified rails. By far the largest volume of transit traffic in Estonia is carried by rail, which remains the principal mode of transport. The total freight carried is about 35 million tonnes, of which 60% is in transit. The main line is the east-west railway link with Russia via Narva and Tartu. There may be a potential to use rail links for the bulk transfer of recovered packaging waste and may provide a more environmentally sensitive solution to transport. The current cost of rail transport is however seen as too expensive for the carriage of waste.

1.4.3 Ferry

Sea passenger traffic has increased greatly in the 1990s. Ferries operate between the two large Estonian islands of Hiumaa and Saaremaa and the mainland, as well as between Estonia and its neighbouring countries. Sea traffic is a major part of Estonian commerce and numerous cargo vessels operate through the Baltic and further a field. This should not create practical problems for the return of segregated packaging waste, as the waste is already in transport containers, on islands that have regular cargo services.

1.5 Domestic Trade

Since the opening of markets in 1990s, the retail and wholesale trade increased annually on average by approximately 20%. In 2000, there were about 11,600 firms in the branch. About 4,700 firms were operating in the retail sector and 5900 firms were involved in the wholesale sector. In 2002, total retail sales were growing strongly as purchasing power increased. New shopping malls and a number of specialist smaller shops are opened every year with an increasing number of hypermarkets. The wholesale sector is also changing to meet these new requirements. In 2000, total wholesale sales amounted to EEK 71,6 billion, increasing almost 25% in comparison to previous year (Finpro, Statistical Office of Estonia). As these figures illustrate there is a growing trend for increasing large amounts of packaging both in terms of the quantity of products purchased in the consumer society and also an increase due to the sophistication of the packaging used to tempt the consumer. Convenience foods, with relatively large amounts of packaging, are only beginning to be placed on the market and will undoubtedly rise in market share and popularity.

1.6 Waste Management

The previous practices of waste management have focused on the disposal of waste and did not fully consider the environmental impact or alternatives. Now waste management is planned at a considerably higher level. Waste, which cannot be recovered, has to be disposed of in landfills complying with new environmental requirements based on the Regulation for the “Requirements for establishment, implementation and disclosure of landfill” No. 38 (2004) and in line with the EU requirements. The target is to establish 7-8 regional landfills in co-operation with municipalities in the relevant regions of Estonia by 2009. Currently 1-2 support landfills will operate in each county until establishment of the new landfills, which comply with the regulations.

The register at the Information and Technology Centre of the Ministry of Environment includes the municipal waste landfills. Presently there are 28 operating landfills in Estonia, a reduction from over 200 a few years ago. This has brought major rearrangements for waste disposal, which municipalities had to consider while developing their waste management plans and waste management rules.

Packaging and packaging waste will be targeted as one waste stream that can be diverted using the producer pays principle.

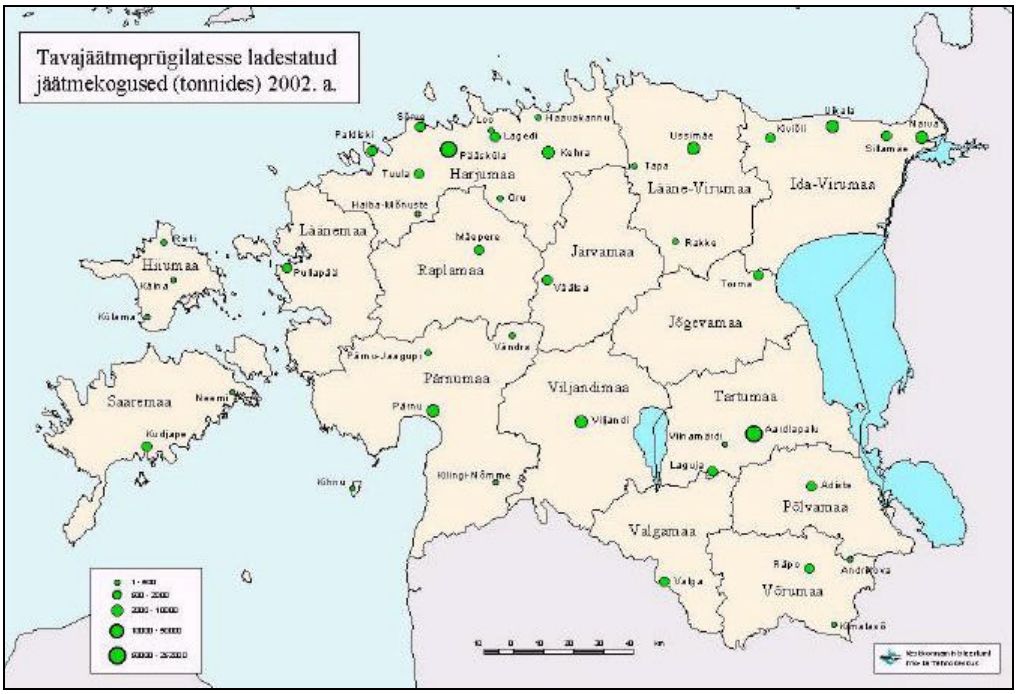


Figure 7 Waste Amounts Disposed on the Non Hazardous Waste Landfills 2002

1.6.1 Current Administration

Ministry of the Environment (MoE) is the key authority to coordinate packaging waste management in Estonia. The National Packaging Register under the Ministry maintains information on packaging and packaging waste as well as issuing certificates for reuse and recovery of packaging according to the Packaging Excise Duty Act. The Ministries of Finance and Economic Affairs are responsible for the development a system of economic incentives and the Ministry of Social Affairs supervise restrictions on materials, which are used for production of packages (e.g. heavy metals). Regional authorities (county level) and local municipalities organise and coordinate the packaging waste management system, establishing contact with the waste companies.

1.6.2 Current Policy

The National Environmental Strategy document is based on internationally recognised principles of; sustainable development, prevention of environmental damage, the precautionary principle, environment consideration and the polluter pays principle. This establishes practical solutions for waste including recovery, handling and disposal. This is interlinked with a National Waste Management Plan (Ministry of Environment, Dec 2002) that provides a basis for regional, county and municipality waste management plans. The plan includes harmonisation with the EU policies and how the aims of the Waste Act and Packaging Act are to be achieved.

1.6.3 Practice

With regard to services such as waste or packaging waste management the two competent authorities are the State (Ministry of Environment) and the Municipality (Local Government). There are 247 (42 towns and 205 municipalities) units of local government in Estonia. These include counties, towns and rural municipalities. The capacity of municipalities to provide services can be very different due to their size, two third of all municipalities have a population less than 3,000 inhabitants.

Waste collection and transportation is organised by direct contracts between waste producer and a waste management company. Waste Management Companies use two different systems of charging for the waste collection and transportation based on either the volume of waste or per uplift (container). There is little cohesive waste management, in some municipalities the containers of different companies are located side by side, companies collect waste based on their routes or market forces with an obvious preference for the higher income areas whether industrial or municipal.

The majority, 95%, of municipal waste is landfilled, waste management companies taking the municipal wastes to self-managed landfills or landfills operated by special companies.

The 15 Counties have an administrative function and for some tasks work with the municipalities to co-operate, allowing the formation of larger local authority units. Co-operation between Municipalities is possible for example in Tallinn and where joint municipality plans have been produced for waste management.

Estonia does not yet have a fully planned and operational waste management system but this is currently being established, problems include lack of knowledge within the Municipalities, lack of waste information, control of waste and finance using the implementation of the polluter pays principle through legislation and enforcement. Estonian municipalities are now responsible for organising the municipal waste disposal through the services of waste contractors. However, much of the rural population is not directly served by regular waste collection, delivering their own waste to landfill, fly-tipping waste, burying or incinerating waste. From the 1 January 2005 all municipal waste collection will be part of waste contracts between the municipaliies and waste contractors.

1.7 Relevant EU and National Legislation

1.7.1 EU Packaging Directive

The EU Directive on Packaging and Packaging Waste 94/62/EEC addresses the need to conform to the EU waste management hierarchy, i.e. minimise the generation of waste and to increase reuse, recovery, and recycling of wastes. The implementation of the Directive on Packaging Waste (94/62/EEC) requires Estonia, and the other Member States to recover between 50% and 65% (by weight) of packaging waste, achieve a 25% recycling rate and within this general target, a minimum of 15% (by weight) for each packaging material.

The Directive also emphasises prevention and reuse of packaging in Articles 4 and 5 respectively. Article 13 of the Directive states that measures must be taken to ensure that users of packaging, including in particular consumers, obtain necessary information about the following:

- The return, collection and recovery systems available to them;
- Their role in contributing to reuse, recovery and recycling of packaging and packaging waste;
- The explanation of identification markings on packaging placed on the market.

The original Directive required revision of recycling and recovery targets after a 5-year period (completed in February 2004). The revised packaging directive (2004/12/EC) sets increased recovery and recycling targets to be achieved by 31st Dec 2008. Following accession Estonia and the other new members requested additional transition periods to implement the Directive. It has been proposed that the existing deadline was ambitious and that the new deadline should be 31 December 2012. If the new deadline is accepted, Estonia will be required to meet the revised targets of 60% recovery and 55% minimum and 80% maximum recycling of packaging waste. Specific material recycling within packaging waste, has an agreed minimum target of 60% for glass, 60% for paper and board, 50% for metals, 22.5% for plastics (recycled back into plastics), and 15% for wood. Higher recycling rates will necessarily mean increased collection of household waste packaging.

These targets may rise further by 31 December 2007, when targets and a deadline for the next 5-year period will be set.

1.7.2 EU Packaging Implementation

The Directive to harmonise national packaging legislation and reduce the impact of packaging waste has been complicated by separate collection and recovery systems within the original Member States and several compromises were reached on the targets. In order to attain these targets a number of different strategies have been employed by the Member States. In 14 of these of states a "green" dot system (see Section 2.1.3) has been established where essentially the companies responsible for packaging entrust the 'take-back' to a national scheme in return for the compliance fee based on the amount (weight) and type of packaging. The "green dot" logo is printed on the packaging to indicate that it is from a responsible producer that has paid for its collection and recycling, and is mandatory in most states. Most "green dot" schemes are directed at management of municipal and household waste. The Ministry of Environment or an independent body, for example a Packaging Organisation, monitors the schemes. Except for the UK and Denmark, industry based organisations manage the recovery of municipal packaging waste. Industrial packaging waste is managed by "producer organisations" that recover material on behalf of the companies and are organised by packaging waste materials, industrial sectors or area.

As the term producer responsibility indicates the private sector is responsible for the packaging they put on the market. In the majority of member states this is shared with the municipality who organise the collection and sorting of packaging waste for the public sector, whilst the collection of industrial packaging is predominantly a private sector task. Private companies undertake the recovery and recycling of both municipal and industrial waste in Estonia.

The collection of municipal packaging waste differs widely in the member states but includes – national, regional, urban, or local limited schemes for either kerb-side or bring- systems.

1.7.3 National Waste Management Plan

The Riigikogu (Parliament of Estonia) approved in Dec 2002 the national Waste Management Plan, the purpose of which is improvement of the organisation of waste management in Estonia. The Waste Management Plan includes a thorough analysis of the current situation of waste management in Estonia and an overview of the respective problems, as well as solutions for improving the situation in the forthcoming years.

The Waste Management Plan includes assessment of the closing of former landfill dumping sites and the setting up of new waste management facilities that impact on the regime for packaging waste management. According to current plans, new landfills will be set up and

former ones closed by 2008. By then there will be eight regional landfills for non-hazardous waste to meet Estonia's requirements. Of these, the Tallinn, Uikala, Torma and Väätsa landfills have already started operation. The construction of landfills of southeast Estonia, Paikuse, and northwest Estonia is currently under preparation. A landfill is also to be constructed on the island of Saaremaa. The Plan also addresses the forming of cooperation systems among local municipalities to improve the organisation of waste management and promotion of waste recovery.

1.7.4 Estonian Packaging Policy and Legislation

Estonia has developed a waste strategy based on the waste hierarchy and the polluter pays principle approximating the EU Directives. Targets for municipal waste include stabilised generation to an annual level of 250-300Kg/person by 2010 and recovery of 50% of generated packaging waste.

Estonia did not apply for a transition period for the waste packaging recovery and recycling targets contained in the original directive. It was planned that an energy recovery programme now withdrawn would fulfil these targets, however the revised targets will require reconsideration and investment.

The 1995 Packaging Act transposed into national legislation the EU Packaging Directive (94/62/EU) principles and set waste packaging recovery targets for Estonia. These were for a minimum of 50% recovery, 25% total recycling of which a target of 15% recycling is set for each packaging material (Glass, Paper and Board, Metal and Plastic). The act is closely linked to the National Waste Management Plan that sets a strategy to improve waste management. A number of new provisions were required for packaging regulation in terms of meeting the EU requirements and a new Packaging Act passed by Parliament entered force on the 1st June 2004. The existing provisions defined packaging and packaging waste, stated the requirements for packaging (provisions from the EU Essential Requirements Regulations), and with the new act now also includes the legal framework for the organisation, collection and reuse of packaging and packaging waste.

1.7.4.1 Waste Act (January 2004)

The 1998 Waste Act has been replaced with a new Waste Act (2004) to further ensure the requirements of the European Union. This provides a legislative basis for the development of a waste recycling system, with the economic measures necessary for the recycling of waste including the collection and organisation of waste. The Act provides general requirements for the prevention of waste and handling of waste including the development

of national, county and municipal plans that require a strategy for waste management. Municipalities will also organise the collection of waste within their region, establish waste collection and transfer via waste contractors. Landfill requirements include the meeting the relevant EU compliance standards by July 2009. Waste is required to treated prior to landfill deposition from July 2004 (where facilities exist) otherwise it can be accepted until Jan 2008.

1.7.4.2 Packaging Act (April 2004)

In more detail this new Act places obligations on the municipalities to set rules for collection (small rural municipalities can be exempted). There are responsibilities on the packaging producer organisation (accredited by the Ministry) to guarantee the collection and reuse of packaging waste on behalf of companies who are the original producers placing packaging on the market. A Packaging Commission will be established, led by the Ministry of Environment to assist in meeting the packaging waste recovery and recycling targets through best practice. Representatives of other Ministries affected by the regulations, producer organisations, waste management organisations and specialists will be invited to form part of the commission.

The Packaging Act contains a number of economic arrangements to obligate the collection of packaging waste through a deposit scheme and packaging excise duty.

The municipality determines how packaging waste is collected within each area. The local Waste Plan details how this is to be achieved and the targets met.

The Producer is responsible for the take back, without charge, of the packaging placed on the market. Producers, excluding those that sell packaged goods must guarantee the collection and reuse of packaging and packaging waste originating from their business, so that the current (50% recovery, 25% recycling with a minimum 15% recycling for specific materials) and future target figures (60% recovery, 55% recycling with material specific targets of 60% glass, 60% paper, 50% metals, 22.5% plastic and 15% wood) for 2012 and beyond can be met. This can be facilitated through an accredited third party organisation that can act on behalf of the producer.

A deposit is placed on sales packaging and added to the sale price of the goods. It applies to reusable and disposable (one way) packaging of beer, low alcohol beverages and soft drinks including glass, plastic and metal containers. The deposit must be not less than 0.5

kroons. The deposits are returned when the packaging is returned to the point of sale or collection centre.

The Packaging Act is supplemented by the Packaging Excise Duty Act, which imposes excise duty on alcoholic and non-alcoholic beverages packaging filled or imported into Estonia.

1.7.4.3 Packaging Excise Duty Act

The Packaging Excise Duty Act covers packaging for sales of alcoholic beverages (1997) and non-alcoholic beverages (1998). It has a clear objective to influence the recovery of packaging filled or imported into Estonia. If the importer or producer organises the collection and recovery of used packaging following the requirements of the Act, (60% recovery) the excise duty is not payable. The companies register on a database, the Packaging Register, and apply for exemption via a certificate system from the Ministry of Environment. From the data held by the register 9,700 tonnes of alcohol and non-alcohol beverage packaging was recovered in 2001. Additionally approximately 6,000 tonnes of paper and cardboard packaging was collected and recycled.

1.7.5 Estonia Packaging Targets

The EEU Directive 94/62/EC of December 1994 on packaging and packaging waste set the following targets:

Current Target

- Between 50 and 65% (by weight) of packaging should be recovered;
- 25% recycling rate;
- Within this general target, between 15% and 45% (by weight) of the total amount of packaging materials contained in packaging waste will be recycled, with a minimum of 15% (by weight) for each packaging material.

Following the EU Directive 2004/12/EC amendment to the Directive 94/62/EC and the extension to the accession countries the following targets have been set.

Proposed Target for December 2012

- 60% (by weight) of packaging should be recovered;
- Between 55% and 80% (by weight) of the total amount of packaging materials contained in packaging waste will be recycled;
- Within this general target, the following minimum recycling targets for materials will be attained:

- 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 for recycling back into plastic;
- 15% (by weight) for wood.

An annual breakdown of the planned packaging and packaging waste recycling rates to be achieved for Estonia were submitted to the EU as part of the proposal for amending the Directive 94/62/EC. These are currently the only breakdown of the overall targets set for Estonia. The targets are given Table 1 below.

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Recycling Target %	25	25	25	25	30	35	35	40	45	55	60

Table 1 Annual Packaging and Packaging Recycling Targets

1.8 Reporting and Monitoring Requirements

The regulation responsibilities of many of the Environment Agencies within the EU Member States places a considerable burden on resources to effectively manage and enforce agreed environmental compliance. Within the requirements of the Packaging Regulations such a system should be founded on a comprehensive, on-line and structured database management system with a high level of interactivity between industry-based data collection and input systems and a Ministry of Environment National Information Management system.

This system should enable the data collected by the compliance scheme (where operators have transferred the obligation to an external organisation, approved by the Regulator or independent body) to be in a standard pro-forma format, verified, confidential and secure.

Similarly, the database can then provide the legal compliance in terms of quantities recovered, reused, recycled and disposed.

2 Packaging Waste Management

Packaging waste management is a complicated interaction between a large number of organisations; these include Government policy makers and regulators at national, regional and local levels; companies involved in waste management collecting or processing packaging; manufacturers, distributors and retailers; non governmental organisation and the public.

2.1 Key Players

The following lists some of the organisations involved in the packaging chain in Estonia.

2.1.1 Public Bodies

The **Ministry of the Environment** is the key authority to coordinate packaging waste management in Estonia. They are responsible for the Acts and Regulations to implement Directive 94/62/EC and ensuring that country targets are met. The Ministry initiates the preparation of national and county waste management plans.

The **Ministry of Finance and Ministry of Economic Affairs** are responsible for developing the system of economic incentives to ensure the financing of the packaging waste management programmes.

The **Consumer Protection Board** is to be responsible for the implementing the general requirements (essential requirements) for packaging covering 'fit for purpose', design for reuse, recoverable and non-hazardous.

The **Counties** are administrative centres and assist in the preparation of waste management plans for their area. These have been completed and can be viewed on the County web site. These plans are organised under the Ministry of Environment and in some cases external assistance has been obtained from consultants. The plans provide a good basis for what is currently a locally organised waste collection system with no economies of scale.

The **Municipalities** have to prepare a rural municipality or city waste management plan as a part of the overall development plan based on a county waste management plan. These plans should enact act a practical level the more strategic requirements. Only the larger towns and municipalities have begun to develop their waste management plans. The

municipalities have the responsibility for the recovery or disposal of waste within their areas and should organise of the collection, transport, storage, recovery and disposal of waste along with any technical requirements including environmental protection, fees and reporting. The Packaging act sets additional tasks for the local municipalities to direct the packaging recovery system in their administrative territory in accordance with the waste management regulations.

The **Environmental Inspectorate** regulates waste handling through its 8 regional departments. The local governments have similar supervision powers within their areas. The inspectorate does not currently undertake a very active role in the field of packaging management.

The **Estonian Environment Information Centre** maintains the basic information in the Packaging Register, for packaging and packaging waste. Using the information from the Register the Ministry issues certificates for reuse and recovery of packaging according to the Packaging Act.

2.1.2 Companies

Packaging manufacturers include plastic, glass, paper and some wooden (pallets) packaging producers. Only the glass producer AS Järvakandi Klaas, uses significant quantities of recyclate in their product. The paper companies AS Horizon, AS Räpina Paberivabrik, AS Lindegaard Eesti use a small proportion of recycled material. The new Packaging Act places the obligation on packaging producers, distributors and importers to organise collection or recovery of the packaging.

Importers bring into Estonia a large amount of products (mainly consumables and food products), which are packaged. The main packaging firms of alcohol and non-alcoholic beverages are AS Tartu Brewery, AS Saku Brewery, Coca-Cola HBC Eesti AS, AS Liviko, AS Ofelia and AS Onistar. The chemical industry is the second largest packaging user in Estonia. The main packers of the Chemical industry in Estonia are Orto Ltd, Mayeri Industries AS and several paint and varnish producers. Several other industries use packaging products but are not covered by local waste management schemes. Following the earlier Packaging Excise Act, 160 alcohol beverage and 190 non-alcoholic beverage producers and importers have applied for the certificates.

The retail chains include ETK, Kesko, Selver, Prisma, and SPAR. In some bigger supermarkets in Tallinn packaging can be returned, the service financed by the

supermarket. In most stores there is no information about returnable packaging or packaging in general. Distributors tend not to be involved in the packaging waste management system, although some distributors have organized collection of transport and grouped packaging

Waste management companies deal with waste collection for landfill and recovery of recycling materials including the separation of packaging waste for recovery companies. There are more than 30 companies that deal with the collection and recovery of packaging waste. The largest companies are Cleanaway Eesti AS, Ragn Sells Eesti AS, AS Sekto, AS Sekto & Parnerid, and Adelan Prugiveod OÜ.

Most of the packaging waste is exported to reprocessors for recovery and recycling. The local users or reprocessors of secondary raw materials include the following companies. AS Järvakandi Klaas (glass factory), whose capacity exceeds the amount of recyclate in Estonia. AS EMEX Ltd accepts from the waste collection companies' metal packaging (mostly aluminium cans) and exports it. Plastitehase OÜ and others recycle plastic and composite packaging waste.

The number of householders sorting and collecting waste separately is small due to the low level of awareness and limited possibilities to participate in separate collection systems. Some householders living in the larger municipalities have better opportunities to recycling. Results from a study in 2001 showed that where facilities exist only 25% of the population used them. Rural areas tend not to have the opportunity to recycle.

2.1.3 Non Government Organisations

Estonian Waste Management Association was established in 1996 as not for profit association. EWMA has 30 organisation members from waste management companies all over Estonia. The Association is managed and represented by the appointed Board of 7 members. The mission of EWMA is to stand for the common interests of the members and to develop waste management in Estonia directed by the general principles of sustainable development. These include activities covering legislation and environmental policies, promotion of recycling and reuse through public actions and developing co-operation with state institutions and local governments.

Estonian Packaging association

The packaging industry formed a forum called The Estonian Packaging Association (EPA) in 2001. It is the objective of the Packaging Association to define and defend the interests of

companies within the packaging chain and the packaging industry in particular. The Association has also agreed to work closely together to realize a recovery system, which not only meets the requirements of the Directive, but also is also efficient and cost effective.

Estonian National Packaging Council, this group has yet to be formed, and requests have been sent to a number of groups requesting representatives. It is envisaged that it will consist of a representative(s) from the competent authorities, local municipalities, industry associations, waste packaging association, waste management companies and NGOs. It's role will be to provide a management board and conducts its tasks as close as possible to today's good practices, knowledge and experience of any waste collection system. The Council will assist to achieve a national wide network for collection practices, a national scheme or other approved schemes and linked collection systems.

Producer Responsibility Organisations are yet to be established, but there are a number of interested groups that have applied to become accredited under the Ministry of Environment. Their role will be to recover and recycling packaging and packaging waste on behalf of the producers that have an obligation under the Packaging Waste Act. One organisation the Estonian Recovery Organisation (ETO) has some 15 major companies in the food and packaging sector (and has the capability to provide a national service). A typical infrastructure chart for the organisation and recovery of packaging and packaging waste is shown in Figure 8.

Following the introduction of producer responsibility through the EU Packaging Waste Directive most of the EU member countries have now established systems for the recovery of packaging and packaging waste. The producers of the waste have the option to recovery the waste on an individual basis or through organisations that fulfil agreed national requirements. These producer responsibility organisations take the obligation on behalf of their members and promote, co-ordinate and finance the selective collection, sorting and recycling of packaging and packaging waste.The producer responsibility organisations are set-up by industry and trade sectors in the form of non-profit organisations. They launch regular competitive tenders to find partners in the waste and reprocessing industries and so ensure competition between them. Examples are given in Table 2:

The organisation of responsibilities and costs charging varies significantly from one country to another. Briefly, one can distinguish five types of systems:

- Industry is responsible for the collection, sorting, recycling and recovery of waste packaging and they finance the full cost of these operations: Austria, Germany

- The municipalities are responsible for organizing the collection and sorting of waste, but producers are obliged to cover the full cost of collection, sorting and recovery: Belgium, Luxembourg

- Industry and the municipalities share costs and responsibilities: industry handles the recycling of packaging waste; the municipalities are responsible for collection (and often sorting), and their costs are partially borne by industry: France, Ireland, Italy, Portugal, Spain, Finland, Sweden

- Industry and the municipalities share responsibilities: the municipalities handle the organization and cost of collection and sorting; industry organizes and covers the cost of recycling. The municipalities collect revenue from the sale of the materials: United Kingdom, Netherlands

- The State levies taxes on packaging. The local authorities are responsible for financing the collection and recycling of packaging waste: Denmark.

Country	Agencies	Domestic waste	Industrial waste
Germany	DSD + others	✓	
Autriche	ARA + others	✓	✓
Belgium	Fost + others	✓	
	Val-I-Pack	✓	
Spain	Ecoembalajes	✓	
	Ecovidrio		✓
Ireland	Repak	✓	✓
Italy	CONAI	✓	✓
Finland	PYR	✓	✓
France	ECO-Emballages	✓	
	Adelphe		✓
Luxembourg	Valorlux	✓	
Netherlands	SVM-Pact	✓	✓
Portugal	SPV	✓	✓
United Kingdom	Valpak + 19 others	✓	✓
Sweden	REPA	✓	✓

Table 2 European packaging waste management systems
Source: Argus, ACRR and Carl Bro a/s

These organisations are often non-profit organisations with a number of associate members (often 50 plus) that represent producers and importers of packaging products or materials, distribution companies etc. Private firms can then become members (the Italian CONAI has 1,400,000) and pass the responsibility of recovery to the producer responsible organisation.

The importance of the producer responsible organisation can be illustrated by the following example from the Czech Republic.

> The Czech Republic Producer Responsible Organisations provide associated compliance of take-back and recovery of packaging waste through municipal schemes of separate collection. This solution is based on legal obligations and is similar to that proposed for Estonia. The Czech Republic have broadly participated in the process of the packaging recovery since the beginning of 1998 but with only recycling quotas of 15% packaging waste and 35% recovery, and without any real legal force. New laws passed in 2002 and a decision to create the Green Dot system with the Ministry of the Environment has dramatically improved packaging recovery. They also included long-term campaigns for the public and children (Tonda Package, focused on co-operation with teachers in environmental education within primary schools). Admission to the Green Dot umbrella organisation PRO EUROPE increased the amount of membership corporations voluntarily fulfilling packaging recovery obligations. Such progress showed that the System could subsidise separate collection for the Czech territory. Producer Responsible Organisations have registered over 20,000 companies and about 4,358 agreements with municipalities have been signed. These municipalities represent approximately 8 million citizens. Table 3 illustrates the growth of the Producer Responsible Organisations, from a slow beginning to coverage of almost the whole country in 3 years.

	1999	2000	2001	2002	2003
No of Companies	41	307	***581***	***15,084***	20,754
No of Municipalities	754	2,156	2,781	3,700	4,358
No of Residents	2,136,000	6,632,000	8,135,238	9,116,400	9,504,706
Percentage of Population	20.7%	51%	79%	88%	93%
Recycled Waste	19,800 t	70,067 t	152,196 t	223,080 t	333,770 t

Table 3 Growth of the Czech Producer Responsible Organisation

Green Dot Schemes

The green dot system was established in 1990, as an industry owned network, to take over the funding of recycling programmes and pay for them by collecting fees from the producer (initially German). The "Green Dot" logo on a package means that the company putting this product on the market is participating in the financing of selective collection, sorting and recycling of household packaging. Today, the Green Dot is the most widely used trademark in the world. Printed on an estimated 460 billion pieces of packaging, almost 250 million consumers in Europe come across it each and every day. The trademark is in use in 14 European countries. It is important to note that all 14 national systems operate independently.

The Green Dot logo on a package is not a sorting instruction. It does not mean that the package on which it is printed will be collected and therefore recycled. It does not mean either that the package or the product that it contains is composed of recycled materials.

The scheme is administered by PRO EUROPE whose function is to award the Green Dot mark to national collection and recovery systems on the basis of uniform rules and regulations. Each nationally recognised collection and recovery system may become a shareholder of the organisation - and at the same time, a main licensee with equal rights. Details can be found at http://www.pro-e.org.

There are currently 22 member schemes listed in Table 4 below.

ARA	ARA - Altstoff Recycling Austria AG	AUSTRIA
ÇEVKO	CEVKO	TURKEY
DER GRÜNE PUNKT	Der Grüne Punkt - Duales System Deutschland AG	GERMANY
ECO-EMBALLAGES	Eco-Emballages S.A.	FRANCE
ECOEMBES	ECOEMBES Ecoembalajes España, S.A.	SPAIN
	EcoPack Bulgaria Jsc	Bulgaria

	EKO-KOM, a.s.	CZECH REPUBLIC
	ENVI-PAK , a.s.	SLOVAKIA
	asbl FOST Plus vzw	BELGIUM
	Green Dot Cyprus Public Comp. Ltd.	CYPRUS
	GreenPak Ltd.	MALTA
	HE.R.R.Co. S.A.	GREECE
	Latvijas Zalais Punkts	LATVIA
	Materialretur A/S	NORWAY
	ÖKO-Pannon Pbc	HUNGARY
	Rekopol Organizacja Odzysku S.A	POLAND
	Reparegistret AB (REPA)	SWEDEN
	Repak Ltd.	IRELAND
	SLOPAK d.d.o.	SLOVENIA

	Sociedade Ponto Verde S.A.	PORTUGAL
	VALORLUX asbl	LUXEMBOURG
	Zaliasis Taskas UAB	LITHUANIA
	CSR	CANADA
	Valpak Ltd.	GREAT BRITAIN

Table 4 Member Schemes for Green Dot

Details on how each member scheme is established and it's operating principles can be found at the various websites linked to the PRO EUROPE site, or on the internet for example www.fostplus.be/tpl/main.cfm covers the management, collection and recycling organisations in Belgium.

Environmental NGO's

The Jaan Tõnisson Institute is a non-profit, non-governmental research and training centre has a database of Estonian non-governmental organisations that can be found at http://www.ngonet.ee/db/. Searching the site produces 56 environmental not for profit organisations, while many are not involved in waste issues some will be able to assist in the promotion and education of the public both at a national and local level. The Institute itself has 9 staff working in the five centres of the institute to implement its goals: - civic education and training.

Environmental NGOs in Estonia:

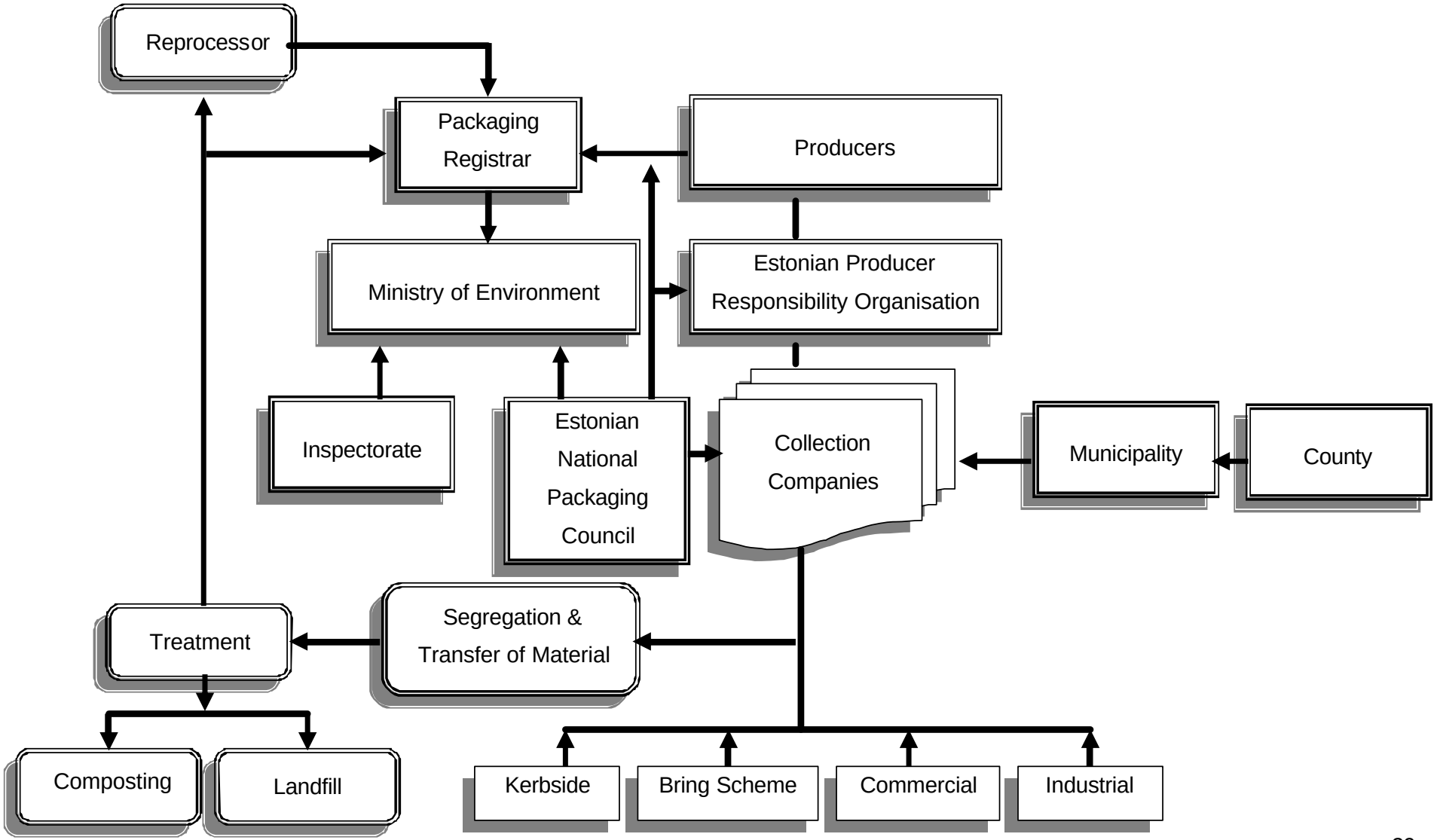
- European Youth Forest Action Estonia
- Society of Neeruti
- Art and Music Club Torso Disharmony
- Peipsi Center for Transboundary Cooperation
- Estonian Vegetarian Society
- Estonian Allergy Federation
- Friends of Earth - Estonia
- Maritime Cultural Society of Estonia
- Lake Peipsi Tourism Association
- Estonian Geography Society
- Forest Youth
- Estonian Union of Scout Supporter's Societies
- The Green Cabinet of Saaremaa
- Noarootsi Holistic Society
- Scientific Association of Estonian Hygenists
- Estonian Land-Reclamation Society
- Estonian Chemistry Society
- Hunting Society of Põlva
- Intellectual Society Rõngu Parnass

- Centre for Development & Environmental Programs
- Western Scout Camp
- Estonian Water Association
- Viljandi Youth Society for Nature Preservation
- Estonian Taxidermists' Society
- Estonian Ecotourism Association
- Virulaste Vennaskond
- Pärnu Heritage Society
- Estonian Fish Farmers Association
- Põlva Life Saving Society
- Saaremaa Linnuklubi
- Adventure Club
- Põlva Rotary Club
- Estonian Scout Association
- Society of Friends of the Tallinn Botanic Garden
- Centre for Applied Ecology
- The Intellectual Society of Tarto Võro
- Aakre Society of Farmers
- The Academical Chemical Society
- Jõgevamaa Society of Foresters
- Young Geographers Club at Tartu University
- Palade Educational Society
- Saunaecological Society Tammejärve
- Halinga Hunting Society
- Mustvee Ecotourism Union
- Estonian Environmental Women's Union
- Tartu Students Nature Protection Circle
- Võsu Centre for the Whole Person AMO
- Traffic Army of Lääne-Viru
- Society for Nature Conservation of Tallinn
- Estonian Society of Foresters
- Mountaineering Club Firn
- Võru Forestowners' Union
- International Youth Association EstYes
- The Union of Forest Owners of the Tartu Country
- Heritage Foundation of Nõmme (region of Tallinn)
- Estonian Biology and Geography Teachers' Union

The importance of the non-governmental bodies should be emphasised as a mechanism to promote recycling to the public.

In the UK for example Waste Watch (www.wastewatch.org.uk) is the leading national organisation. promoting and encouraging action on the 3Rs - waste reduction, reuse and recycling. It works with community organisations, local and national government encouraging the environmental benefits of waste minimisation and recycling, highlighting the positive impact on the economy and wider society. This 'not for profit' organisation has now extensive links with the business community, re-processors, schools and the general public. There are also many other local organisations involved in the awareness raising campaigns.

Figure 8 Proposed Packaging Waste Management Infrastructure



2.2 Packaging Waste Generation

In 2003, the European Commission estimated that annual municipal solid waste (MSW) generation stood at about 550 kg per capita (average across the EU), while the OECD estimated that MSW generation would reach 640 kg per capita in 2020. Reliable analyses for the packaging waste streams as such are not available at present at EU level. However, the trend of the rising of the total municipal solid waste indicates that also the packaging waste is going up instead of being stabilised or prevented.

There are two basic approaches to estimate the total quantities of packaging waste for re-use, recycling, energy recovery and disposal.

The first method, material flow, is based on the total production of packaging, material and imports and adjusted for exports, reuse and lifetimes of the products. This is difficult as there is little documentation on the packaging associated with imported goods (unless data is collected from the producers) and it is difficult to quantify where the material is finally discarded.

Alternatively, a waste analysis approach can be used where the total quantity of waste is sampled and characterised. Provided sufficient data samples are available good estimates can be made for a given area or sector. To apply this information elsewhere, the accuracy will diminish as it is affected by the characteristics of new waste. The waste from households will change with the age of the population, the type of housing, the economic activities, local events (e.g. markets), season (tourists) and whether it is a rural, urban or large metropolitan area. Given the available data, a waste analysis approach has been used to derive packaging waste.

2.3 Packaging Waste in Estonia

Packaging waste in Estonia represents approximately 20-30% of the solid municipal waste by weight (SEI – Tallinn 2002) and the total quantity of packaging produced in 2002 was about 120,000 tonnes per year or 85 kg/year/person. This was also broken down by material type into the EU target constituents; paper and card (44%), glass (21%), plastic (17%), metals (8%) and wood (10%). MSW also includes commercial or business waste from the activities of offices, shops and catering establishments. Industrial waste from factories and industrial plant is separately collected and accounted. Industrial waste has not been examined in detail, but the proportion of packaging waste is small, in 2000 this was estimated for paper and card (ESA 2001) at 3,189 tonnes.

The MSW data was used to provide information on the current packaging waste generation for Estonia using the latest population figures and % arisings for material types. Population data from the Association of Estonian Cities (January 2004), MSW data from the Estonian Environment Information Centre and the percentage waste types (SEI 2004) shown in Figure 9 were used to generate figures for this year and future years.

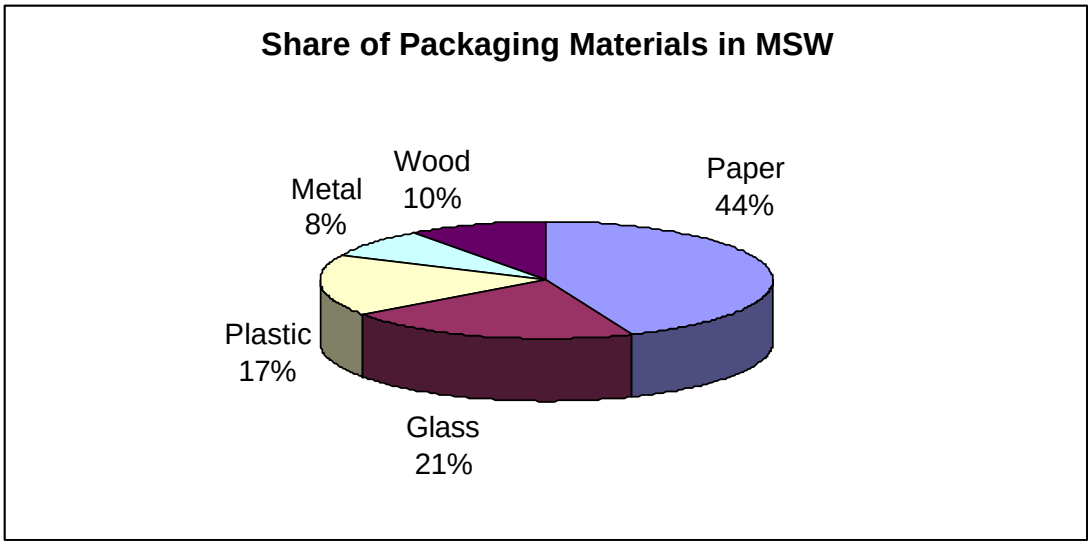


Figure 9 Percentages of Packaging Materials in MSW

The percentage of each material was compared with data (Source Evaluation and cost benefits for different packaging materials RDC & Pira 2003) from other EU countries and is broadly representative as demonstrated in Figure 10. The element of paper packaging is higher than the EU15 members in line with the reduction in plastic packaging. The percentage of glass is reduced due to the current collection of beverage glass implemented via the Packaging Excise Duty.

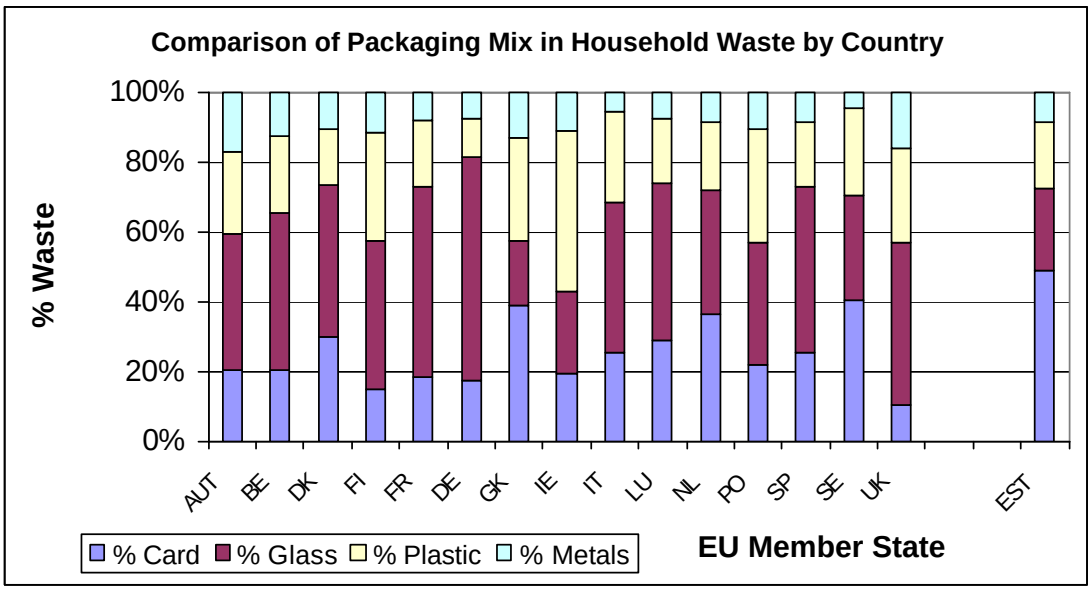


Figure 10 Comparison of Packaging Mix in EU Countries

The quantity of MSW generated in Estonia in 2004 was approximately 524,239 tonnes and with a population estimate of 1,365,265 derives a 132,300 tonnes of packaging waste or 100 kg/year/person. Data from the Ministry of Finance on the GDP (averaged at 5%) which is linked to retail sales, and population growth statistics from the UN 2002 Database Projections for the population change (5 year changes of minus 15000, 14000 and 13000 for the period 2000-2015) provide packaging waste arisings to the period 2012 and kg/year/person. It can be seen from the two graphs in Figure 11 that whilst the amount of packaging waste increases in line with the GDP and the inevitable increase in packaging associated with consumer activity (no EU member country has reduced this figure despite promotional campaigns) the falling population (estimated at 1,173532 for 2012) stems the rise to some extent. It is also notable that the packaging waste per person rises to 167 kg/year/person by 2012, which was the EU15 average for 1999. A Microsoft Excel spreadsheet model was developed to derive the current and future packaging waste arisings in each of the municipalities and for Estonia as a whole. Details of the model can be found in Section 3.8.

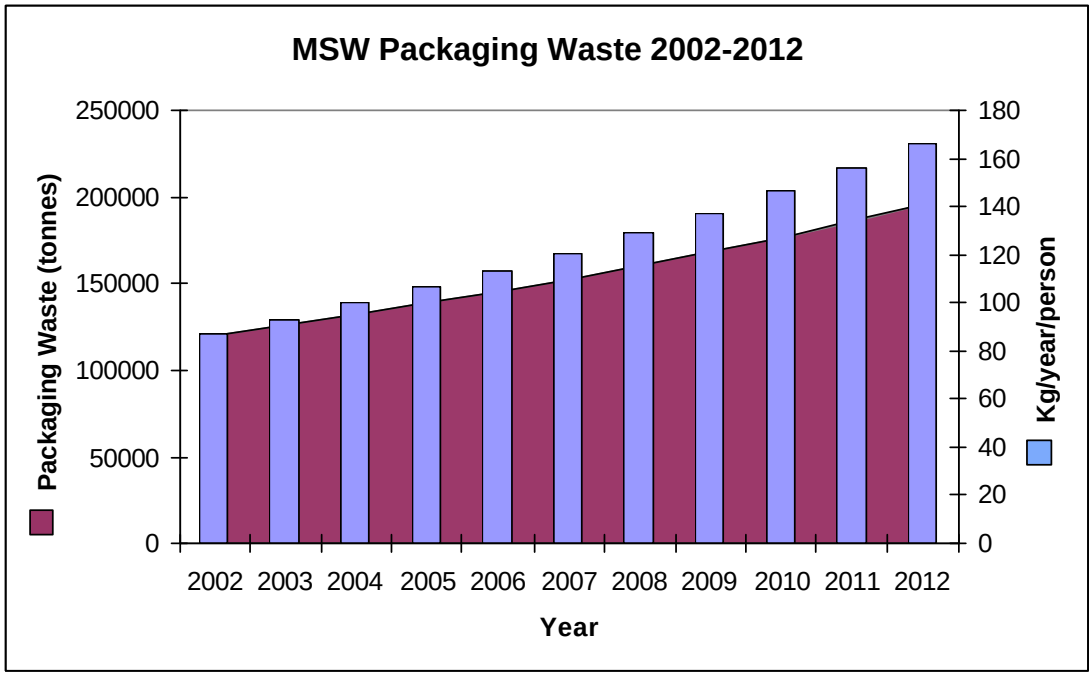


Figure 11 MSW Packaging Waste Arisings with population 2002-2012

Table 5 indicates the annual MSW packaging waste arisings per year by category, kg/person/year and population in line with GDP and population change.

MSW Packaging Waste Arisings 2002 - 2012											
Material / Year	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Paper & Card	52800	55440	58212	61123	64179	67388	70757	74295	78010	81910	86006
Glass	25200	26460	27783	29172	30631	32162	33770	35459	37232	39093	41048
Plastics	20400	21420	22491	23616	24796	26036	27338	28705	30140	31647	33229
Metal	9600	10080	10584	11113	11669	12252	12865	13508	14184	14893	15637
Wood	12000	12600	13230	13892	14586	15315	16081	16885	17729	18616	19547
Total	**120000**	**126000**	**132300**	**138915**	**145861**	**153154**	**160811**	**168852**	**177295**	**186159**	**195467**
Population	1365000	1344525	1324357	1304492	1284924	1265651	1246666	1227966	1209546	1191403	1173532
kg/person/yr	88	94	100	106	114	121	129	138	147	156	167

Table 5 MSW Packaging Waste Arisings 2002-2012 by material type

Using the same calculation technique, the required packaging waste recovery totals shown in Table 6 and Figure 12 for Estonia can be calculated. The growth curve in % recovery from 50% to 60% has been assumed.

Recovery Targets and Projected Waste Amounts												
Recovery / Year		**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Total		60000	63000	66150	72236	75848	81172	86838	92869	99285	107972	117280
% Overall Recovery		50.0	50.0	50.0	52.0	52.0	53.0	54.0	55.0	56.0	58.0	60.0

Table 6 Recovery Targets as Tonnages for Packaging Waste based on annual increases

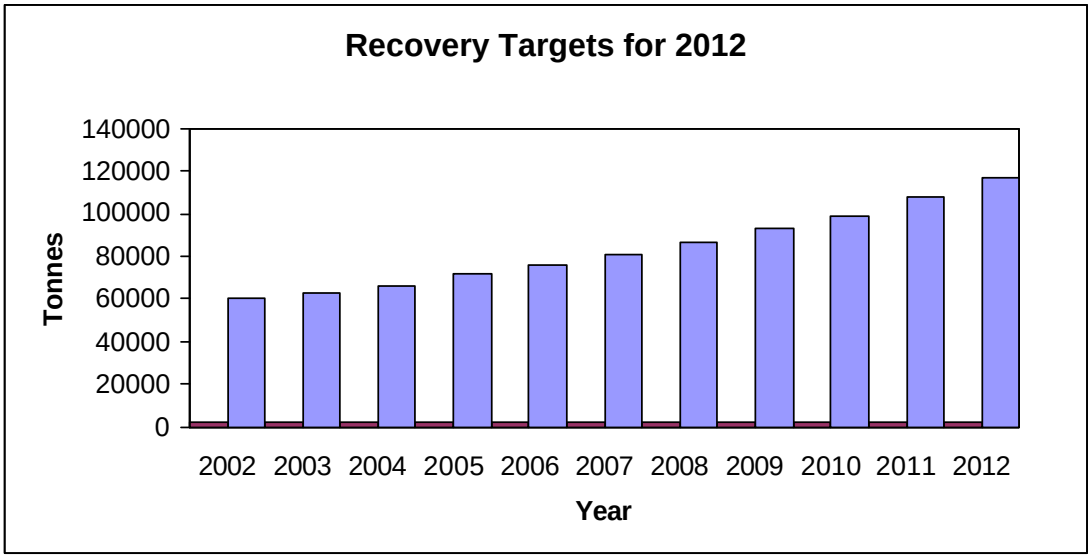


Figure 12 Recovery Targets for 2002-2012

The minimum recycling target tonnage has also been calculated in Table 7 for each material based on the % change from the present 15% to the 2012 figure of 25%. The annual %

change by year has been assumed for Estonia as rising growth curve. The targets are based on, 60% for glass; 60% for paper and board; 50% for metals; 22.5% for plastics, and15% for wood by 2012. This target 48.3% recovery falls short of the overall target of 50% or 117,280 tonnes, as these are minimums for each material not the required 60% overall target by weight. For certain materials, for example glass, where recovery and recycling is already established these target figures will increase, as calculated in Section 3.4

Recycling Targets and Projected Waste Amounts											
	2002	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Paper & Card	7920	8316	8732	9168	19254	23586	24765	29718	35104	40955	51603
Glass	3780	3969	4167	4376	9189	11257	11820	14184	16754	19547	24629
Plastics	3060	3213	3374	3542	3719	3905	4374	4880	5425	6329	7477
Metal	1440	1512	1588	1667	3501	3982	4503	4052	5673	6702	7819
Wood	1800	1890	1985	2084	2188	2297	2412	2533	2659	2792	2932
Total	18000	18900	19845	20837	37851	45027	47874	55367	65617	76325	94460

Table 7 Recycling Targets as Tonnages to 2012

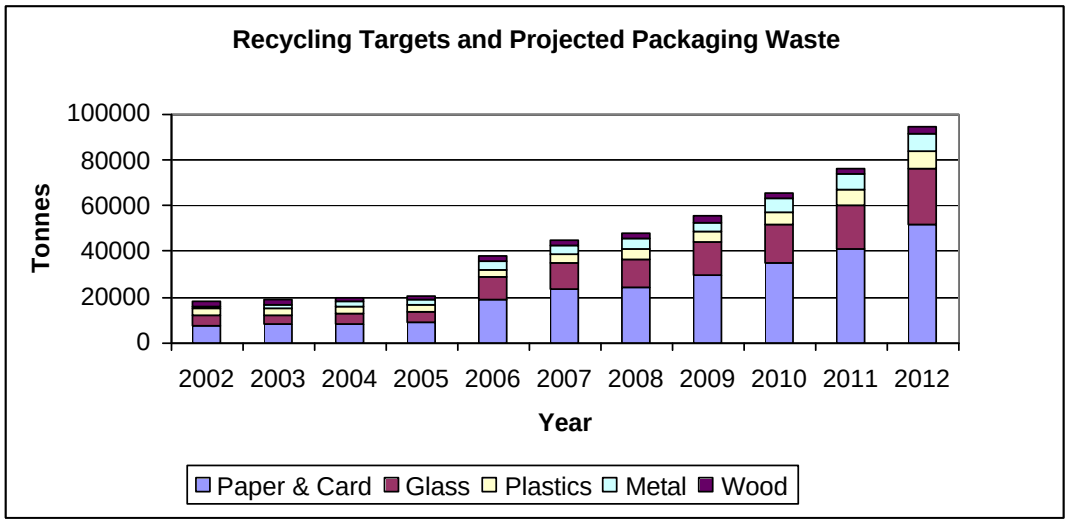


Figure 13 Recycling Targets and Projected Packaging Waste

2.4 Packaging Waste by Municipality

The packing waste arisings for Estonia were calculated using population and percentage figures for the packaging materials in household waste as detailed in Section 2.3. This data could then be used to predict the waste arising from each Municipality (the Municipalities of Tallinn are aggregated in line with their waste management policies) by factoring the population with the amount of waste generated and hence provide recovery targets. The information could be further subdivided using the percentage fractions for paper and card, glass, plastic, metal and wood as required for the EU recycling targets. This waste analysis

approach has it's limitations but certainly provides a basis for collection. A breakdown of the predicted maximum waste generated from each Municipality is presented in the Table 8.

Table 8 Packaging Waste Arisings by Municipality

Locale	Total Population 01.01.2004	MSW Total (tonnes)	Quantity of Packaging Waste	Quantity of Paper Packaging	Quantity of Glass Packaging	Quantity of Plastic Packaging	Quantity of Metal Packaging	Quantity of Wood Packaging
TALLINN	389,642	215300	53825	23683	11303	9150	4306	5383
HARJU MAAKOND								
Keila linn	9,432	1719	430	189	90	73	34	43
Loksa linn	3,447	628	157	69	33	27	13	16
Maardu linn	16,134	2940	735	323	154	125	59	73
Paldiski linn	4,404	802	201	88	42	34	16	20
Saue linn	5,375	979	245	108	51	42	20	24
Aegviidu vald	990	180	45	20	9	8	4	5
Anija vald	6,404	1167	292	128	61	50	23	29
Harku vald	7,228	1317	329	145	69	56	26	33
Jõelähtme vald	5,217	951	238	105	50	40	19	24
Keila vald	3,928	716	179	79	38	30	14	18
Kernu vald	1,772	323	81	36	17	14	6	8
Kiili vald	2,543	463	116	51	24	20	9	12
Kose vald	5,731	1044	261	115	55	44	21	26
Kuusalu vald	4,726	861	215	95	45	37	17	22
Kõue vald	1,745	318	79	35	17	14	6	8
Loksa vald	1,982	361	90	40	19	15	7	9
Nissi vald	3,349	610	153	67	32	26	12	15
Padise vald	1,955	356	89	39	19	15	7	9
Raasiku vald	4,489	818	204	90	43	35	16	20
Rae vald	7,866	1433	358	158	75	61	29	36
Saku vald	7,436	1355	339	149	71	58	27	34
Saue vald	7,333	1336	334	147	70	57	27	33
Vasalemma vald	2,796	509	127	56	27	22	10	13
Viimsi vald	9,900	1804	451	198	95	77	36	45
TOTAL	126,182	22991	5748	2529	1207	977	460	575
HIIU MAAKOND								
Kärdla linn	3,947	728	182	80	38	31	15	18
Emmaste vald	1,440	266	66	29	14	11	5	7
Kõrgessaare vald	1,487	274	69	30	14	12	5	7
Käina vald	2,390	441	110	48	23	19	9	11
Pühalepa vald	1,818	335	84	37	18	14	7	8
TOTAL	11,082	2044	511	225	107	87	41	51

Locale	Total Population 01.01.2004	MSW Total (tonnes)	Quantity of Packaging Waste	Quantity of Paper Packaging	Quantity of Glass Packaging	Quantity of Plastic Packaging	Quantity of Metal Packaging	Quantity of Wood Packaging
IDA-VIRU MAAKOND								
Jõhvi linn	12,062	3740	935	411	196	159	75	93
Kiviõli linn	7,262	2251	563	248	118	96	45	56
Kohtla-Järve linn	44,901	13921	3480	1531	731	592	278	348
Narva linn	69,158	21441	5360	2359	1126	911	429	536
Narva-Jõesuu linn	3,060	949	237	104	50	40	19	24
Püssi linn	1,757	545	136	60	29	23	11	14
Sillamäe linn	17,210	5336	1334	587	280	227	107	133
Alajõe vald	470	146	36	16	8	6	3	4
Aseri vald	2,392	742	185	82	39	32	15	19
Avinurme vald	1,622	503	126	55	26	21	10	13
Iisaku vald	1,526	473	118	52	25	20	9	12
Illuka vald	1,235	383	96	42	20	16	8	10
Jõhvi vald	1,766	548	137	60	29	23	11	14
Kohtla vald	1,657	514	128	57	27	22	10	13
Kohtla-Nõmme vald	1,214	376	94	41	20	16	8	9
Lohusuu vald	968	300	75	33	16	13	6	8
Lüganuse vald	1,419	440	110	48	23	19	9	11
Maidla vald	879	273	68	30	14	12	5	7
Mäetaguse vald	1,680	521	130	57	27	22	10	13
Sonda vald	1,157	359	90	39	19	15	7	9
Toila vald	2,520	781	195	86	41	33	16	20
Tudulinna vald	632	196	49	22	10	8	4	5
Vaivara vald	1,739	539	135	59	28	23	11	13
TOTAL	178,286	55275	13819	6080	2902	2349	1106	1382
JÕGEVA MAAKOND								
Jõgeva linn	6,235	1306	326	144	69	55	26	33
Mustvee linn	1,801	377	94	41	20	16	8	9
Põltsamaa linn	4,998	1047	262	115	55	44	21	26
Jõgeva vald	5,653	1184	296	130	62	50	24	30
Kasepää vald	1,419	297	74	33	16	13	6	7
Pajusi vald	1,601	335	84	37	18	14	7	8
Pala vald	1,344	281	70	31	15	12	6	7
Palamuse vald	2,490	521	130	57	27	22	10	13
Puurmani vald	1,920	402	101	44	21	17	8	10
Põltsamaa vald	4,574	958	239	105	50	41	19	24
Saare vald	1,422	298	74	33	16	13	6	7
Tabivere vald	2,522	528	132	58	28	22	11	13
Torma vald	2,490	521	130	57	27	22	10	13
TOTAL	38,469	8056	2014	886	423	342	161	201

Locale	Total Population 01.01.2004	MSW Total (tonnes)	Quantity of Packaging Waste	Quantity of Paper Packaging	Quantity of Glass Packaging	Quantity of Plastic Packaging	Quantity of Metal Packaging	Quantity of Wood Packaging
JÄRVA MAAKOND								
Paide linn	9,658	2581	645	284	136	110	52	65
Türi linn	6,667	1782	445	196	94	76	36	45
Albu vald	1,492	399	100	44	21	17	8	10
Ambla vald	2,451	655	164	72	34	28	13	16
Imavere vald	1,087	291	73	32	15	12	6	7
Järva-Jaani vald	1,926	515	129	57	27	22	10	13
Kabala vald	1,071	286	72	31	15	12	6	7
Kareda vald	843	225	56	25	12	10	5	6
Koeru vald	2,529	676	169	74	35	29	14	17
Koigi vald	1,175	314	79	35	16	13	6	8
Lehtse vald	1,640	438	110	48	23	19	9	11
Oisu vald	1,420	380	95	42	20	16	8	9
Paide vald	1,928	515	129	57	27	22	10	13
Roosna-Alliku vald	1,368	366	91	40	19	16	7	9
Türi vald	2,664	712	178	78	37	30	14	18
Väätsa vald	1,539	411	103	45	22	17	8	10
TOTAL	39,458	10546	2637	1160	554	448	211	264
LÄÄNE MAAKOND								
Haapsalu linn	12,307	4143	1036	456	217	176	83	104
Hanila vald	1,848	622	156	68	33	26	12	16
Kullamaa vald	1,403	472	118	52	25	20	9	12
Lihula vald	2,946	992	248	109	52	42	20	25
Martna vald	1,060	357	89	39	19	15	7	9
Noarootsi vald	892	300	75	33	16	13	6	8
Nõva vald	483	163	41	18	9	7	3	4
Oru vald	1,013	341	85	38	18	14	7	9
Ridala vald	3,283	1105	276	122	58	47	22	28
Risti vald	986	332	83	37	17	14	7	8
Taebla vald	2,761	929	232	102	49	39	19	23
Vormsi vald	308	104	26	11	5	4	2	3
TOTAL	29,290	9859	2465	1084	518	419	197	246
LÄÄNE-VIRU MAAKOND								
Kunda linn	3,979	1110	277	122	58	47	22	28
Rakvere linn	17,557	4896	1224	539	257	208	98	122
Tamsalu linn	2,732	762	190	84	40	32	15	19
Tapa linn	6,939	1935	484	213	102	82	39	48
Avanduse vald	1,060	296	74	33	16	13	6	7
Haljala vald	3,003	837	209	92	44	36	17	21

Locale	Total Population 01.01.2004	MSW Total (tonnes)	Quantity of Packaging Waste	Quantity of Paper Packaging	Quantity of Glass Packaging	Quantity of Plastic Packaging	Quantity of Metal Packaging	Quantity of Wood Packaging
Kadrina vald	5,291	1475	369	162	77	63	30	37
Laekvere vald	1,917	535	134	59	28	23	11	13
Rakke vald	2,116	590	148	65	31	25	12	15
Rakvere vald	2,382	664	166	73	35	28	13	17
Rägavere vald	1,055	294	74	32	15	13	6	7
Saksi vald	1,250	349	87	38	18	15	7	9
Sõmeru vald	3,757	1048	262	115	55	45	21	26
Tamsalu vald	2,025	565	141	62	30	24	11	14
Vihula vald	2,207	615	154	68	32	26	12	15
Vinni vald	5,692	1587	397	175	83	67	32	40
Viru-Nigula vald	1,477	412	103	45	22	18	8	10
Väike-Maarja vald	4,576	1276	319	140	67	54	26	32
TOTAL	69,015	19245	4811	2117	1010	818	385	481
PÕLVA MAAKOND								
Põlva linn	6,436	1443	361	159	76	61	29	36
Ahja vald	1,224	274	69	30	14	12	5	7
Kanepi vald	2,873	644	161	71	34	27	13	16
Kõlleste vald	1,072	240	60	26	13	10	5	6
Laheda vald	1,472	330	83	36	17	14	7	8
Mikitamäe vald	1,211	272	68	30	14	12	5	7
Mooste vald	1,715	385	96	42	20	16	8	10
Orava vald	914	205	51	23	11	9	4	5
Põlva vald	4,390	984	246	108	52	42	20	25
Räpina vald	5,857	1313	328	144	69	56	26	33
Valgjärve vald	1,573	353	88	39	19	15	7	9
Vastse-Kuuste vald	1,289	289	72	32	15	12	6	7
Veriora vald	1,685	378	94	42	20	16	8	9
Värska vald	1,555	349	87	38	18	15	7	9
TOTAL	33,266	7460	1865	821	392	317	149	187
PÄRNU MAAKOND								
Kilingi-Nõmme linn	2,301	982	246	108	52	42	20	25
Pärnu linn	43,654	18632	4658	2049	978	792	373	466
Sindi linn	4,288	1830	458	201	96	78	37	46
Are vald	1,412	603	151	66	32	26	12	15
Audru vald	5,155	2200	550	242	116	94	44	55
Halinga vald	3,680	1571	393	173	82	67	31	39
Häädemeeste vald	3,303	1410	352	155	74	60	28	35
Kaisma vald	620	265	66	29	14	11	5	7
Kihnu vald	633	270	68	30	14	11	5	7
Koonga vald	1,467	626	157	69	33	27	13	16

Locale	Total Population 01.01.2004	MSW Total (tonnes)	Quantity of Packaging Waste	Quantity of Paper Packaging	Quantity of Glass Packaging	Quantity of Plastic Packaging	Quantity of Metal Packaging	Quantity of Wood Packaging
Lavassaare vald	601	257	64	28	13	11	5	6
Paikuse vald	3,418	1459	365	160	77	62	29	36
Saarde vald	2,291	978	244	108	51	42	20	24
Sauga vald	2,816	1202	300	132	63	51	24	30
Surju vald	1,092	466	117	51	24	20	9	12
Tahkuranna vald	2,077	886	222	98	47	38	18	22
Tali vald	813	347	87	38	18	15	7	9
Tootsi vald	1,028	439	110	48	23	19	9	11
Tori vald	2,685	1146	286	126	60	49	23	29
Tõstamaa vald	1,664	710	178	78	37	30	14	18
Varbla vald	1,130	482	121	53	25	20	10	12
Vändra alevi vald	2,779	1186	297	130	62	50	24	30
Vändra vald	2,747	1172	293	129	62	50	23	29
TOTAL	91,654	39118	9780	4303	2054	1663	782	978
RAPLA MAAKOND								
Juuru vald	1,624	735	184	81	39	31	15	18
Järvakandi vald	1,575	713	178	78	37	30	14	18
Kaiu vald	1,670	756	189	83	40	32	15	19
Kehtna vald	5,224	2364	591	260	124	100	47	59
Kohila vald	6,131	2775	694	305	146	118	55	69
Käru vald	769	348	87	38	18	15	7	9
Märjamaa vald	7,634	3455	864	380	181	147	69	86
Raikküla vald	1,826	826	207	91	43	35	17	21
Rapla vald	9,817	4443	1111	489	233	189	89	111
Vigala vald	1,691	765	191	84	40	33	15	19
TOTAL	37,961	17179	4295	1890	902	730	344	429
SAARE MAAKOND								
Kuressaare linn	15,260	5944	1486	654	312	253	119	149
Kaarma vald	4,229	1647	412	181	86	70	33	41
Kihelkonna vald	997	388	97	43	20	17	8	10
Kärla vald	1,871	729	182	80	38	31	15	18
Laimjala vald	861	335	84	37	18	14	7	8
Leisi vald	2,361	920	230	101	48	39	18	23
Lümanda vald	934	364	91	40	19	15	7	9
Muhu vald	2,038	794	198	87	42	34	16	20
Mustjala vald	839	327	82	36	17	14	7	8
Orissaare vald	2,176	848	212	93	44	36	17	21
Pihtla vald	1,507	587	147	65	31	25	12	15
Pöide vald	1,061	413	103	45	22	18	8	10
Ruhnu vald	98	38	10	4	2	2	1	1

Locale	Total Population 01.01.2004	MSW Total (tonnes)	Quantity of Packaging Waste	Quantity of Paper Packaging	Quantity of Glass Packaging	Quantity of Plastic Packaging	Quantity of Metal Packaging	Quantity of Wood Packaging
Salme vald	1,347	525	131	58	28	22	10	13
Torgu vald	406	158	40	17	8	7	3	4
Valjala vald	1,533	597	149	66	31	25	12	15
TOTAL	37,518	14614	3654	1608	767	621	292	365
TARTU MAAKOND								
Elva linn	6,273	3266	817	359	171	139	65	82
Kallaste linn	1,245	648	162	71	34	28	13	16
Tartu linn	100,070	52107	13027	5732	2736	2215	1042	1303
Alatskivi vald	1,523	793	198	87	42	34	16	20
Haaslava vald	1,762	917	229	101	48	39	18	23
Kambja vald	2,488	1296	324	143	68	55	26	32
Konguta vald	1,405	732	183	80	38	31	15	18
Laeva vald	905	471	118	52	25	20	9	12
Luunja vald	2,628	1368	342	151	72	58	27	34
Meeksi vald	812	423	106	47	22	18	8	11
Mäksa vald	1,693	882	220	97	46	37	18	22
Nõo vald	3,811	1984	496	218	104	84	40	50
Peipsiääre vald	967	504	126	55	26	21	10	13
Piirissaare vald	105	55	14	6	3	2	1	1
Puhja vald	2,504	1304	326	143	68	55	26	33
Rannu vald	1,849	963	241	106	51	41	19	24
Rõngu vald	3,068	1598	399	176	84	68	32	40
Tartu vald	5,075	2643	661	291	139	112	53	66
Tähtvere vald	2,692	1402	350	154	74	60	28	35
Vara vald	2,110	1099	275	121	58	47	22	27
Võnnu vald	1,207	628	157	69	33	27	13	16
Ülenurme vald	4,467	2326	581	256	122	99	47	58
TOTAL	148,659	77407	19352	8515	4064	3290	1548	1935
VALGA MAAKOND								
Tõrva linn	3,334	486	122	53	26	21	10	12
Valga linn	14,745	2151	538	237	113	91	43	54
Helme vald	2,389	348	87	38	18	15	7	9
Hummuli vald	1,066	155	39	17	8	7	3	4
Karula vald	1,158	169	42	19	9	7	3	4
Otepää vald	4,351	635	159	70	33	27	13	16
Palupera vald	1,152	168	42	18	9	7	3	4
Puka vald	1,918	280	70	31	15	12	6	7
Põdrala vald	996	145	36	16	8	6	3	4
Sangaste vald	1,553	227	57	25	12	10	5	6
Taheva vald	976	142	36	16	7	6	3	4

Locale	Total Population 01.01.2004	MSW Total (tonnes)	Quantity of Packaging Waste	Quantity of Paper Packaging	Quantity of Glass Packaging	Quantity of Plastic Packaging	Quantity of Metal Packaging	Quantity of Wood Packaging
Tõlliste vald	1,971	288	72	32	15	12	6	7
Õru vald	595	87	22	10	5	4	2	2
TOTAL	36,204	5281	1320	581	277	224	106	132
VILJANDI MAAKOND								
Mõisaküla linn	1,138	289	72	32	15	12	6	7
Suure-Jaani linn	1,274	323	81	36	17	14	6	8
Viljandi linn	20,601	5229	1307	575	275	222	105	131
Võhma linn	1,695	430	108	47	23	18	9	11
Abja vald	2,912	739	185	81	39	31	15	18
Halliste vald	1,832	465	116	51	24	20	9	12
Karksi vald	4,365	1108	277	122	58	47	22	28
Kolga-Jaani vald	1,820	462	115	51	24	20	9	12
Kõo vald	1,295	329	82	36	17	14	7	8
Kõpu vald	868	220	55	24	12	9	4	6
Olustvere vald	1,521	386	97	42	20	16	8	10
Paistu vald	1,690	429	107	47	23	18	9	11
Pärsti vald	3,944	1001	250	110	53	43	20	25
Saarepeedi vald	1,320	335	84	37	18	14	7	8
Suure-Jaani vald	2,467	626	157	69	33	27	13	16
Tarvastu vald	4,517	1147	287	126	60	49	23	29
Vastemõisa vald	1,188	302	75	33	16	13	6	8
Viiratsi vald	3,754	953	238	105	50	40	19	24
TOTAL	58,201	14774	3694	1625	776	628	295	369
VÕRU MAAKOND								
Võru linn	14,771	1862	466	205	98	79	37	47
Antsla vald	4,400	555	139	61	29	24	11	14
Haanja vald	1,289	162	41	18	9	7	3	4
Lasva vald	1,854	234	58	26	12	10	5	6
Meremäe vald	1,353	171	43	19	9	7	3	4
Misso vald	890	112	28	12	6	5	2	3
Mõniste vald	1,117	141	35	15	7	6	3	4
Rõuge vald	2,307	291	73	32	15	12	6	7
Sõmerpalu vald	2,075	262	65	29	14	11	5	7
Urvaste vald	1,624	205	51	23	11	9	4	5
Varstu vald	1,393	176	44	19	9	7	4	4
Vastseliina vald	2,250	284	71	31	15	12	6	7
Võru vald	5,055	637	159	70	33	27	13	16
TOTAL	40,378	5090	1273	560	267	216	102	127
TOTAL ESTONIANS	1,365,265	524239	131060	57666	27523	22280	10485	13106

2.5 Recovery and Recycling

At present the level of compliance with the packaging regulations is very poor (glass being the exception) in the country in general. The Packaging Excise Duty Act (1997) has been the driving force for packaging and packaging waste collection, recovery and recycling in Estonia. This only applies to companies that place beverages (alcoholic and non alcoholic) on the market filled by them or imported. These companies have organised collection and recycling of the packaging (bottles and cartons) to get exemption from the excise duty. The data collected in the Packaging Register (Report 2004) gives a recovery of 13,510 tonnes of beverage packaging (glass) and 5,740 tonnes of paper and card. There is also some recovery of plastic, 1,734 tonnes and metal, 401 tonnes. These figures for 2002 would estimate a recovery of 17.8% of the total packaging waste. The current target is for 50% recovery. The data sets are provided by the companies and are not necessarily complete or accurate.

Although the Authorities in general have drawn up lists of relevant 'major producers' and in some cases disseminated information and surveyed the companies involved, there has been no enforcement carried out, some warnings have been issued from the Tax Board and Inspectorate. These have focused on the elements covered by the Excise Duty (beverage packaging) rather than packaging 'per se'. There is an official register kept of relevant producers, and there is an obligation to register the company and it's data.

One obstacle to achieving the recycling targets is the shortage of recovery and alternative disposal facilities (to landfill) in Estonia. The only recycling of certain packaging materials (paper, plastic, metal, composites) is through export from Estonia. A small amount of composite waste packaging is also incinerated for energy recovery.

2.5.1 Glass Packaging

Glass packaging collection and recovery is common in Estonia with 13,510 tonnes being collected in 2002. Glass packaging is produced in Estonia and therefore the possibilities of glass packaging waste recycling are very good, the capacity of glass recycling at AS Järvakandi Klaas exceed the amount of glass cullet, generated in Estonia. Transportation of glass (being a dense material) is also cost effective. Glass packaging should be promoted and developed, since the possibilities for the reuse of glass packaging and recycling of glass waste are wide and the share of reusable packaging in the total packaging volume is high.

2.5.2 Paper and Cardboard Packaging

This is the most widely used packaging material. Material collection in Estonia can be organised, but the current possibilities of paper and cardboard recycling, as a secondary raw material in Estonia is limited. Paper and cardboard waste is mostly exported for recycling (this dependant on the volatile market situation and demand) and energy recovery (incineration). Small amounts of waste paper are used at two low-capacity paper mills and for the production of insulation material. Some paper and cardboard packaging waste recovery is through incineration at boiler houses for heat production.

2.5.3 Metal Packaging

The collection of alcohol and non-alcoholic beverages metal (aluminium) packaging waste is organised in Estonia. The company AS EMEX accepts and exports, for recycling, metal packaging in unlimited amounts. Collection and recovery of metal packaging waste (steel, aluminium) is easy due to relatively high value of the packaging material as a secondary raw material. There are no recycling possibilities in Estonia presently or in the near future. Metal packaging is collected and exported to other countries (mainly Sweden) for recycling. The collection system requires to be expanded across the whole country.

2.5.4 Plastic Packaging

Plastic packaging is becoming more widely used and generating increasing packaging waste. Different plastic packaging collection systems are expensive, because of the required sorting and material recovery. There is one plastic re-processing plant in Estonia, at OÜ Plastitehas where PET-bottles are washed and shredded. The grind is exported as secondary raw material, either for production of new plastic products or other purposes. A few plastic packaging producers (e.g. Estiko Plastar, Dagöplast, etc.) also use imported recycled plastics.

2.5.5 Wood Packaging

Wood packaging is mainly used as pallets and boxes. The use of wood in Estonia has decreased as more durable packaging materials (plastic for example) are used. Standard returnable EUR- or FIN-pallets with fixed parameters and prices are widely used. Non-standard pallets are less common, and are commonly only used once. The use of standard, returnable (reusable) timber pallets should be promoted. Due to the relatively high price of the pallets a return system, generally known as pallet pools is often used.

2.6 Current Management Practice and Facilities

The existing collection points for packaging waste already operating, primarily in the Tallinn area, include points for the collection of sorted waste glass, metal, plastic packaging and paper by Krissan AS and Sekto AS (61 collection points for paper), Ragn-Sells AS has opened two points for the collection of sorted waste (source Tallinn Waste Management Plan 2000). The list of collection points by town districts is as follows:

- Pirita – a collection point per 1100 inhabitants;
- Mustamäe- a collection point per 3620 inhabitants;
- Haabersti – a collection point per 6000 inhabitants;
- Nõmme – a collection point per 7000 inhabitants;
- Lasnamäe – a collection point per 7300 inhabitants;
- City Centre – a collection point per 7600 inhabitants;
- Kristiine – a collection point per 9000 inhabitants;
- North Tallinn – a collection point per 28000* inhabitants.

* This is recognised and being addressed

In addition to these points, Cleanaway AS has 35 collection units for the reception of bottles (clear and coloured glass).

The Tallinn Waste Management Plan also notes that although steps have been taken to make the collection of source-sorted municipal waste from the population easier; the situation in the city districts differs notably and that the collection points function inefficiently. This is currently hardly surprising given the levels of finance, collection facilities, public education and awareness that are crucial to their success.

2.7 Actions for Change

The practicalities of packaging waste recycling and recovery is essentially an issue for the business and industry in the private sector, given that the Estonian Government has adopted a market-based approach that places obligations on those businesses involved in the packaging chain. The private sector therefore has two key roles to play, namely as producers of packaging wastes, and as service providers for the recycling and recovery of packaging wastes. This latter sector is also deemed to include Packaging Waste Compliance Schemes, who have a role to play in ensuring that their obligations are met. Such obligations include not only the current generation of statutory targets, but also the need to anticipate and plan for the higher targets that have emerged from the review of the Packaging Waste Directive.

As producers, obligated businesses who handle and supply packaging waste must undertake all the requirements that have been set, with a full understanding, not only of the legislation but also the reasoning behind it. It is essential that these obligated businesses report their progress, and waste flows, enabling better tracking of packaging waste.

The analysis of future trends and anticipated targets indicate that increased levels of recycling and recovery of packaging wastes from the municipal waste stream is likely to be critical to the achievement of EU targets. However, given the principle of Producer Responsibility, and assuming that Government continues with the current approach, there is a very real need for obligated businesses and Compliance Schemes to work with Municipalities to develop systems to recover and recycle packaging waste from the municipal waste stream.

A critical component of this approach will be to ensure that revenues are not only generated, but flow to the appropriate parties, i.e. from waste producers, to the waste collection companies, advertising campaigns and local groups undertaking activities that recycle and recover packaging wastes. This is in accordance with the concept of Producer Responsibility, and is likely to mean that contractual or other formalised relationships between obligated industry and local municipalities (and/or their contractors) are likely to evolve over time. It should also ensure that additional burdens are not placed on householders for these activities where the responsibility properly lies elsewhere under the legislative provisions.

Businesses should also consider packaging within the context of their supply chain management and consider initiatives appropriate to their organisation to encourage the concept of Producer Responsibility, and packaging waste minimisation and re-use. Opportunities to encourage the use of recycled materials in their activities should also be sought, where economically feasible, to assist with the development of sustainable markets and end-uses for recycled materials. It is also recognised that the private sector also have a key role to play in the recycling and reprocessing of packaging wastes, through the provision of services and facilities. This is clearly recognised in the National Waste Management plan.

A range of facilities therefore will be required for the management of packaging wastes, including for example, collection, sorting, materials recovery, bulking and storage of materials, treatment, and re-processing. Such facilities will be distributed across Estonia,

forming part of the network that is required to support more sustainable waste management practices. The need for specific types of facilities for packaging wastes, and their locations, will evolve and be developed in response to market demand, which is in accordance with the concept of Producer Responsibility, associated statutory requirements and the Estonian market-based approach.

Hence, it is a matter for the 'market' to determine the need, nature, scale and location of particular facilities, subject of course to appropriate location of facilities, consistent with land-use planning policy.

3 Developing Packaging Waste Collection

Some quite stringent recycling targets have been put forward, both on the national and the European level. The achievement of these targets depends for a large part on the actions taken by the obligated companies that produce the packaging and packaging waste and the organisation of collection at the local level by the municipality. Any recycling scheme should however always be part of a broader integrated waste management policy.

The design of a local selective collection and recycling scheme is seldom straightforward, and many local factors are involved and are discussed in Section 3.4. These factors make each case different and create decision indicators that have to be acknowledged when designing and implementing a selective collection and recycling scheme.

Local factors may be physical, socio-economical, cultural and geographical in nature. The packaging and packaging waste fraction constitutes a large proportion of the household waste and is rising continuously. For a selective collection system to work well, the active cooperation of municipalities, waste management companies, re-processors and of course the householder is essential.

Since materials recovered from a mixed waste collection system generally give low quality recycled materials, selective collection systems are necessary. Generally separate collection begins with kerbside selective collection and voluntary bring systems, which either consist of a network of neighbourhood containers or a network of waste collection points. Both systems are explained in the following section. Estonia does not operate a kerbside collection nationally and has opted primarily for a 'bring system' for packaging waste collection. AS Ragn Sells does operates a 'green bag' scheme for some Tallinn households where beverage glass is separately collected.

3.1 Kerbside Collection

As an example, a kerbside collection system requires householders to place their recyclable materials in a box, which is then collected and sorted at the kerbside into a compartmentalised collection vehicle. Each of the materials (such as glass, cans, paper, plastic) is placed in a different compartment of the vehicle and is not mixed together. In some schemes householders are provided with more than one box in which to store their recyclables prior to collection, in other schemes householders are provided with one box. Boxes are the preferred container for kerbside sort schemes as the materials can easily be retrieved and sorted by the collection crew. Some vehicles are designed so that the box can

be attached to the vehicle while the materials are sorted. A number of areas operate a system using bags but these generally require the householder to sort the waste into separate bags, before it is then sorted into the separate compartments of the collection vehicle. A large variety of vehicles exist for the collection of segregated waste. The choice of which one to use will depend largely on the characteristics of the selective collection system itself. Most commonly a weekly or fortnightly collection is arranged. This system is capable of collecting a range of dry recyclables and typically results in high quality materials being collected. As the materials are sorted at the kerbside, there is no requirement for a materials recovery facility (MRF), although some further sorting, for example of plastic types, may be required.

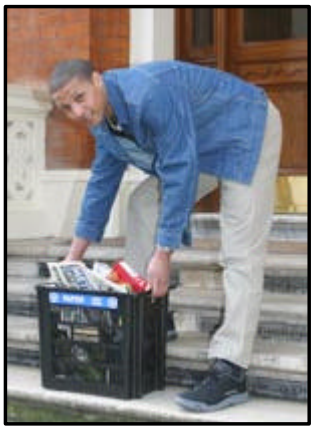


Figure 14 Kerbside Collection

A separate fleet of specialised collection vehicles is required to support this collection system, which can represent major capital investment or cost to a local authority. This system is fairly labour intensive, and requires more operatives per collection round than for a mixed collection. However, the job creation opportunities can be attractive to a local authority and can be a consideration in selecting this system. Collection rates are slow, and the more sorting done at the kerbside the longer the collection.

3.2 Bring Systems

In an example voluntary bring system, (alternatively called bring banks, container schemes, container parks, street schemes, mini recycling centres, or municipal or civic amenity sites) the householder takes the packaging and packaging waste materials to the collection facility. These consist of permanent, 3-6 m^3 or larger containers, (specially designed metal or plastic containers, large wheeled bins or Euro bins) placed on the street or at easily accessible public areas that are used by several households rather than providing individual containers to each household.

Housing estates with multiple occupancy buildings, particularly high-rise blocks, are problematic when setting up separate waste collection schemes and here recycling centres are becoming more common.

Figure 15 Waste sorting containers in Tallinn

These systems do not necessarily require uplift to be on a specific day and therefore are more appropriate for certain areas because of the flexibility.

The container system is best suited to more densely populated, urban areas, especially where there are a lot of flats and properties without a defined kerbside area. It is also used successfully for the collection of wastes for example in rural areas of Spain. The containers can be designed in a great variety of materials, shapes and sizes appropriate for the collection area and number of households served. Designs can be aesthetically pleasing, utilitarian or completely hidden (using underground containers with small chutes, that are still lifted and transported in the same way). The following pictures in Figure 16 give some ideas on the variations possible taken from examples in other EU member countries.

As the containers will be used by a number of households, it is difficult to monitor participation levels. The system also makes the provision of direct feedback to householders more difficult (for example to try to address problems with contamination and misuse). The collection containers have to be emptied when they are 75% full.

Utility Collection Containers

Street Containers

(note: locking system for security)

Apartment Block

Grouped Household

Underground

Multi-purpose

Extra Large

Compact

Figure 16 Example Street Containers for Bring Systems

3.2.1 Container Costs

As can be seen from the large variety of container types and volumes the costs per container vary accordingly. Typical costs for individual utility containers of 2-3 m^3 range

from €200 to €500 depending on the construction material (plastic / metal). Large container banks of 10-30 m^3, for multiple collections will cost €800 to €1000. More aesthetic containers and specialist designs may cost €1500 or more. Similarly the cost of establishing a container centre or park can vary from negligible for example on municipal ground with no facilities to areas that are purpose designed with a hard surface, pathways, screening, fencing, lighting and signage. A typical cost spent on container centres across a range of sites would be €5,000. Annual maintenance costs for container centres (i.e. excluding the transport of containers) is small and involves mainly cleaning operations, typically €1000 per annum.

3.3 Transfer and Sorting of Packaging Waste

One advantage of 'bring' systems is that there no are requirements for the collection of packaging waste from the householder's premises, thus eliminating a door-to-door collection. The packaging waste still needs to be collected from the collection site. For most 'bring' systems a vehicle with a crane or lifting cradle is used to pick up the containers, when three quarter filled. An empty container is exchanged for the filled container at the same time. The containers are then taken to a transfer station.

There are a lot of different configurations of transfer station depending on the tonnage, nature and density of waste. Basically, transfer stations locally receive waste collected by the collection vehicles and stock the waste in containers, open spaces or in a constructed pit. Wastes are sometimes compacted before they are transported to a treatment facility in large capacity vehicles. Several main characteristics differentiate transfer stations: These are the transfer mode, tipping (gravity) or pick up of waste and whether sorting or compaction takes place on the site. In some plants the paper and plastic waste is baled and treated to remove contaminants usually a simple visual check and sometimes the use of a metal detector. There are baling systems on the market that seal bales in polythene so they can be stored temporarily without nuisances such as smell or leaching. The bulked waste can then be transferred to the sorting facility or reprocessing site, often some distance away. Guiding distances of 20-40 km can be found in literature as the break-even point for introduction of waste transfer, but this would be correct only for larger quantities of waste. The break-even distance may be considerable longer for smaller waste quantities, which has been the conclusion on previous work in Estonia.

After being collected, the waste has to be further sorted, packed and sent to the recycling centres. The choice of equipment for the sorting centre should be made simultaneously with the choice of the collection system. Sorting remains a highly manual task, but the system

can be more or less automated. The available financial resources, social considerations and the quantity of materials to be treated, will all have an influence on the choice of the degree of automation of a sorting centre. When planning a sorting centre, the possibility of adding new materials to be sorted or absorbing a rise in the amounts of waste collected per material, should be incorporated into the construction plans.

Figure 17 Example Activities at a Sorting Plant

The location of the plant should be carefully studied, taking into account public acceptability, transport considerations, etc. Finding useful applications for secondary materials will depend largely on the quality and purity of the sorted materials. The quality control of secondary materials is thus a key element in the recycling chain. When constructing a sorting centre, sufficient area should be provided for stocking materials. It is equally important to create a pleasant and functional working atmosphere, so as to raise the efficiency of workers.

The ergonomics of the workplace, hygienic conditions and cleanness should be optimal. The choice of the degree of automation of collection and sorting will largely depend on the local municipality and what is put in their waste management plan. Since sorting of waste does not require high skilled labour, a sorting centre can be conceived as a source for employment.

Bring schemes will have less requirement for sorting than other forms of waste collection. The degree to which sorting facilities are required, and the complexity of their design, depends upon the requirement for sorting. If the material is for higher quality markets (for example, if paper and card, includes paper packaging, newsprint, magazines and card all collected together, it may make sense to deliver this ready-sorted to re-processors to gain added value through the separation into different paper grades. Conversely, uses for mixed (colour) glass cullet are now emerging (e.g. road surfacing) which require less separation of glass fractions. Finally the ability of end-users to segregate materials may be limited. For example, it may make sense to co-collect cans and plastic if plastics re-processors are able to sort metals from the mix. Effectively, this will reduce the value of the materials delivered by the local municipality as re-processors undertake the materials separation. Mixed cans (e.g. aluminium and steel) are often collected this way.

Materials Recovery Facilities (MRFs) are centralised facilities that process source-separated recyclables to present them as commodity-grade materials for sale to materials re-processors. MRFs that process mixed solid wastes are often referred to as 'dirty' MRFs, with 'clean' MRFs processing source-separated materials. An example of the system design of a clean MRF is shown in Figure 18. They are specifically designed to process individual waste types (e.g. aluminium cans), mixtures of individual components (e.g. commingled tin, glass, and aluminium containers), or both. As such, clean MRFs can be further sub-divided according to the degree that waste components are mixed or commingled, those processing individual components often being referred to as 'source-separated MRFs' or 'intermediate processing facilities' (IPF). Clean MRFs can recover around 90% of the incoming segregated waste material in the form of marketable materials, typical process residues being as low as 3%-10%.

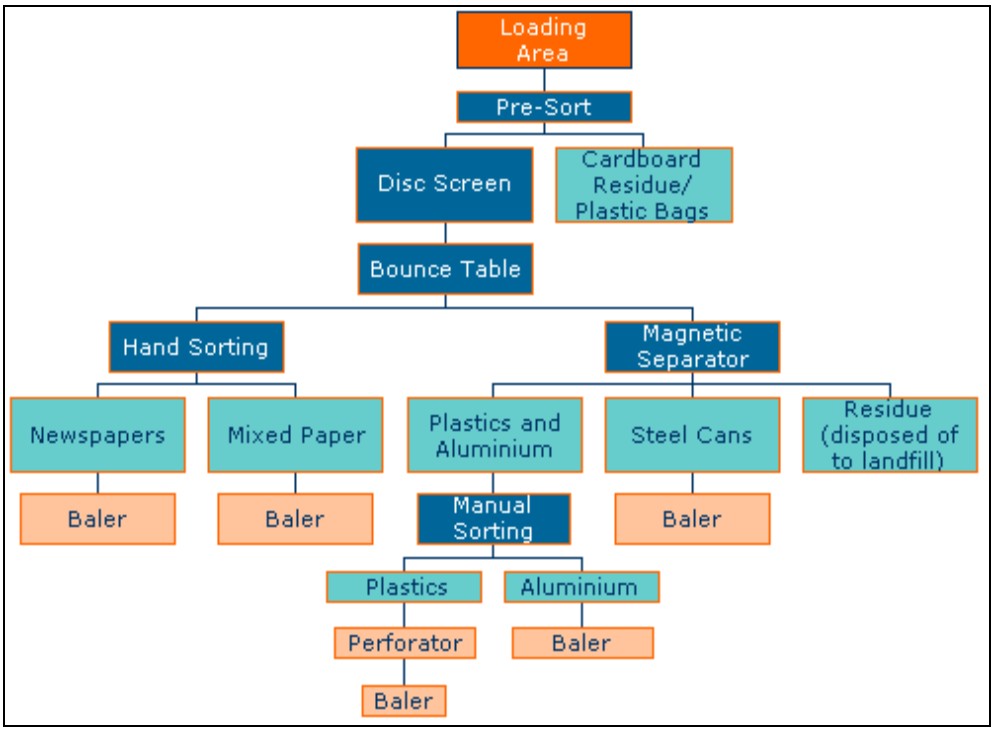


Figure 18 Example of a Clean MRF Processing System

3.3.1 Costs of Sorting and Transfer Stations

Estonia as part of the National Waste Management Plan will establish several Waste Transfer Centres within each County and discussed further in Section 3.7. The majority of these will be bulk collection facilities with transfer or bulking of waste (from small vehicles that collect the waste to large haulage vehicles for onward transport) and hand sorting of waste. Each County will also have a more sophisticated transfer facility that will allow

compaction of the material. A budget for this activity is within the investments for the establishment of landfills and transfer facilities. These sites are an obvious collection point for the dry materials from the bring scheme containers. No new facilities would be required and a gate fee based on the weight of material could be charged for the onward transport and where sorting is required. Typical costs to establish a bulk collection centre would be €50,000 handling up to 2000 tonnes annually of local waste. A regional centre with a small MRF handling 5-20,000 tonnes annually may cost €300,000. Estonia does not have large quantities of packaging waste that makes for economies of scale; hence it would be cheaper for the separated waste to be handled at the same locations as the MSW where centres are being constructed.

3.4 Capture Rates and Recycling Targets

The capture rates (the amount from municipal waste put directly into segregated collection) for recycled packaging are related to various social and economic factors. The highest recycling rates are from kerbside schemes and depend on the material, convenience, reliability, customer care and successful promotion. Demographic studies show that the participation and hence recovery is dependant on economic status (recycling increases with property value), tenure (increased in owned as opposed to rented properties), employment status (highest recycling in retired householders and lowest in unemployed), length of residence (highest in residents staying over 2 years lowest in residents of less than 6 months), age (highest in 65+ and lowest for 16-43 year olds, family (highest recycling for 2 adults no children lowest for households with children 0-4 or single adult households with children). There may also be less recycling performance in rural areas possibly due to lower consumption, accessibility of shops and poorer collection facilities. High-rise and ethic minority populations are also related to lower recycling. Whilst these variables can be significant, the single most important demographic variable is economic status of the residents.

The effectiveness of the collection scheme at capturing dry materials is dependant on a number of other issues, these include:

- The convenience of the scheme;
- The role of scheme promotion in encouraging participation;
- The role of mandating recycling (not accepting recyclates in regular household waste); and
- Incentives - what would the householder pay otherwise?

With the diversity of collection strategies across Europe, and the range of different country performances the systems are likely to enter a period of considerable change as separate collection is pursued more vigorously. Local circumstances clearly affect the strategy and performance regarding the quantity of separately collected material. It is often the intensity with which local authorities seek to encourage householders to separate their wastes that is the key determining factor. For example; in Flanders they recycle 62% of the municipal waste, Finland recovers 67% of paper and card waste, whilst other Member States are either still in, or only just out of, single figures.

Recycling rates for packaging waste in Austria, Germany, Belgium, Netherlands and Sweden all exceed the maximum current recycling target of 45%. Denmark and Finland are very close to this target and Italy, UK and Luxemburg just exceed the minimum 15% target. With so many factors at a local level it is difficult to predict the recycling rates from the collection system. It will develop with time, with scheme improvements and with culture change from raising awareness. Recycling rates are dependant on the specific material being recycled. In two scenarios the returns have been calculated with high and low capture rates to produce the tonnages (for 2004) required for each material to meet the EU requirements. Example high and low capture rates from collection scheme based on data from the EU have been used to derive the overall recovery and amount of materials to be collected. These are shown in Table 9. Wood has been included as part of the collection scheme but will be recovered directly at the transfer stations.

Capture Rate for Material	High %	Low %
Paper & Card	70%	20%
Glass	60%	20%
Plastics	20%	5%
Metal	30%	10%
Wood	10%	5%

Table 9 Estimated Capture Rates for a Collection Scheme

It can be seen that the low capture rate in Table 10 will meet the EU recycling target, if it is achieved. The higher rate of capture modelled is near the overall requirement for 2012. It should be remembered that added to these figures will be the materials from other recycling systems, for example the glass from deposit schemes, and material directly collected from industry and some commercial organisations.

Capture Rate for Material	High Rate Tonnages	Low Rate Tonnages
Paper & Card	40748	11642
Glass	16670	5557
Plastics	4498	1125

Metal	3175	1058
Wood	1323	662
TOTAL	**66415**	**20043**
% Overall Recovery	**50.2**	**15.2**

Table 10 Predicted Recovery Figures (2004) from Capture Rates for Collection

Estonia at present have no figures for the anticipated recycling rates from resident populations – and this can be very variable ranging perhaps from 10-80% collection for a given material depending on the factors detailed above. Encouragingly an opinion poll carried out in Rakvere showed that 83% were ready to collect glass separately, 72% paper, 77% plastic, and whilst not packaging 52% organic waste. The review did not detail if whilst willing to recycle the individuals would 'bring' the waste to a central collection facility, returns for this question are often lower percentages.

3.5 Development of a 'Bring' Collection Scheme

The development of a bring collection scheme is perhaps the easiest mechanism to start the process of recovering packaging and packaging waste from households. Bring schemes are a useful approach when there is no defined kerbside scheme (although they can be used together and reduce municipal cost); they are suitable for installation in multiple residency buildings and smaller communities that are difficult to service with direct collection. It allows different levels of segregation depending on space available/other local systems and flexibility in terms of collection rounds, as residents are not required to put out containers for collection. It does require more effort from householders (and hence public promotion) than a kerbside system, as they will have to store the separate fractions at home and place them in the containers. It also allows for the separate accounting of the cost for collection and recovery. As stated previously, packaging waste recycling and recovery is essentially an issue for the business and industry in the private sector. To assist with the recovery of packaging and packaging waste the following sections set out the production of waste by category at municipality level and the identification of collection and treatment facilities.

3.6 Number of Collection Points or Bring Centres

Using the Microsoft Excel spreadsheet model of packaging waste arisings for each Municipality, the data was linked to the population density for each area. This was calculated from the area of the city, town or rural boundary (provided by the Association of Estonian Cities) and used to determine the number of collection sites required. The model uses three rules related to the density to give the number of sites.

- **One collection point** at not more than 500 metres for high-density urban areas. A high-density urban area is defined as a population density of greater than 1000 inhabitants per km^2.
- **One collection point** at not more than 1000 metres for urban areas with a population density of greater than 500 inhabitants per km^2.
- **For rural areas** a collection point will be provided at central locations at a frequency of 1 per 2,500 inhabitants with a minimum of 1 per municipality.

Typical ranges that have been used in other countries range from 300 – 2000 metres for urban areas and 1 per 1000 - 3000 inhabitants for rural areas. The following provides the results of calculating the number of collection points based on the three criteria for establishing collection.

Table 11 Collection points based on Population Densities

Percentage population served with collection stations at 3 densities	Total Population 01.01.2004	Area km^2	Density Persons /km^2	No of Collection Points	Cumulative % Population
linn – city			No sites 500m separation		
vald - municipality			No sites 1000m separation		
			Rural 1 per 2,500 inhabitants		
Valga linn	14,745	5	3069.32	19	1.08
Tartu linn	100,070	39	2579.19	155	8.41
TALLINN	389,642	158	2461.88	633	36.95
Rakvere linn	17,557	11	1650.09	43	38.24
Sillamäe linn	17,210	11	1632.36	42	39.50
Jõgeva linn	6,235	4	1615.28	15	39.95
Jõhvi linn	12,062	8	1583.98	30	40.84
Saue linn	5,375	3	1541.44	14	41.23
Pärnu linn	43,654	31	1421.58	123	44.43
Viljandi linn	20,601	15	1409.10	58	45.94
Põlva linn	6,436	5	1214.34	21	46.41
Haapsalu linn	12,307	11	1162.02	42	47.31
Võru linn	14,771	13	1115.89	53	48.39
Kohtla-Järve linn	44,901	42	1074.96	167	51.68
Kuressaare linn	15,260	15	1020.46	60	52.80
Paide linn	9,658	10	962.34	10	53.50
Loksa linn	3,447	4	905.68	4	53.76
Keila linn	9,432	10	901.89	10	54.45
Kärdla linn	3,947	4	877.50	4	54.74
Võhma linn	1,695	2	876.88	2	54.86
Vändra alevi vald	2,779	3	865.73	3	55.07
Sindi linn	4,288	5	856.06	5	55.38
Püssi linn	1,757	2	838.26	2	55.51
Põltsamaa linn	4,998	6	834.67	6	55.87

Percentage population served with collection stations at 3 densities	Total Population 01.01.2004	Area km^2	Density Persons /km^2	No of Collection Points	Cumulative % Population
Narva linn	69,158	85	818.10	85	60.94
Maardu linn	16,134	23	708.75	23	62.12
Tamsalu linn	2,732	4	696.94	4	62.32
Türi linn	6,667	10	681.07	10	62.81
Kallaste linn	1,245	2	646.42	2	62.90
Elva linn	6,273	10	632.61	10	63.36
Kiviõli linn	7,262	12	618.20	12	63.89
Suure-Jaani linn	1,274	2	573.10	2	63.99
Kilingi-Nõmme linn	2,301	4	540.27	4	64.15
Mõisaküla linn	1,138	2	516.33	2	64.24
Tali vald	813	2	462.72	1	64.30
Tapa linn	6,939	17	401.59	3	64.81
Kunda linn	3,979	10	397.34	2	65.10
Mustvee linn	1,801	5	330.58	1	65.23
Järvakandi vald	1,575	5	325.88	1	65.34
Narva-Jõesuu linn	3,060	11	277.48	1	65.57
Kohtla-Nõmme vald	1,214	5	261.92	1	65.66
Helme vald	2,389	17	144.42	1	65.83
Viimsi vald	9,900	71	138.65	4	66.56
Paldiski linn	4,404	34	130.06	2	66.88
Aegviidu vald	990	12	82.73	1	66.95
Lavassaare vald	601	8	77.41	1	67.00
Vasalemma vald	2,796	40	69.09	1	67.20
Ülenurme vald	4,467	86	51.73	2	67.53
Harku vald	7,228	162	44.59	3	68.06
Saku vald	7,436	171	43.52	3	68.60
Rapla vald	9,817	243	40.34	4	69.32
Rae vald	7,866	207	38.05	3	69.90
Kihnu vald	633	17	37.50	1	69.94
Saue vald	7,333	197	37.21	3	70.48
Aseri vald	2,392	67	35.63	1	70.66
Kasepää vald	1,419	41	34.72	1	70.76
Peipsiääre vald	967	31	31.24	1	70.83
Raasiku vald	4,489	159	28.27	2	71.16
Kohila vald	6,131	230	26.63	2	71.61
Kiili vald	2,543	100	25.34	1	71.80
Võru vald	5,055	202	25.05	2	72.17
Jõelähtme vald	5,217	211	24.75	2	72.55
Kose vald	5,731	236	24.30	2	72.97
Tähtvere vald	2,692	113	23.88	1	73.16
Nõo vald	3,811	169	22.56	2	73.44
Sõmeru vald	3,757	168	22.38	2	73.72
Räpina vald	5,857	266	22.05	2	74.15
Luunja vald	2,628	133	19.74	1	74.34
Paikuse vald	3,418	175	19.56	1	74.59
Taebla vald	2,761	141	19.52	1	74.79
Keila vald	3,928	204	19.24	2	75.08
Põlva vald	4,390	231	18.98	2	75.40

Percentage population served with collection stations at 3 densities	Total Population 01.01.2004	Area km^2	Density Persons /km^2	No of Collection Points	Cumulative % Population
Rakvere vald	2,382	126	18.96	1	75.58
Otepää vald	4,351	230	18.92	2	75.90
Pärsti vald	3,944	210	18.74	2	76.18
Rõngu vald	3,068	164	18.69	1	76.41
Viiratsi vald	3,754	215	17.46	2	76.68
Tartu vald	5,075	299	16.99	2	77.06
Sauga vald	2,816	166	16.93	1	77.26
Ahja vald	1,224	73	16.88	1	77.35
Haljala vald	3,003	182	16.47	1	77.57
Kohtla vald	1,657	101	16.42	1	77.69
Väike-Maarja vald	4,576	279	16.37	2	78.03
Antsla vald	4,400	271	16.24	2	78.35
Tõstamaa vald	1,664	103	16.18	1	78.47
Laheda vald	1,472	92	16.09	1	78.58
Haaslava vald	1,762	110	16.02	1	78.71
Kadrina vald	5,291	337	15.69	2	79.10
Järva-Jaani vald	1,926	126	15.35	1	79.24
Tõrva linn	3,334	217	15.34	1	79.48
Toila vald	2,520	165	15.31	1	79.67
Ambla vald	2,451	163	15.07	1	79.85
Puhja vald	2,504	170	14.77	1	80.03
Jõhvi vald	1,766	123	14.35	1	80.16
Karksi vald	4,365	312	13.97	2	80.48
Audru vald	5,155	379	13.61	2	80.86
Lüganuse vald	1,419	105	13.57	1	80.96
Piirissaare vald	105	8	13.53	1	80.97
Saarepeedi vald	1,320	98	13.42	1	81.06
Orissaare vald	2,176	163	13.35	1	81.22
Kambja vald	2,488	189	13.15	1	81.41
Konguta vald	1,405	108	13.06	1	81.51
Ridala vald	3,283	253	12.96	1	81.75
Käina vald	2,390	186	12.83	1	81.92
Nissi vald	3,349	264	12.70	1	82.17
Mäksa vald	1,693	133	12.68	1	82.29
Tabivere vald	2,522	200	12.58	1	82.48
Anija vald	6,404	515	12.43	3	82.95
Kanepi vald	2,873	232	12.41	1	83.16
Jõgeva vald	5,653	459	12.32	2	83.57
Saksi vald	1,250	102	12.27	1	83.66
Kolga-Jaani vald	1,820	149	12.18	1	83.80
Vastseliina vald	2,250	185	12.15	1	83.96
Oisu vald	1,420	118	12.03	1	84.07
Mikitamäe vald	1,211	102	11.89	1	84.15
Alatskivi vald	1,523	128	11.86	1	84.27
Olustvere vald	1,521	129	11.81	1	84.38
Salme vald	1,347	115	11.71	1	84.48
Rannu vald	1,849	158	11.69	1	84.61
Vinni vald	5,692	490	11.61	2	85.03

Percentage population served with collection stations at 3 densities	Total Population 01.01.2004	Area km^2	Density Persons /km^2	No of Collection Points	Cumulative % Population
Urvaste vald	1,624	140	11.59	1	85.15
Palamuse vald	2,490	216	11.52	1	85.33
Sõmerpalu vald	2,075	182	11.39	1	85.48
Tarvastu vald	4,517	409	11.04	2	85.81
Põltsamaa vald	4,574	417	10.98	2	86.15
Valgjärve vald	1,573	143	10.97	1	86.26
Kaarma vald	4,229	388	10.89	2	86.57
Lasva vald	1,854	172	10.77	1	86.71
Sangaste vald	1,553	145	10.73	1	86.82
Tahkuranna vald	2,077	194	10.68	1	86.97
Koeru vald	2,529	237	10.68	1	87.16
Juuru vald	1,624	152	10.66	1	87.28
Vastse-Kuuste vald	1,289	123	10.48	1	87.37
Kernu vald	1,772	171	10.37	1	87.50
Kehtna vald	5,224	507	10.30	2	87.89
Tori vald	2,685	261	10.28	1	88.08
Türi vald	2,664	261	10.19	1	88.28
Tõlliste vald	1,971	194	10.17	1	88.42
Halinga vald	3,680	365	10.08	1	88.69
Abja vald	2,912	290	10.03	1	88.90
Muhu vald	2,038	206	9.88	1	89.05
Lehtse vald	1,640	167	9.83	1	89.17
Roosna-Alliku vald	1,368	140	9.75	1	89.27
Tamsalu vald	2,025	209	9.70	1	89.42
Kuusalu vald	4,726	488	9.68	2	89.77
Puka vald	1,918	201	9.55	1	89.91
Lohusuu vald	968	103	9.37	1	89.98
Rakke vald	2,116	226	9.35	1	90.13
Palupera vald	1,152	123	9.33	1	90.22
Mooste vald	1,715	185	9.26	1	90.34
Loksa vald	1,982	222	8.91	1	90.49
Kareda vald	843	95	8.83	1	90.55
Are vald	1,412	161	8.76	1	90.65
Rõuge vald	2,307	264	8.75	1	90.82
Märjamaa vald	7,634	874	8.73	3	91.38
Pöide vald	1,061	124	8.59	1	91.46
Kärla vald	1,871	218	8.59	1	91.60
Pala vald	1,344	157	8.58	1	91.70
Ruhnu vald	98	12	8.50	1	91.70
Valjala vald	1,533	181	8.48	1	91.82
Häädemeeste vald	3,303	390	8.46	1	92.06
Avinurme vald	1,622	194	8.38	1	92.18
Veriora vald	1,685	202	8.33	1	92.30
Värska vald	1,555	188	8.28	1	92.41
Raikküla vald	1,826	224	8.14	1	92.55
Varstu vald	1,393	173	8.07	1	92.65
Lihula vald	2,946	367	8.02	1	92.87
Meremäe vald	1,353	169	8.01	1	92.96

Percentage population served with collection stations at 3 densities	Total Population 01.01.2004	Area km^2	Density Persons /km^2	No of Collection Points	Cumulative % Population
Hanila vald	1,848	232	7.97	1	93.10
Imavere vald	1,087	137	7.96	1	93.18
Väätsa vald	1,539	195	7.88	1	93.29
Põdrala vald	996	127	7.83	1	93.37
Suure-Jaani vald	2,467	316	7.81	1	93.55
Haanja vald	1,289	171	7.53	1	93.64
Laimjala vald	861	116	7.45	1	93.70
Emmaste vald	1,440	197	7.29	1	93.81
Sonda vald	1,157	159	7.27	1	93.89
Kõlleste vald	1,072	150	7.15	1	93.97
Torma vald	2,490	349	7.13	1	94.15
Karula vald	1,158	163	7.12	1	94.24
Pühalepa vald	1,818	255	7.12	1	94.37
Pajusi vald	1,601	232	6.89	1	94.49
Paide vald	1,928	280	6.88	1	94.63
Leisi vald	2,361	349	6.77	1	94.80
Halliste vald	1,832	272	6.73	1	94.94
Pihtla vald	1,507	229	6.59	1	95.05
Puurmani vald	1,920	293	6.56	1	95.19
Mõniste vald	1,117	175	6.40	1	95.27
Kaiu vald	1,670	261	6.40	1	95.39
Saare vald	1,422	225	6.33	1	95.50
Vara vald	2,110	334	6.32	1	95.65
Vigala vald	1,691	268	6.32	1	95.78
Viru-Nigula vald	1,477	234	6.30	1	95.88
Kullamaa vald	1,403	225	6.25	1	95.99
Rägavere vald	1,055	173	6.10	1	96.06
Iisaku vald	1,526	252	6.05	1	96.18
Vihula vald	2,207	365	6.05	1	96.34
Kõpu vald	868	144	6.02	1	96.40
Vändra vald	2,747	465	5.91	1	96.60
Mäetaguse vald	1,680	285	5.90	1	96.73
Risti vald	986	168	5.87	1	96.80
Avanduse vald	1,060	181	5.84	1	96.88
Kõue vald	1,745	300	5.82	1	97.00
Koigi vald	1,175	206	5.71	1	97.09
Õru vald	595	105	5.69	1	97.13
Meeksi vald	812	144	5.64	1	97.19
Albu vald	1,492	268	5.56	1	97.30
Laekvere vald	1,917	349	5.49	1	97.44
Paistu vald	1,690	316	5.34	1	97.57
Padise vald	1,955	368	5.31	1	97.71
Võnnu vald	1,207	232	5.20	1	97.80
Orava vald	914	176	5.19	1	97.86
Oru vald	1,013	198	5.13	1	97.94
Kabala vald	1,071	210	5.11	1	98.02
Kõo vald	1,295	259	5.00	1	98.11
Taheva vald	976	205	4.77	1	98.18

Percentage population served with collection stations at 3 densities	Total Population 01.01.2004	Area km^2	Density Persons /km^2	No of Collection Points	Cumulative % Population
Misso vald	890	189	4.71	1	98.25
Lümanda vald	934	199	4.68	1	98.32
Saarde vald	2,291	508	4.51	1	98.48
Vaivara vald	1,739	393	4.43	1	98.61
Alajõe vald	470	108	4.34	1	98.65
Vastemõisa vald	1,188	280	4.24	1	98.73
Kihelkonna vald	997	246	4.05	1	98.81
Martna vald	1,060	269	3.93	1	98.88
Kõrgessaare vald	1,487	380	3.92	1	98.99
Laeva vald	905	233	3.88	1	99.06
Nõva vald	483	130	3.73	1	99.09
Tootsi vald	1,028	281	3.66	1	99.17
Varbla vald	1,130	314	3.60	1	99.25
Käru vald	769	215	3.58	1	99.31
Mustjala vald	839	236	3.56	1	99.37
Kaisma vald	620	178	3.49	1	99.42
Hummuli vald	1,066	313	3.41	1	99.49
Koonga vald	1,467	439	3.35	1	99.60
Vormsi vald	308	93	3.32	1	99.62
Torgu vald	406	126	3.21	1	99.65
Surju vald	1,092	358	3.05	1	99.73
Noarootsi vald	892	296	3.01	1	99.80
Maidla vald	879	319	2.76	1	99.86
Tudulinna vald	632	269	2.35	1	99.91
Illuka vald	1,235	548	2.26	1	100.00
TOTAL	1,365,265	43433		1931	

By using this approach it can be seen in the graph depicted in Figure 18 that some 64% of the population are served by urban schemes with a collection facility within 1000 metres and more than 53% of the population are within 500 metres of a collection point. There is obviously a strong link between recycling performance and provision of efficient facilities.

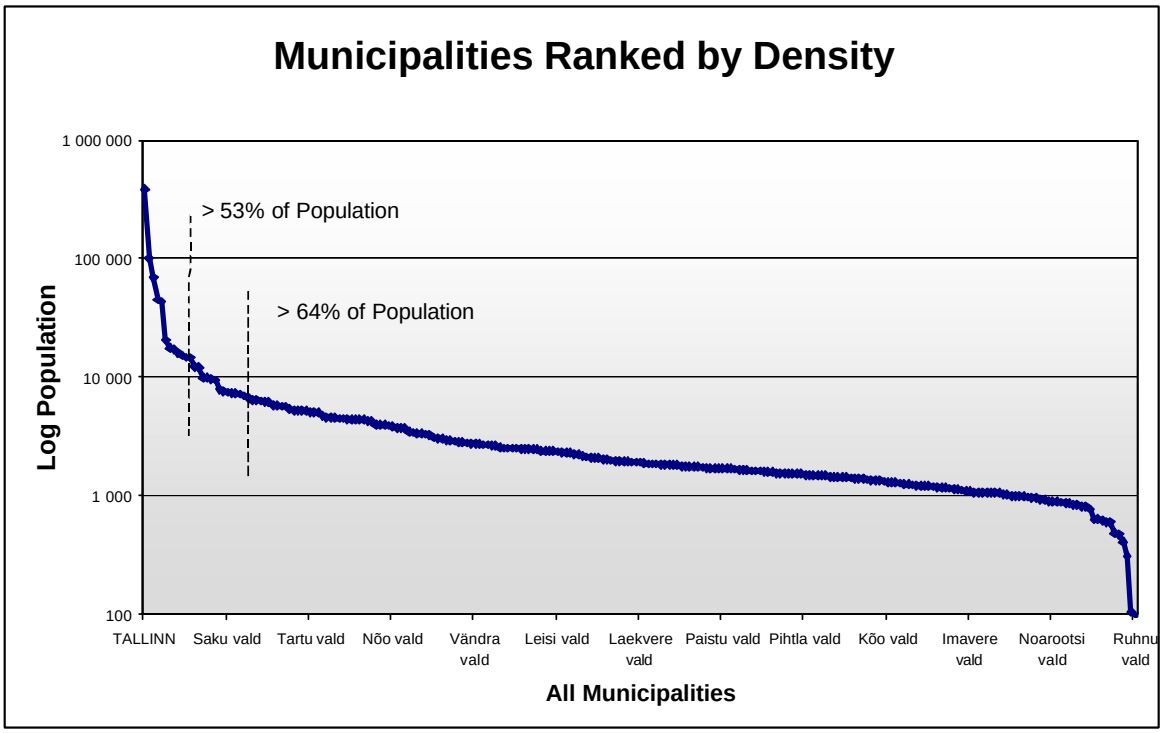


Figure 19 Municipalities Ranked by Population Density

To implement this scheme for collection it would involve the locating of some 1931 container sites (either with single multiple material banks or grouped individual material collection containers on municipal ground), throughout the municipalities. Of these collection points the majority are in urban areas (1,675) based on 1,475 in the high-density urban areas and 200 in lower density urban areas, the remainder being in the rural areas (256). The Municipalities will organise location of these facilities directly or in conjunction with waste management contractors. The key factors in their decision process should include:

- Near the centre of the collection area (easy to use by the public);
- Convenient to good transport routes;
- No planning or other restrictions that impact placement;
- Minimal public objections (noise, odours and visual impact);
- No or minimal costs of land (usually the land is provided free by the municipality, although some EU cities have been discussing fees) and construction (site levelling screening or fencing); and
- Avoidance of sensitive areas (ecological, scenic or other sensitivities).

For many areas, especially in more rural locations where the distance to the nearest recycling facility is greater, they should be sited at or near centres of population activity – for example at a supermarket or near a petrol filling station, bus stop, school or village centre.

Collection containers should use a uniform recognised colour scheme across Estonia; this will aid householder recognition and is likely to improve participation. It is appreciated that this may be difficult with individual ideas and a number of different waste groups operating in Estonia. Existing recycling collection facilities (Section 2.6) can be incorporated readily into the overall scheme. The most common faults, to be avoided of bring schemes include:

- There is not always a bin placed for litter such as plastic bags (most people carry the recyclables in a box or bag which must then be disposed of);
- Untidiness around the bins due to a lack of maintenance;
- The banks are not emptied often enough, becoming full and the public leaving bottles and cans in the vicinity;
- Poor signage, lighting and public information.

There should be a minimum standard across the regions in terms of appearance. This means investment in terms of maintenance, more frequent collection, and a fresh image. In terms of design costs and public information there would be benefits of scale from working on a regional basis.

3.7 Number of Transfer and Sorting Facilities

Given the small size of the Municipalities and the inclusion in the National Waste Plan for a number of waste transfer centres, which would handle municipal waste with both transfer and sorting facilities the cost effective solution would be to collate the packaging waste at these sites. The sites are well distributed and serve all areas.

County Waste transfer centres			
Harju	30	Hiiu	5
Ida-Viru	20	Jõgeva	6
Järva	3	Lääne	10
Lääne-Viru	10	Põlva	5
Pärnu	5	Rapla	5
Saare	5	SE-Estonia	10
Valga	5	Viljandi	15
Võru	5		
		Total	**139**

Table 12 Proposed Waste Transfer Stations 2002-2009

Table 12 has recently been re-evaluated and it is proposed that 124 waste collection facilities will be constructed. This comprises of mostly collection centres with the ability to carry out bulk transfer and some limited hand sorting (ideal for bring centres). Some 30 waste transfer stations will have the added ability for compaction facilities. This is still an

ample number to service the 'bring scheme' container system throughout the country. Each county will have at least 1 sorting / compaction and bulk transfer facility with a number of smaller facilities to collect and transfer local containers. It is worth noting that the 'bring' schemes separately collect dry recyclables and hence they reduce the household collected material reducing the cost of municipal collection. Some countries with 'bring' schemes, recycling parks, container parks and civic amenity sites approach have no requirement for sorting facilities. In fact this is a determining factor in selecting such schemes.

3.8 Assumptions Used in Determining Collection Facilities

The analysis has been based on a limited amount of packaging waste data currently available for the Municipalities in Estonia. Data is collected at a regional level but the formulation of a collection scheme is required at a Municipal level. These data gaps reflect the need for an effective data gathering and monitoring system capable of not only identifying waste arisings locally but also accurately obtaining information on performance indicators for municipal waste collection, recycling, and disposal from all Municipalities in Estonia. At the outset of this study it was envisaged that this could be obtained via a questionnaire based approach for the Municipalities via the contractors that operate in each area. However, data will not be available until later in 2004, as the process of gathering this type of information is only now beginning. The example questionnaire to gather key performance statistics for waste has been included in Appendix 1 for future reference. As stated, the approach has been to build on available data and to use tested methods or assumption, from other waste schemes to provide the strategy, quantities and costs for capacity planning.

The Excel spreadsheet (provided to MoE) of MSW and Packaging Waste that was developed and used to determine current and future levels of waste has a number of limitations. A particular problem in waste is the availability of reliable and up-to-date information. This makes building models difficult as well as relying on small data sets and in some cases data gaps have to be filled. This means that the outputs from the model have to be used with caution. The principal outputs that were calculated include:

- Volume of municipal and packaging waste and future predictions
- Volume and rate of recycling;
- Predicted participation / capture rates and collection systems for recycling;
- Recycling targets and volumes; and
- Collection facilities and costs.

Figure 20 provides a summary of the data and methods used.

Model Framework for Packaging Waste Calculations

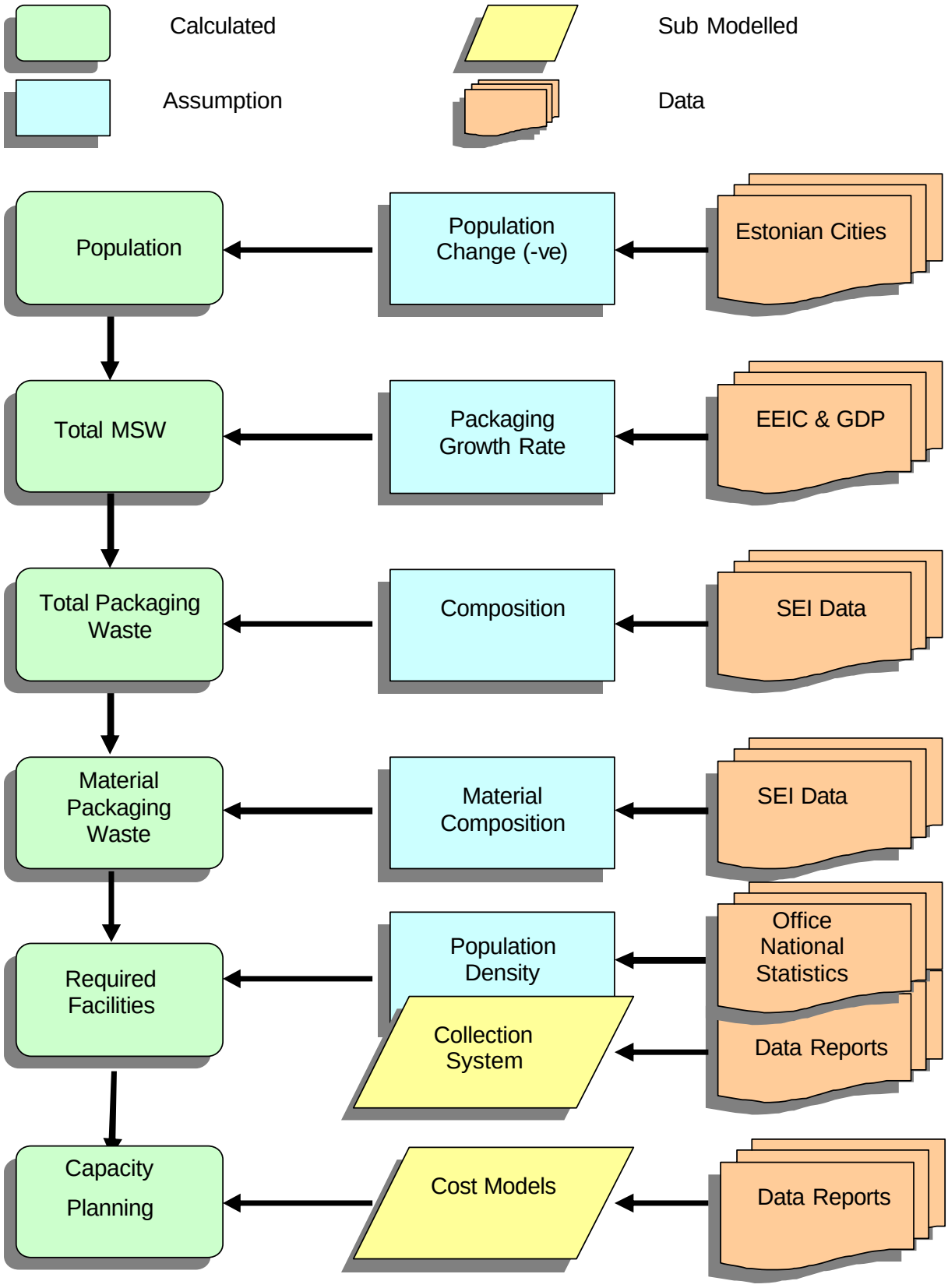


Figure 20 Modelling Framework for Packaging Waste
The model and modelling data are fully presented on a CD-R disk.

3.9 Financial Costs for Collection, Sorting and Transfer

The financial costs for the collection of separated packaging and packaging waste has been calculated based on the assumptions detailed in the previous sections on the type, location, and facilities provided and detailed in Tables 13 and 14.

Table 13 Requirements for new facilities

Requirement	Equipment	Assumptions
Collection	• Selective "at source" collection containers provided at high-density urban dwellings. • Total 1475	• 4 types of containers for 4 different segregated wastes. • Containers not more than 500 metres in high-density urban areas covering 53% of the population.
	• Selective "at source" collection containers provided at urban dwellings. • Total 200	• 4 types of containers for 4 different segregated wastes • Containers not more than 1000 metres in urban areas covering 64% (with the above) of the population.
	• Rural and central selective collection points. • Total 256	• Placed in municipalities of less than 2,500 inhabitants or serving 2,500 inhabitants / km in rural areas. Container of the large multiple collection type.
Site Requirements	• Basic provision of level ground, hard-standing area and signage.	• The majority of sights will have most provisions already, e.g. at apartment blocks. A provision to cover 20% new build has been included plus signage.
Maintenance	• Cleaning of the area and replacement of damaged containers	• Weekly maintenance of the site and replacement at 2% per annum.
Transportation	• 30 Primary collection vehicles	• Estimates are based on generated wastes, vehicle capacity and number of possible trips per day.
Bulk Transfer and Sorting	• Use of existing facilities with a capacity to transfer 20,000 tonnes initially rising to 66,400 tonnes in 2012 of separated materials.	• Availability of MSW transfer and sorting stations

Table 14 Waste Recovery & Recycling System Capital Investment Costs (€)

Component	Total Cost in €
Initial Costs of Collection Containers (1675 x €800+256 x €1,000)	1,596,000
Build for Collection Points (385 x €5,000)	1,930,000
Primary Transport Units (30 x €62,500)	1,875,000
Sorting Plants	N/A
Total	**5,401,000 euros**

The main financing mechanism for the packaging waste recovery and recycling system will be through producer funding. These funds derive income from the fees for packaging and packaging wastes placed on the market and support the emphasis on financial sustainability, economic efficiency and the polluter pays. This fee also contains an investment and operating cost element. The use of municipal waste management facilities for sorting and transfer of the collected waste can be resourced through the charging of 'gate fees' whilst still providing the incentive for packaging waste producers to reduce and recover packaging waste.

Operational or collection costs vary widely across the EU. Bring schemes are cheaper to establish than kerbside schemes but have lower capture rates and higher contamination. The rate of capture, vehicles and methods used for transport, sorting and compaction all affect the costs. Typical cost for collection are shown in Table 15.

EU Member/Material	Paper €/t	Glass €/t	Metal Cans €/t	Plastic €/t
AU		48	296	298
BE		48		
DK	74	91		
FR		30-35		
IR		63	63	
IT	90-150	20-40	20-40	230-500
LUX	82	32		
NL		27		
PO	60	39		
SP	40-70	30-50		
UK		50-80		

Table 15 Comparative Costs for Bring / Container Schemes
Data derived from Eunomia Research Ltd Report 'Costs for Municipal Waste Management in the EU', 2001.

4 Institutional Resources and Costs

This section reviews the tasks required for Institution building and training of personnel based on each identified group's requirement and their role in the recovery of packaging and packaging waste.

4.1 Capacity and Training Needs of Institutions

In Agenda 2000, the European Commission proposed to focus the Phare Programme on preparing the candidate countries for EU membership by concentrating its support on two priorities that are crucial for the countries to function well within the EU, institution building and investment support. Institution building means adapting and strengthening democratic institutions, public administration and organisations so that, once adopted, EU legislation or the national equivalent is properly implemented and enforced. This requires development of the necessary structures, human resources and management skills. Candidate countries also have to make the considerable investment in adapting their enterprises and main infrastructure to respect EU norms and standards in areas such as environment, nuclear safety, transport safety, working conditions and marketing of food products and consumer information. The introduction of the Packaging Directive has a legal requirement for the Estonian government to ensure packaging waste recovery targets are met. This will require additional staff and training of government officials with responsibilities under the new legislation.

A typical framework for determining training requirements is shown in Table 16. This framework was used to assess the training needs of organisations directly involved in the implementation of the Packaging Act and assess the costs of training.

Table 16 Training Project Framework

Framework for training projects			
Wider Objective	**Indicators**	**Means of Verification**	**Assumptions**
• Improved organisation performance	• Specific service standards	• Organisational reviews • Public opinion surveys	• High level commitment to reform and funding of public services
Immediate Objective(s)	**Indicators**	**Means of Verification**	**Assumptions**
• Trained staff applying new skills and knowledge	• Improved personal and team performance	• Internal organisational reviews • Independent evaluations	• Commitment to use new skills and knowledge • Employment environment fosters positive

			attitudes
Outputs	**Indicators**	**Means of Verification**	**Assumptions**
• Define number and grade of staff acquiring specified skills and knowledge	• Number of trainees achieving specified standards	• Training reports • Survey of participants and supervisors • Project monitoring and evaluation	• Selected staff will attend and will be motivated to learn
Activities	**Inputs**	**Costs**	**Assumptions**
• Training needs analysis • Course design • Production of course material • Support documents • Equipment, software and materials	• Technical assistance • Trainers • Support equipment	• Budget	• Institutional commitment to release staff for training

4.2 Identifying Training Requirements

A comprehensive review of the Packaging Waste Directive and Packaging Act extracted the key organisations with legal roles and responsibilities for ensuring that national waste recovery targets are met in Estonia, these were identified and their roles discussed in Section 2 of this report. These are principally the Groups of organisations requiring training for institutional strengthening.

Information on the organisational structure of each Group was used to determine the number of personnel requiring training. Their roles and responsibilities in regard to the Packaging Act identified the type of training required. To confirm the assessment, representatives from each Group were contacted to discuss the new legislation and prepare a *"training needs analysis*". The analysis forms the basis of the training package described in Table17.

To optimise cost-effectiveness of training resources and encourage the interaction of personnel from different groups, training for areas 1 and 2 could be provided to Groups 1, 2 and 3 collectively (Government organisations) with separate training for Group 4 (Producers and Recovery organisations). Similarly, training for area 4 could be provided for Groups 1 and 3 collectively, with separate training for Group 4.

Identifying trainers is an important part of the training programme. There are a large number of consultant groups that provide training, but it is essential to select trainers that have both the knowledge of packaging and packaging waste requirements as well as how this is to be implemented in Estonia.

Table 17 Analyses of Training Needs

Organisation	Role in Packaging Waste Recovery	No. of Personnel Requiring Training	Training Needs	Training Days
Group 1				
Ministry of Environment	Policy and Co-ordination	3	1,2	6
The Estonian Environment Information Centre	Data control and monitoring from Producers and Recovery Organisation	3	1,2,4,5	12
Packaging Commission	Policy and Co-ordination	9	1,2	18
Group 2				
County Environmental Departments	Engagement with end users (householders)	15	1,2,3	45
Representatives of Local Municipalities	Engagement with end users (householders)	25	1,2,3	75
Group 3				
Environmental Inspectorate	Enforcement of producers responsibility	10	1,2,4	30
Group 4				
Recovery Organisation	Delivery of recovery mechanisms, Input recovery data to Packaging Register	5	1,2,3,4,5	25
Producer Organisations (e.g. manufacturers, packer/fillers, importers)	Finance, Input packaging use data to Packaging Register	20	1,2,4,5	80
TOTAL		**90**		**291**

Training Needs Analysis

1.General awareness of Legislation, Roles and responsibilities 2.The national strategy (how) to meet EU targets

3.How and where to use collection systems 4.Data collection required for monitoring performance 5.IT – systems and software

4.2.1 Tasks Required for Training

The proposed plan for training includes a comprehensive development of course material, training guides and documentation in addition to the post-monitoring of participants and their achievements. The ministry and authority staff should be trained first in the strategy and actions required to implement the recovery of packaging. Following this the producers and collection organisation can be offered training, possibly after issuing a promotional flyer and posting web information. IT and data reporting requirements can follow after development of the system and data sheets.

Tasks and Materials

- Training needs analysis
- Course design for 5 training courses
- Production of course materials for 5 courses
- Acquisition of support documentation (e.g. non-technical summary of legislation, guidance for Producers, Recovery Organisation and Estonian Environment Information Centre on submission of data)
- Acquisition of necessary equipment, software, materials

Monitoring Post-Training

- Training Reports
- Survey of participants and their supervisors
- Evaluation using the Logical Framework. Training can be evaluated against four basic criteria – efficiency, effectiveness, impact and sustainability. Furthermore, Phare PAR projects and programmes are evaluated against their overall relevance for the country concerned.
- Project monitoring and evaluation e.g. number of trainees achieving specified standards

Support

- Technical assistance including trainers
- Supporting equipment and materials

4.2.2 Exchange Ministry Visit

A number of EU members are currently implementing similar schemes and are at differing stages. Following a review of the member states current activity, Ireland have a similar system, a rural population with urban centres, a recently establish collection system of similar scale and a producer responsible organisation, Repak. An initial contact with the

Ministry of Environment in Ireland indicated that they would be pleased to discuss their packaging waste recovery programme and would organise contact with the inspectorate, producer organisation and local authorities for the Estonian ministry. It is suggested that a representative(s) from the ministry, inspectorate, producer responsibility and data reporting consider a visit to the ministry in Ireland. Contact details have been provided.

4.2.3 Training Budget

The budget is linked to the number of training days (291) and a minimum equivalent of 135 Euros /person allocated. The total budget required is therefore €39,285.

4.3 Identifying Additional Staff Requirements

A typical framework for determining human resource (staff) requirements is shown in Table 18. This framework was used to assess the human resource requirements directly involved in the implementation of the Packaging Act and assess the costs of new permanent or short-term personnel. Staff resources are for the main tasks required by the Governments to ensure that the Packaging Act is complied with in Estonia.

Table 18 Legal and Organisational Reform Framework

Framework for legal and organisational reform			
Wider Objective(s)	**Indicators**	**Means of Verification**	**Assumptions**
• Improved organisation performance	• Specific service standards	• Organisational reviews • Public opinion surveys	• High level commitment to reform and funding of public services
Immediate Objective(s)	**Indicators**	**Means of Verification**	**Assumptions**
• New legislation or new organisational structures or procedures	• Proposal accepted and law enacted with new structures	• Parliamentary reports • Organisational reviews	• Legislative time available • Administration level commitment to reform
Outputs	**Indicators**	**Means of Verification**	**Assumptions**
• Draft legislation • Re-organisation proposals	• Proposals presented	• Project monitoring and evaluation	• No major political or organisation changes
Activities	**Inputs**	**Costs**	**Assumptions**
• Review of current situation • Consult with stakeholders • Prepare proposals	• Technical assistance • Support equipment	• Budget	• Commitment to reform

4.3.1 Additional Staff Resources

Information on the current staff levels and required activities was used to determine the number of new staff required. To confirm the assessment, representatives from the Ministry were contacted to discuss the new legislation and prepare a *"resource needs analysis*". The analysis forms the basis of the institutional building of staff resources and required budget described in Table 18.

Table 19 Resource Needs Analyses for Institutional Strengthening

Institutional Strengthening Activity	Staff Required	Current Staff Level	New Staff	Budget (Euros)	External Support
Collection scheme	1	0	1 full time project manager	20,000	Recovery Organisation
PR campaign	1 (6 short term)	0	1 full time co-ordinator 6 short term assistants	20,000 36,000	PR Agency Research Agency
Data reporting system	5	3	1 full time manager 1 full time assistant	20,000 12,000	IT Agency
Inspectorate	2	0	2 full time inspectors	30,000	

The additional staff equate to 2 full time positions within the Ministry of Environment, 2 positions in the Inspectorate and 2 positions in the Estonian Environment Information Centre. The Ministry of Environment staff will act as a full time technical project manager for implementation of Packaging in Estonia and work closely with a National PR campaign manager who would co-ordinate the national and local campaigns and work with the Producer Responsible Organisations and NGOs. This individual could also work on other areas including waste minimisation and MSW all of which are closely linked to packaging. Initially the PR manager will require local assistants in a number of the county and town areas to locally promote and co-ordinate activity. It is suggested that these are temporary contract staff from a PR agency or similar. The Inspectorate and Estonian Environment Information Centre will also require additional staffing of 2 persons.

4.3.2 Additional Staffing Budget

The annual resource budget for the additional positions is €102,000 plus a short-term expenditure over three years of €108,000 for the PR personnel.

5 Public Awareness and Information Activities

5.1 Information campaign

Since the late1990s, a great deal of activity, knowledge and good research of public relations campaigns has been undertaken. Examples can be drawn upon and translated into best practice for the design of new campaigns and to measure their effectiveness in a way that contributes to national recycling targets. This section draws together what has been learned to provide guidance on the essential elements of a waste awareness campaign for Estonia. Specifically, the awareness campaign will aim to encourage the public to recycle packaging waste in order for the Government to meet its national recycling targets. Estimates of the resources needed to deliver the campaign are also provided.

5.2 Current waste awareness and PR activity in Estonia

One of the most comprehensive reviews of public waste awareness in Estonia is contained in the report "Developing new opportunities for municipal waste management in three Baltic States". The report states that there is low environmental awareness of citizens and that some of the plastic, glass and aluminium drinks packaging is collected from landfill sites (handpicked), rather than as separate fractions sorted at source by householders. Other problems identified as a result of poor waste awareness include fly tipping in rural areas. Both these activities are being tackled and the problem is reducing.

There is a limited amount of information on the amount of PR activities currently taking place in Estonia to promote waste awareness. Campaigns, such as the "Keep City Tidy" day in Tartu and "Clean up" days in Parnu have focused on "where" and "how" to dispose of hazardous waste. Campaigns on prevention and minimisation of household waste have yet to be developed. Rakvere, by exception has run a limited campaign to raise public awareness, as part of a wider LA21 introduction to the city. The campaign developed an information leaflet, which was delivered by mail to 5500 householders and a public event was held, which included public consultation of current waste management arrangements and future solutions. The communities of Rakvere and Parnu have both identified the requirement of PR activities to raise awareness of waste as a priority for their waste management strategy. Tallinn City Government has contacts with a number of environmental NGOs, and there is an ongoing campaign for collection of paper organised jointly by Tallinn Sustainable Development Board and Estonian Youth Nature Protection Society.

5.2 Review of waste awareness campaigns

The following section summarises the findings from detailed analysis, where practical, of 54 selected campaigns. These campaigns cover around 200 local authorities. Key factors in determining success were drawn out, interesting lessons learned on running waste campaigns have been determined, and these are summarised below. From the results, key features have been identified and good practice highlighted.

5.2.1 The campaign

All campaigns reviewed had stated aims and objectives and specific messages that they wanted to deliver. Although increasing recycling was often the stated aim, not all provided clearly defined targets and stated mechanisms for measuring outcomes.

It was found that the greater the complexity of the message and the delivery, the more likelihood of confusion by local residents. The most effective campaigns were those that were focused (e.g. on one waste stream), delivering a single message that was clear. The majority of the campaigns had taken on board the need to be action-based (e.g. providing practical advice) and not to patronise or preach. For example, the Northern Ireland campaign provided a list of "daily-do-ables". The more locally-related the advice, the better understood and accepted was the campaign by residents. This was found to be particularly important when the campaign was covering a very wide geographical area with the involvement of a large number of local authorities (40+).

It was found that a combination of direct messages that were popular and fun worked best. Although residents expected recycling to be serious, they did not respond to "serious messages" that were accusatory in tone; they did not want to be made to feel guilty. Analysing and targeting specific audience groups means that different communications tools can be used more effectively. If a campaign is trying to talk to everyone it can leave the message diluted. Research bears out the fact that good campaigns use different approaches for different target audiences (e.g. age, income profile, etc).

Campaigns tend to assume that they have to target "hard to reach" groups on the presumption that they should focus on those that are not currently recycling. Whilst they should not be ignored, the research clearly shows that these groups are not the primary focus. Hard to reach groups are, by their nature, hard to reach and take time and effort to change habits. In the short term, campaigns should concentrate on residents who will provide the tonnages required to meet national targets (i.e. the medium recyclers), who are already receptive to the recycling message and who can be encouraged to do more. People in this group may not necessarily know about all the materials it is possible to recycle in their area.

The majority of the campaigns reviewed did not have a specific target audience, other than the general resident population. Research shows that females are the main recyclers in the home. For example, to capture the female audience, TV or radio adverts were played at meal times, and road shows or posters were set up at supermarkets. Some also targeted women's lifestyle magazines.

Most of the campaigns made full use of the expertise of external organisations in delivering research and in developing and delivering the marketing campaign and PR. It is usually more effective to budget for professional agencies to design leaflets and promotional items. These organisations have the knowledge and skills to make best use of the media and understand how to develop good media relations – an essential element of a campaign that can bring much needed "added value" and increase "opportunities to see" (see below) and advertising value. The experiences of the campaigns studied in this research suggest that those that have embarked on media campaigns with professional agencies have felt that the cost and effort was worthwhile.

(Graphics from the Rethink Rubbish Campaign managed by Waste Watch and SWAP)

5.2.2 Monitoring and analysis

Any campaign will rely on carefully considered, mutually agreed SMART (Specific, Measurable, Achievable, Realistic and Time based) targets. Without these the campaign will lack direction, coherence and focus.

Targets should allow for the capacity of existing infrastructure (i.e. not raise expectations that cannot be met). They should be reviewed regularly, possibly yearly, and be modified if necessary in light of any external changes such as new infrastructure, new methods of measurement, and new targets set by national government.

The most effective campaigns are those with a clear focus. If stated aims and objectives are clear at the outset, and have measurable targets, then monitoring and evaluation can provide accurate and quantitative measures of effectiveness. Not all campaigns reviewed had clearly defined targets against which success could be measured. No consistent approach was found, although there were many examples of good practice that could be adopted.

Most often "soft" targets were monitored (e.g. number of leaflets distributed) with little or no direct monitoring of "hard" outputs (e.g. recycling tonnage increased). Most campaigns were measuring what residents *say* they do (i.e. via questionnaire surveys) and attitudinal change but few were also measuring what residents *actually* do (i.e. translated into tonnages recycled, waste arisings reduction). As over-reporting can be as much as 20%, reliance on attitudinal change does not guarantee that this has been translated into action as a measure of the effectiveness of a campaign. Campaigns were often monitoring awareness of the campaign message as a measure of success rather than direct impact on behaviour. Behavioural change needs to be monitored as well as awareness of campaign messages.

Measuring "hard" targets

The mechanisms used involved a combination of the following:

- Analysis of waste arisings (e.g. collected tonnages of residuals, recyclables);
- Bin monitoring;
- Participation and putout rates;
- Recording opportunities to see (OTS) and advertising value equivalents (AVEs) for media coverage, response to campaign material (such as helpline calls, website visits);
- Qualitative pre and post-campaign focus groups with the target audience; and
- Quantitative pre and post-campaign questionnaires with the target audience.

Waste analysis is relatively cheap to undertake and can provide a focus for the waste awareness campaign and to show its effectiveness in a very localised area and for the campaign area as a whole. Waste analysis was undertaken by many of the campaigns, along with waste arisings monitoring.

Waste awareness campaign questionnaires

The information gained from questionnaires would complement the waste and recycling tonnage data and assist in assessing the effectiveness of the campaign. To better understand the choice and type of questions that have been used by waste awareness campaigns, a number of campaign questionnaires have been studied.

Before creating a questionnaire, it is essential to know what the purpose of the questions is and how the responses will contribute in the monitoring of a campaign. Questions that will not help in the monitoring of the campaign are best kept to a minimum to reduce the time needed for completion. The majority of the surveys had questions that were easy to answer and understand and often guided the respondents further by providing a choice of responses, for example:

The questionnaires sent out post campaign included questions relating to where the respondents had heard or read about the campaign. This is much easier to respond to and would provide a better understanding of what the best methods were in getting the public's attention. Other questions asked post campaign related to how interesting or appealing the respondent had found any messages or pictures. Again, this would provide useful feedback to compare with pre-campaign research on successful campaign messages and materials.

Few campaigns provided feedback to residents on the outcomes. This seems like a missed opportunity. Some have actively sought feedback from residents but also provided feedback on campaign outcomes in the form of advertorials. Feedback from residents is particularly valuable in dealing with the media, as it provides locally based stories.

5.2.3 Infrastructure and Resources

Convenient recycling infrastructure provision was an essential element in the majority of the campaigns. Some waited until facilities coverage was complete before they embarked on their campaign and others integrated changes (harmonisation) into the campaign.

Many experienced problems with varying provision and there is no doubt that the best campaigns operated where the provision of recycling facilities was harmonised.

Most local authorities advised their contractors to prepare for increased recyclate during the campaign period and few experienced any difficulties. Many worked very closely with contractors to the extent of running training sessions on the campaign for collection personnel. In some, a service provider brief was issued to all service organisations.

The best run campaigns are well staffed and have full-time co-ordinators, as well as involving recycling officers and commissioning external expertise. For example, one campaign had seven full-time campaign staff, and three staff in other external organisations (e.g. marketing, PR and research).

A breakdown of the funding (Euros) attained by the 14 campaigns run in the UK can be seen in Table 20. The UK was selected as an example because it has a low current recycling rate and awareness and the campaigns are at the early stages.

Table 20 UK Campaign Costs

County and city campaigns	**Campaign period**	**Population of campaign area**	**Households within campaign area**	**Budget (€)**
Bristol	1999–2002	372,400	158,719	784000
Devon	2002–present	1,074,919	458,534	1745712
Essex	2002–present	1,532,100	700,000	403000
Gloucestershire	2001–2004	574,000	240,000	942000
Greater Manchester	20032	,482,328	1,040,231	619000
Hampshire	1999–2004	1,608,511	652,155	375000
Hertfordshire	1993–present	1,015,815	405,144	392749
Lancashire(Phase1)	2002/03	1,402,400	615,461	191000
Sheffield	2003–2006	530,400	223,000	404000
Western Riverside	2003–2008	789,896	378,291	8208955
TOTAL		**11,382769**	**4,871,535**	**14,063,687**
Regional campaigns	**Campaign period**	**Population of campaign area**	**Households within campaign area**	**Budget €**

East Anglia(ARWAC)	1999–present	5,769,712	2,385,836	998112
London(GLA)	2002–2004	6,658,929	2,913,325	2156130
Northern Ireland	2002–present	1,680,000	619,789	2507463
Wales	2002–2005	2,903,085	1,209,048	1045000
TOTAL		**17,011,726**	**7,127,998**	**6,706,481**

The campaigns are divided into two groups: countywide and city campaigns, region-wide campaigns.

5.2.4 Campaign funding obtained

The total budget for all campaigns analysed was €20,770,167 covering a population of 28,394,495 (48% of the UK population) and 11,999,533 households (49% of UK households). The funding campaign period is from 1999-2005. Analysis of the county/city council campaigns indicates no clear correlation between the budgets obtained, the population of the campaign area and the campaign period. The data suggest though that southern county/city councils obtained a comparatively larger budget for waste awareness campaigns than their northern counterparts. Analysis of the regional campaigns also indicates no clear correlation between the budget obtained, the population of the campaign area and the campaign period.

In total the campaigns spent an average €0.60 per head of campaign population (i.e. per person) and €1.71 per campaign household as shown in Figure 21. The amount spent per person per year varied between €0.04 and €2.07, and between €0.10 and €4.33 per household per year. Experience suggests that a minimum yearly expenditure of €0.75 per household is needed in order for a waste awareness campaign to be successful and provide long-term benefits. However, a more realistic figure based on current targets, timescales and scale of desired impact will be €1.50–€1.80 per household (though €3.72–€6.00 may be desirable). Using €1.50–1.80 as a benchmark, only Bristol, Devon, Northern Ireland and Western Riverside have obtained sufficient funding for their campaigns.

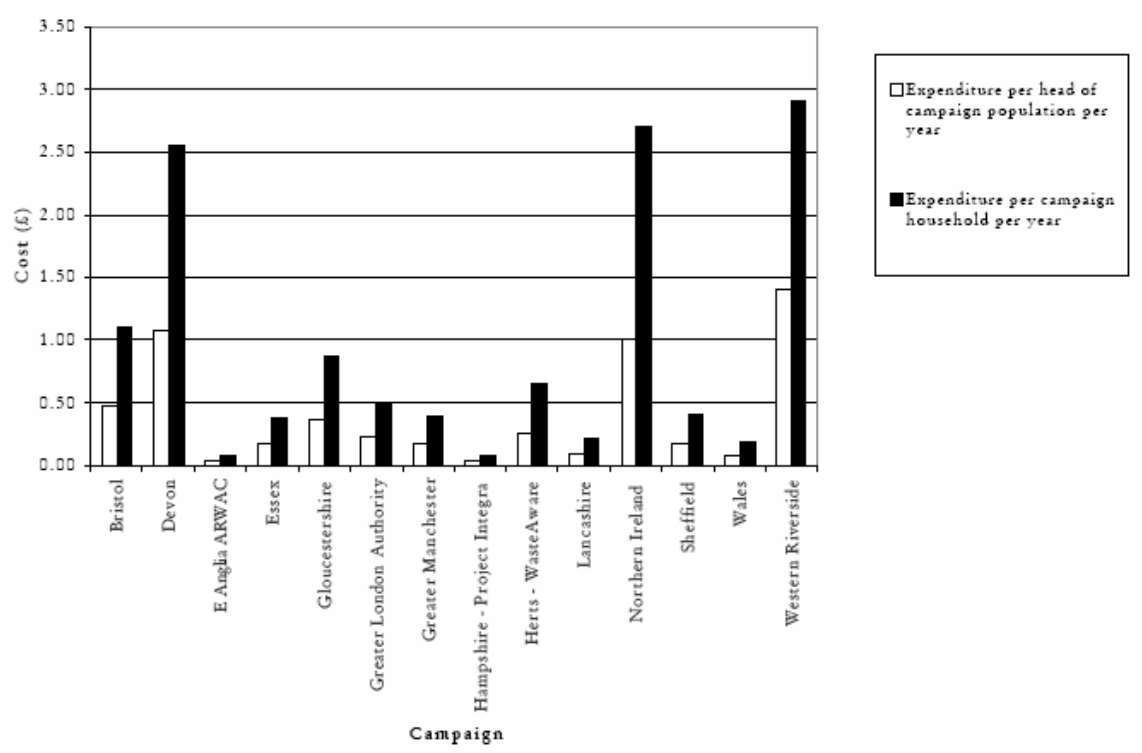


Figure 21 Analysis of campaign funding per household and per person per year

This figure compares favourably with research conducted in other EU countries listed in Table 21. Information is limited, but there appears to be a minimum requirement of the order €1.60-2.00 per household per annum on an ongoing basis, and in some cases greater expenditure may be required in start-up phases.

Country	**Denmark**	**France**	**Ireland**	**Italy**	**UK**
Expenditure (€)					
Start-up		1.5-6/inh	9/hhld		
Ongoing	7/hhld	0.8/inh	5-7/hhld	1/inh	1.6/hhld

Table 21 Costs for Information Provision / Education for Collection Schemes
(Estimated averages from a number of in-country schemes) NB: (inh – inhabitants, hhld – household)

Analysis of campaign budgets over their pre-planned length suggests overall an even distribution of expenditure (see below). Characteristically, the first year of the campaign introduces the public to the subject and message, and the second year is focused on delivery and activity around the main campaign message, with subsequent years reinforcing the message and sometimes introducing mini-campaigns. The majority of campaigns have allocated a slightly higher budget in year three compared to year one. Figure 22 shows the proportion of budget spent over time.

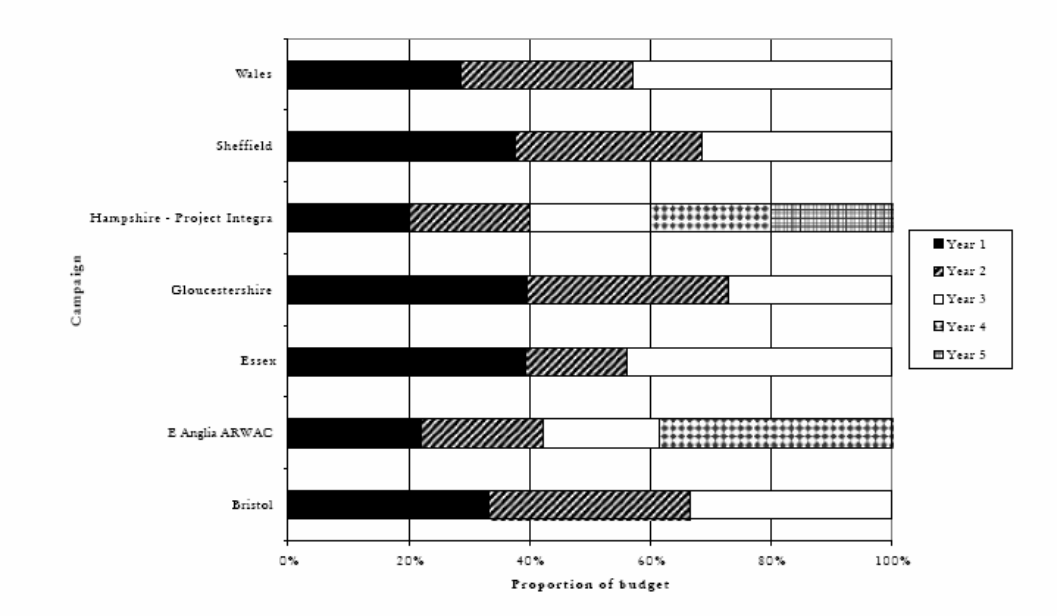


Figure 22 Proportion of campaign budget over time

Government funding restrictions have meant that some campaigns have been shortened to meet deliver dates within specified timescales. Not surprisingly, this has affected the content and format of campaigns.

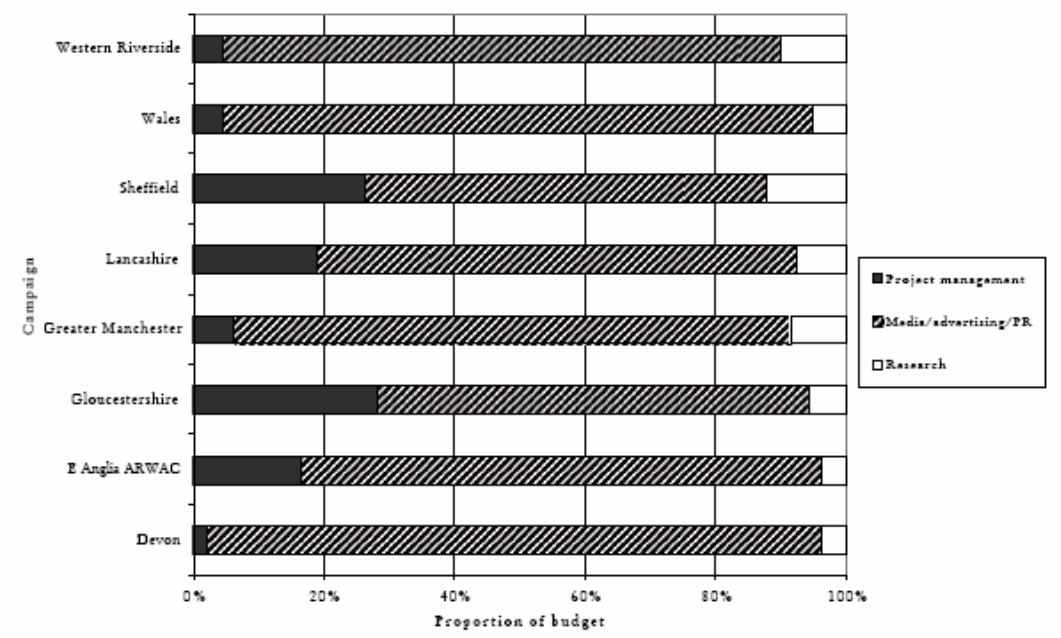


Figure 23 Breakdown of waste awareness campaign expenditure

Analysis of the expenditure indicates that for all waste awareness campaigns the majority of the budget (60%–80%) is spent on media, advertising and PR. The majority of the campaigns analysed will employ external PR agencies to achieve a balanced and coordinated approach to the campaign. The budget for project management varies from

1%–40%. The majority of campaigns are also provided with in-kind management support from local authority waste management departments or other project partners. For example, the authority additional to the project budget met project management costs for many of the campaigns.

Research costs accounted for 5%–15% of campaign expenditure. Increasingly, campaigns are budgeting for preliminary research to identify the focus, messages and objectives and to monitor and evaluate their effectiveness. Monitoring throughout the campaign period allows targets to be tracked and post-campaign feedback provided to residents. As with media, advertising and PR, waste awareness campaigns are increasingly using external research consultants.

As this analysis shows, all campaigns need sizable resources. Other than assessing the budget by resident or by household, it is difficult to put an exact figure on how much funding will need to be available because all areas differ in demography, geography and infrastructure provision.

Table 22 provides details and costs of the UK campaigns and Table 23 some selected campaigns from other countries.

Table 22 Campaign Analyses and Funding

Campaign	Total budget (Euro)	Cost per head of population per year	Cost per house-hold per year	Number of funding sources	Additional funding sought	Planned length (years)	Actual length (years)	Budget Year 1	Budget Year 2	Budget Year 3	Budget Year 4	Budget Year 5	Project manage-ment	Media/ Advertising/PR[1]	Research
Bristol[3]	784	1	1,65	1		3.0	3.0	260750	260750	260750					
Devon	1745712	1,60	3.79	2	40,000	0.45	Ongoing	1742744	0,00	0,00			35633	1645274	61835
East Anglia	998112	0,04	0,10	1			Ongoing	218,210	201842	192746	383615		165823	792596	37995
Essex	403	0,27	0,59	1	414,000	0.5	Ongoing	402300	169860	447000					
Gloucestershire	942	0,55	1,31	2	Searching	3.0	Ongoing	372500	312900	254790			263730	622820	53640
London Authority	2156130	0,34	0,76	1		0.5	0.5	2235000						1530568	501285
Greater Manchester	619	0,25	0,60	3		0.16	0.16	617457					38450	526677	52328
Hampshire – Project Integra	375	0,04	0,10	1-5 per yr		Ongoing	Ongoing	74872	74872	74872	74872	74872	29800	59600	14900
Hertfordshire	393	0,39	0,97	8	Searching	2.00	Ongoing	173114	218967				59600	332481	
Lancashire – P1	191	0,13	0,31	3		0.16	0.16	190335					36375	139727	14233
Northern Ireland8	2507463	1,50	4,02	2		1.25	Ongoing								155186
Sheffield9	404	0,25	0,60	2		3.0	Ongoing	151980	124638	126438			106546	247340	49170
Wales	1045	0,12	0,28	1		3.0	Ongoing	298000	298000	447000			30694	614476	34270
Western Riverside	8208955	2,07	4,46	1		5.0	Ongoing	2078412					42655	779651	90067
TOTAL	**20,770,167**							**8,815,677**	**1,,661,831**	**1,803,597**	**458,487**	**74,872**	**809,309**	**7,291,213**	**1,129,612**

Analysis of Funding Data

Table 23 Reviews of Waste Awareness Campaigns in other EU Countries

Country	Scheme Description	Aim & Objective	Publicity Tools Used	Focus/ Target Audience	Duration	Outcomes	Problems	Cost Implications
America	America Recycles Day	To encourage Americans to pledge to buy more recycled products. To encourage every consumer to "make buying recycled products in the 21st Century every bit as natural as tossing a can into a recycling bin".	http://americarecyclesday.org/ By pledging to recycle and to purchase more recycled products you become eligible to win one of several national prizes. Recycling pledge at events nationwide	General Public	Yearly	Several thousand local recycling and Buy Recycled showcase events across the country media impressions, In 2001, nearly 1,000,000 pledges to recycle and buy recycled products were entered for the national awards. 125 government resolutions and proclamations were made in 14 states 46 States, plus the District of Columbia, Puerto Rico, and US Virgin Islands participated in America Recycles Day 135 events were listed on the official ARD events calendar Over 4,000 online pledges		
Belgium (Local Authorities)	Pay-per-bag scheme	Influence the amount of MSW set out, and on efforts made by householders to sort waste. Finance municipal waste management via 'household' or 'environmental' tax and payments for waste bags.		National. General Public	Study carried out in 1999	Decrease in the amount of residual waste offered by approx. 30kg per inhabitant; Separation effect accounted for 9kg (30%) on average and reduction in waste set out for collection was 21kg on average.(70%). Scheme ongoing	Increase in bulky waste offered. Fly tipping?	€ 0.5 per grey waste bag.
Germany	Weight Volume based system	Reduce the amount of residual waste from apartments using 'lock gate system'. Reduce WM costs. Reduce residual waste, increase dry recyclables. Setting up a polluter-pays fees system. Rationalisation of the waste collection.		Local. General Public	5 months	45% reduction in waste after installation of the Identify Press Weigh (IPW) centre.. Cost per month per household reduced from Eu220 to Eu171. Use of 'Lock gate' also reduced waste. Pilot scheme lasted 5 months.		Cost of IPW was approx. €19400. Concrete founding cost Eu2000
Italy	Tagged bag scheme.	Source separation for biowaste. Fixed and variable fee structure.		National/Regional. General Public	1998	Residual waste fell by approx. 18%. Source separation rose by 8%. Total production of MSW actually rose slightly. Scheme ongoing.	Slight rise in overall MSW arisings. Tags can get lost. Tax evasion accounted for 4.5% of total participants though the true figure maybe double.	Variable and fixed costs not specified.
Italy	Pay-per-bag scheme	Volumetric quantification of producer. Introduction of PAYT Implement such schemes in 20 other municipalities in the province of Bergamo.		Regional. General Public	1998	Scheme ongoing	Avoidance sometimes leads to deliveries outside Municipal boundaries (5-6% by weight)	

Luxembourg	Combined volume and weight-based scheme	Cost effective WM system. Generate fairness in waste fees and incentives to improve environmental behaviour in households. Polluter pays principle		Local, General Public	1995-96	35% reduction between 1994 and 1996 of total waste. 1 year pilot scheme		Fees to customer depended on waste bin volume and waste type.
Sweden	Weight-based scheme.	To give economic incentives for households to recycle. Weight based system and kerbside collection of 11 waste fractions.		Local. General Public	April/May 2000	75% of households presently have kerbside collection of recyclable fractions. Overall result of the last 2 years – total waste reduction of 30% and a reduction of residual waste of more than 70%. Scheme ongoing	Problems with the weighing system. Difficult to balance against budget. Recycling rates exceeded the fees needed to cover the costs. More administration was needed. Burning of waste and fly tipping	Fees were compulsory or additional; dependent on frequency of collection chosen, weight of waste (residual and compostable), collection of recyclables and garden waste.
Belgium	Residual waste levy	Tax on municipalities if total amount of household waste collected exceeds the legal amount. Ensure that every inhabitant is conscious of waste prevention.		Local. General public	January 1999	Difficult to see overall practical results of tax measures. 34% recycling and composting in 2000. Scheme ongoing	Increased likelihood of fly tipping	Tax dependent on weight produced.
Greece	Schemes using aluminium can return vending machines	To divert a portion of the aluminium from the municipal waste stream. Recover value of cans Promote environmental awareness.	Publicity in supermarkets. Involvement of local business for prize giving.	National/Local . General Public	2 Years	Two schemes; One with 50 vending machines, and one with 13 vending machines. First scheme failed through lack of interest and motivation. Second machine addressed problems and was more successful. Pilot scheme over 2 years.	Scheme 1, Lack of motivation and interest. Not viable economically. Homeless people showed more interest, but for supermarkets this was bad for their image. Machines became dirty and neglected.	Refund of approx € 0.12-0.015 per aluminium can. Vending machines were operated by private firm (ESPAS HELLAS) each cost € 8000. Scheme operated by supermarket chain. Scheme 2 operated by a businessman with cooperation from a supermarket chain.
Sweden	Promotion of home composting.	Reduce the amount of waste at source, and encourage recycling of plant nutrients.	Information through brochures	Regional. General Public	1992 onwards	20% of all owners of detached houses and 14% of owners of summerhouses or leisure homes have applied from fee reduction for composting. Scheme ongoing	Application for fee reduction without possession of a compost bin. Compost waste put in with residual waste 25-59% of potential compost waste went this way. Mismanagement of composting bins, complaints about odours, rats and birds.	Approved compost bins cost 1000SEK to buy.

5.3 The Campaign Strategy for Estonia

The proposed national implementation plan given in Table 24 includes a comprehensive national monitoring system, management staff and information campaign. The scale of the strategy has been developed to include national, local and partnership initiatives as well as additional external sources for PR/media and research expertise.

Table 24 Packaging Waste Campaign Strategies for Estonia

Component	Campaign Strategy
Aims and Objectives	Current 50% recovery, 25% recycling with a minimum 15% recycling for specific materials and future target figures of 60% recovery, 55% recycling with material specific targets of 60% glass, 60% paper, 50% metals, 22.5% plastic and 15% wood for 2012 and beyond.
Target Audience	**Key opinion-formers and decision-makers** (influence, communication channel, clarification) *Primary targets* Local authority members Local media (communicate, educate, influence) Operational (contractor and operational staff) Partner organizations *Secondary targets* Business policy-makers and leaders (influence, leadership, agents of change) Funders Members of Parliament and Government (legislative framework) NGO policy-makers and leaders (influence, leadership, agents of change) Wider media (communicate, educate, influence) **Potential participants** (motivate into action) *Primary target – local residents* Existing recyclers (medium/low) Women *Secondary target* Potential new recyclers School children (8–14 years)
Messages	Few messages and simple (e.g. waste aware, recycle more, rethink rubbish)
Timescale	**3 years minimum** **Year 1** Research of existing situation (e.g. focus groups and face-to-face interviews) PR/media/communications campaign on general waste awareness (e.g. TV, radio, newspapers) Set up campaign team Monitoring and review

	Year 2 Action (e.g. door-stopping, mailing flyers) Local events/exhibitions/partnerships PR focus on slogans, single messages, specific waste streams Monitoring and review **Year 3** Link to associated waste streams (e.g. compost) and campaigns PR/media/communications reinforcement of messages Monitor and review
Delivery	**Management team** (internal) – 30% budget allocation Campaign manager to interface at national and local levels **Campaign team** (up to 6 short term staff – one for Tallinn (Harju), Tartu and Ida-Vini (Parnu) and 3 to cover the remaining Counties) to provide local delivery National and local partnerships Information on how, where to recycle Local messages Events, exhibitions Actions with door stopping, leaflets, mailing, web information, incentives and promotions **PR Agency** (external) – 60% budget allocation Advertising Media communications Branding, design, messages, tone Advertorials **Research Agency** (external) – 10% budget allocation Situation analysis Target audience Performance indicators
Budget	The budget is linked to the population size (1,365,265 people) and a minimum spend of or €1.50 normalised for the Estonian economy (Average salary UK / EU15 is €24,500, Average Estonian salary €6,240), equivalent to €0.38 /person or €518,800 /year For a 3 year campaign, the projected budget would be €1,554,000 **Year 1** Management Team and materials €155,400 PR Agency and materials for design and delivery of national campaign €310,000 Research Agency and materials €51,800 **Year 2** Management Team and materials €155,400 PR Agency and materials for design and delivery of national campaign €310,000 Research Agency and materials €51,800 **Year 3** Management Team and materials €155,400 PR Agency and materials for design and delivery of national campaign €310,000 Research Agency and materials €51,800
	3 Year Campaign Budget €1,554,000

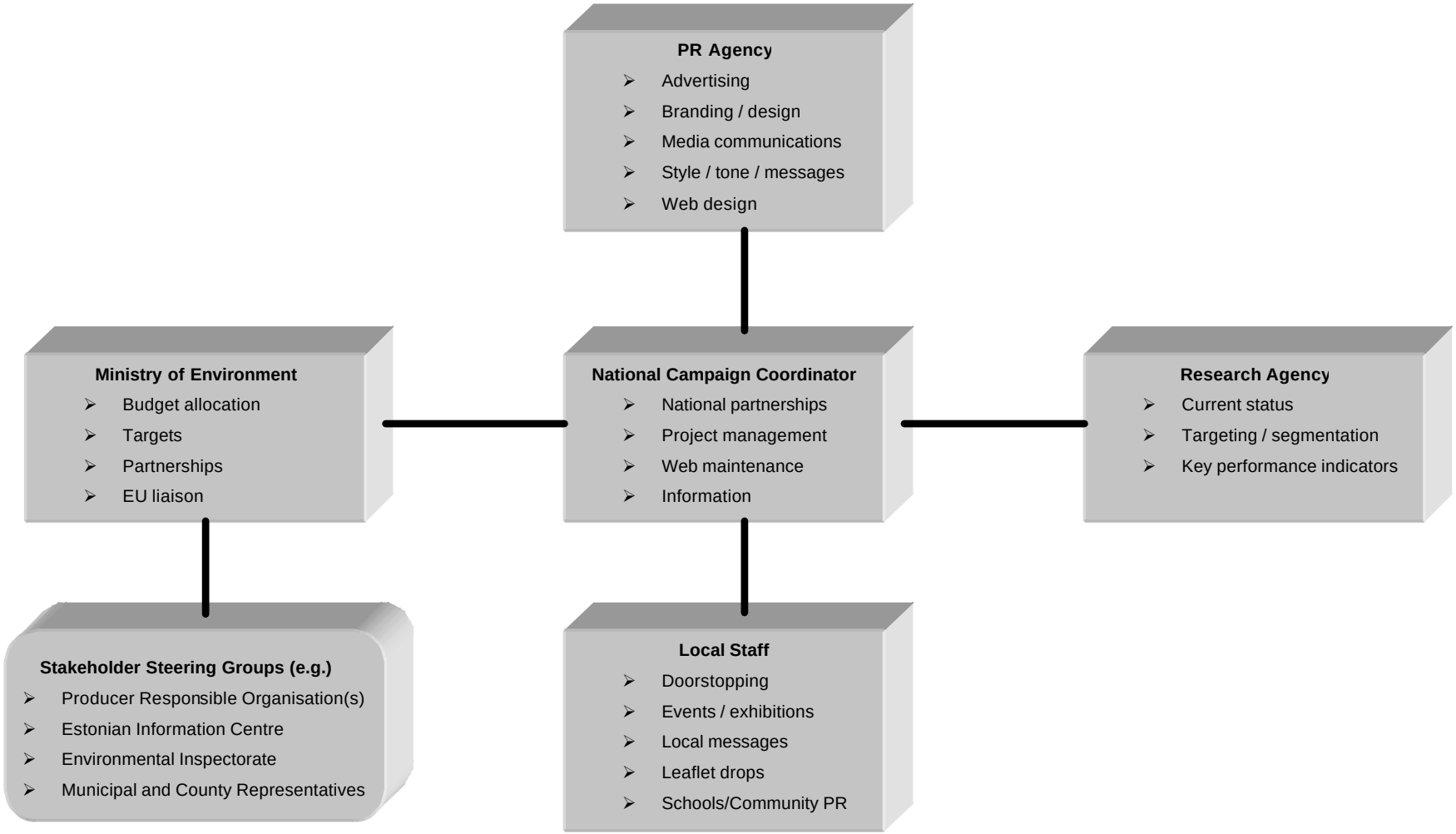
A three programme is seen as essential to the success of the collection scheme, this has been borne out by numerous studies, collection schemes work – but do need active management and effort to initiate and change people's behaviour to use the scheme. A three year budget is estimated at €1,554,000.

5.4 Roles and Responsibilities

The roles and responsibilities of the Campaign Team are shown in Figure 24. Successful campaigns need a full-time co-ordinator to liase at a national level with stakeholder groups (e.g. Ministry of Environment, County and Municipal staff, Environment Inspectorate) and to project manage external supporting organisations (e.g. PR Agency, Research Agency) and Campaign staff. To ensure that the impact of the Campaign is optimised, local delivery by trained Campaign staff will be important so that local knowledge can be imparted to householders (where, how to, when), the local community engaged, any problems identified and solved, and local "messages" developed. It is suggested that based on the size of the population, 6 staff are required, one to cover each of the three largest towns and three to cover the remaining Counties (i.e. 4 each). Staff will be required to work on a full-time basis initially (in the first year), with less time required in Years 2 and 3. Resources will be equivalent to 6 short-term staff overall.

The use of external Agents for PR and research is cost-effective and is an additional resource required for the Campaign. The Agents need a comprehensive brief, performance targets and a budget allocation. Project management of the Agents should be the responsibility of the National Campaign Co-ordinator.

Figure 24 Example National Campaign Team



5.5 Key Actions for Successful Implementation of the Strategy

Effective communication with householders is essential to the success of any separate waste collection system. A public awareness, education and consultation programme should be carried out in advance of and during the implementation of a separate collection system. There is a wide range of media tools available for doing this; selection of the campaign approach and methodology will depend on local conditions.

After commencement of the collection system, the programme operators should implement a sustained programme of public awareness and education throughout the life of the collection system. This is essential to maintain householder interest and participation in the scheme inform new householders in the area and keep users informed any changes that the operator wishes to make to the system over time.

Awareness Campaigns

Public awareness campaigns encourage individual consumers and householders to help achieve sustainable waste management through producing less waste, buying products made from recycled materials, separating waste for recycling and home composting, and taking part in local debates on waste management.

Any nation-wide awareness campaign, targeted predominantly at the general public, aims to encourage and maintain positive change in public awareness, attitudes and behaviour towards waste production and management. These initiatives aim to encourage people to adopt more responsible attitudes towards waste and to deal with it in ways that are more sustainable, such as reduce it (at source), reuse it, recycle it, or dispose of it safely if no other alternative exists.

Local Municipalities will want to consider the role of awareness and information campaigns in supporting sustainable waste management. Research conducted on behalf of one campaign concluded that local waste awareness campaigns should:

- Use all forms of media;
- Challenge a belief, misconception or complacency;
- Be thought provoking;
- Make the campaign personal, highlighting individual actions;
- Use simple, focussed messages;
- Avoid individual blame or allocation of guilt;
- Use comprehensive yet easily understood messages.

The Government should encourage local municipalities to work alongside the national campaign.

The strategy for the campaign should address issues such as:

- The reason for the campaign;
- How it supports recycling initiatives;
- Audiences at which the campaign is directed; and
- Anticipated/desired behaviour change.

5.6 The Key Steps for a Campaign

Audit and analysis

Start with a situation analysis to provide a benchmark to monitor future developments against, and to give a clear picture of the pre-campaign situation.

Campaign focus

Develop the tone and style of the communications, the primary message and any sub-messages.

Messages and tone

The message tone should be serious but friendly, fun and light-hearted. Link messages with action-based advice. Inform householders the benefits of recycling and how to do it.

Test the message and creative treatments amongst representatives of the target audience as well as non-targets.

- Use few messages and keep them simple (e.g. waste aware, recycle more, rethink rubbish);
- Make it easy (design, infrastructure, messages, how to);
- Make it matter and locally relevant;
- Use clever treatment and concepts;
- Test and re-test the message, concepts, treatments and media;
- Use a communications mix (advertising and PR, face-to-face communication, events, direct communications);
- Professional marketing expertise is needed at all levels and phases;
- One-to-one communication is time consuming and expensive but is an effective medium for getting the message across;

- Partnerships are important in the equation of success; and
- Allocate a large enough budget (for staff and materials) and allow time for planning, testing, implementation and follow-up.

Mechanics

Develop a combination of activities and tools in order to get the message across and generate action.

- Advertising – television, radio, national and local press;
- Direct-marketing – door stepping, leaflet drops, inserts; and
- Public relations.
    - Press releases and photo opportunities targeting press and media, picking out newsworthy factors and key reasons of why it is of use. Develop a relationship with the media, building on existing links to support promotional activities; and
    - Events, meetings and exhibitions.
- Publications – leaflets, posters, brochures, stickers direct to householder;
- Incentives and promotions – third party promotions, e.g. retailers and businesses with a local presence, merchandise and widgets to spread awareness and reinforce the message, competitions; and
- Web presence.

Monitor and review

Develop a set of key performance indicators to monitor the waste awareness campaign. A range of techniques will be needed to collect the required data, such as:

- analysis of waste arisings collected tonnages of residuals, recyclables
- bin monitoring
- participation and put-out rates
- recording opportunities to see (OTS) and advertising value equivalents (AVEs) for media coverage, response to campaign material (such as helpline calls, website visits)
- qualitative pre and post-campaign focus groups with the target audience
- quantitative pre and post-campaign questionnaires with the target audience.

Infrastructure and resources

- Prepare collection staff / contractors in the requirements of the campaign – if possible, provide some training of operatives.
- Ensure that the recycling infrastructure can cope with increased demand.?
- Ensure that each element of the campaign is appropriately staffed and that staff are fully trained in its requirements.

6 Reporting Requirement

The EU Directive on Packaging and Packaging Waste was amended in December 1999, and a requirement to publish a compliance monitoring strategy each year, commencing in 2000 was established. This places a duty on the Estonian Ministry of Environment to monitor targets for three distinct groups, which are:

- Registered producers;
- Compliance scheme operators; and
- Companies that the Ministry considers may be obligated producers but are not registered with an agency or are members of a compliance scheme.

In undertaking its duty to monitor compliance with the regulations the Ministry checks four key requirements, these are:

- Those persons who are obligated producers are registered
- All relevant packaging is included in the data return
- All relevant activities are included in the data return
- Calculated obligations are correct

Compliance monitoring fulfils two principle objectives. Firstly to ensure that all producers meet their responsibility which in turn helps to minimise any possible business advantages that may be gained from non-compliance. Secondly, compliance monitoring ensures that the regulatory system placed on industry delivers the required volumes of Estonian packaging waste for recovery and recycling such that Estonia is able to demonstrate compliance with the EU Directive targets. The compliance monitoring is conducted by the Estonian Environment Information Centre who verify and validate data on packaging. This data is collated and then provided to the Ministry to enable them to review and report on the Estonian position.

6.1 Packaging Database

Databases on packaging and packaging waste must be established so that the implementation of the Directive may be monitored. In order to ensure harmonisation of the information recorded in such databases, the Commission established formats for the database system (Decision 97/138/EC). The databases must provide information on the magnitude, characteristics and development of the packaging and packaging waste flows, which must include information on the toxicity or danger of packaging materials and

components used for their manufacture. To ensure that accurate data is collected, the economic operators involved are placed under an obligation to provide the Ministry with relevant and reliable data.

6.2 Current Data Practices

The National Packaging Register was established following the introduction of the Packaging Act in 1997 for alcoholic beverage packaging and 1998 for soft drinks packaging and from 1999 for other packaging. Producers registered in the Business Register and affiliated branches of foreign business associations in Estonia who manufacture or use, import or export packaging, packaged goods or packaging waste, recover packaging and/or packaging waste, are obligated to submit data to the National Packaging Register. A computer in the Estonian Environment Information Centre stores and compiles consolidated reports according to the packaging register forms using a Visual Fox Pro database program. The inquiry tables of forms are quite detailed and need experience to complete, there are five forms to complete. There are separate forms for alcoholic beverage, soft drinks and for exemption of the excise duty. The information required in the forms includes; imported and exported packaging quantities, packaging filled by producers, the methods and sites of packaging waste management and imported-exported amounts of packaging waste. Form tables contain separate columns for categories and types of packaging material (e.g. polyethylene, sales packaging). The Statute of Packaging Register obligates producers to submit their packaging data every year by 1 of March. The data collection of alcohol and soft drinks packaging is supported by the Packaging Excise Duty Act, and forces companies to keep correct documentation to receive the certificate for exemption from excise duty. For other forms of packaging, information is sparse as there little requirements to complete the information.

- The current computer system has the following software and hardware:
- OS Requirement – Linux
- Server – Apache
- Database – SQL
- Web application server - Zope
- Programme language – Python
- IBM eServer x232, 1Gb RAM, 1.13GHz Pentium III
- IBM eServer x200, 128 RAM, 800 Mhz Pentium III
- Barricade Firewall

6.3 Future Practice

The existing system for recording data on packaging and packaging waste does not meet a number of needs related to promotion of reduction and recovery of packaging waste. E.g. the lack of reliable data in the Packaging Register makes it difficult to work out the principles of establishment of a packaging waste collection and recovery system covering all types of packaging.

The new Packaging Act (2004) places obligations on the producer responsible organisation (accredited by the Ministry) to guarantee the collection and reuse of packaging waste on behalf of companies who are the original producers placing packaging on the market and to report the information on behalf of members registered with the scheme. Companies will be able to register via a compliance scheme or individually. It is hoped that the majority of producers will select a compliance scheme route to fulfil their obligations. In this case an inter-company collection and recovery system for packaging and packaging waste would be created and it would be more practical if the functions related to collection and administration of information on packaging and packaging waste be largely handed over from the Packaging Register to the new organisation to be established. The task of the Packaging Register would then be to collect, analyse and verify the consolidated data received from this organisation and to organise reporting.

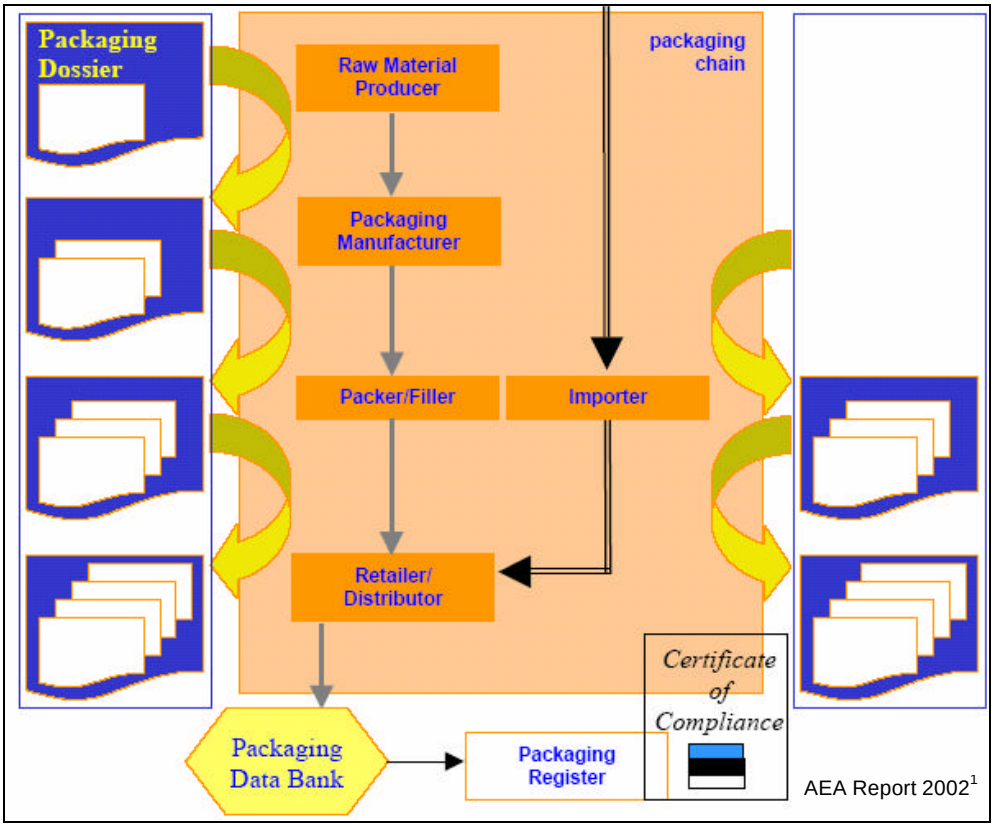


Figure 25 The Packaging Dossier Route

This will change the nature of the database collection, as most of the initial processing will be completed for the majority of producers by the producer responsible organisation. It has been proposed, but not decided, that a new independent Packaging Data Bank (PDB), acceptable to industry and approved by the Ministry is established. The PDB is a database where all required industrial packaging data is collected and reprocessed while conforming to legal requirements. Confidentiality contract with the schemes/companies to guarantee confidential handling of data would be required. The task of the "Packaging Data Bank" is to collect the data from the Producer Responsible Scheme (s) and any individual companies. The PDB will provide appropriate electronic forms or hard copies to fill out the required data and information at an individual basis to be returned to the Bank for processing. The Bank will generate an annual report with respect to all required data and supporting information for submission and verification to the Packaging Register held at the Estonian Environment Information Centre.

6.4 Data Type, Route and Scale

The AEA report 'Assistance in Implementation of Directive 96/62/EC on Packaging and Packaging Waste for Estonia' proposes the use of a Packaging Dossier to collect information on the packaging composition and added packaging along the packaging chain as required by the New Packaging Act. The Dossier should be come an integral part of business and the relation between the customer and the supplier. Most orders are based on order-forms and linked to specification sheets. The report details the information requirements and the interaction between the organisations and the Packaging Register.

The Estonian Environment Information Centre would process registration application forms and update the Ministry database. On receipt of an application, the form is reviewed for completeness and then checked to ensure that the data tables are completed and in a coherent manner. Finally the obligation is checked to ensure it correlates with that calculated by the producer.

Any errors or concerns arising from the assessment of the registration forms and data provided are highlighted and the applicant is requested to revise the application by providing the required information or rectifying any errors in the data tables. Once a satisfactory application is received, the registrant details are entered onto the Packaging Register database.

Following registration, field staff located in the Inspectorate offices will generally undertake the next stage of compliance monitoring. Staff will ordinarily monitor registered producers

through an on-site visit. In some circumstances monitoring will also be undertaken through desk-based audits. Where a visit is to be undertaken, this will be preceded by preparatory work, which will include a review of current and previous registration data forms, any previous requests for re-submissions and any advisory guidance given in previous communications. As a result of compliance monitoring of a registrant one of three outcomes will normally be determined;

- Satisfactory, based on the aspects monitored, the registrant is compliant, at the time of monitoring;
- Data form has to be re-submitted; or
- Further investigation required, which may lead to enforcement action.

The number of obligated companies in Estonia under the Packaging Waste Act is currently unknown. The indication are that some 10-12,000 companies (per communication MoE) would be obligated that place packaging or packaging waste on the market.

6.5 Database Requirements

The Directive requirements and the Packaging Act lay out the content of the database. In the future, the input from the companies could be in any of three formats – paper based, PC based using a software program (usually Access or Excel based) provided by the Estonian Environment Information Centre and producer responsible organisation(s) on disk or web (internet based). The advantages of computer based data entry are numerous, not least in terms of the time saving of data input, easier tracking and error control. The UK is currently moving from a paper based data system to an on-line database, and a growing number of the producer organisations compliance schemes in the EU15 use Internet reporting. The Estonian Environment Information Centre would also support the use an Internet based system as the most economic method.

Many countries now use Internet reporting for VAT, Income Tax and promote e-commerce, with economic cost savings that will be an important consideration for the companies returning their data. Companies are increasing using, and trusting the use of the Internet to complete proposal and tenders containing confidential information. Several Government based e-market places and portals have been created for public procurements (with proven significant cost savings) and act as demonstrator points that catalyse demand and participation to help companies embed an e-culture. On this basis, and with the high levels of participation within Estonian companies an Internet based system would advantageous as the prime route for data entry. A small number of organisations may wish to use the

suggested alternatives that can also be provided with little extra effort having established the main system. The issues of legal, security and data protection are briefly discussed in the following sections.

6.5.1 Electronic Documents

A common problem with conducting business on-line is that the legal status of electronic documents or information is often unclear. Even if the content of the electronic message is identical to a written document, it is by no means certain that it will be accepted as a contract by a court. Furthermore, it is often not clear when a contract becomes effective legally, if it is sent electronically. Special agreements, otherwise known as interchange agreements, should be negotiated between trading partners to decide the legal status of electronic documents. The need for such measures may be re-examined once the legal recognition of electronic contracts has been achieved.

6.5.2 Security

Security of data during transfer raises difficult questions of company data privacy protection. However, the ability to use encryption is essential to the development of electronic data, and the use of digital signatures can be used. The lack of standardisation on this technology does hinders its introduction into the legal process and acts as a barrier to electronic commerce that is being addressed within the EU.

6.5.3 Data Protection

In the field of data protection, national laws should take a practical and balanced approach to the issue of third party disclosure and the transfer of data outside the EU. Transfer of data within a company or groups of companies in this case the producer responsible organisation and the Ministry should be permitted without the need to go back to the data subject to obtain further consent. Concern may be raised by the producer companies regarding the security of their data and the requirements for the provision of environmental information to third parties. Clear guidelines must be set between the commercial company data in the Packaging Dossiers and the Packaging Register information parts of which are publicly available.

6.6 Example System

An example of some of the steps that require to be in place for an Internet database entry system are listed:

- Registration with the Estonian Environment Information Centre to set up an account and obtain a **Primary Contact**, a **Company Number**, a **Login ID**, and **Password** to

the online data reporting and management system. (Primary contacts have sole access to the online account, but can set up separate passwords for other members of the company registration team);

- Access the reporting and management system via the Internet (digitally signed);
- Log-in screen with membership identification number, login name and password;
- Verify that the data is correct, as provided in pre-registration;
- One-time registration of basic filing and data reporting contact information (e.g., company, address, contact information);
- Provision of 'security telephone phrase' requiring a question to be asked should the company require to speak with an adviser at the Centre with the appropriate answer to be given;
- Provision to allow Primary Contact to assign separate passwords for subsidiary companies / contacts to enable them to report information through a primary contact. (These will require individual Login ID's and Passwords set by the Primary Contact as Secondary Contacts cannot access the company registration screens – only data input screens);
- Packaging Data reporting screens by material type to allow entry of the quantities of designated materials as measured or reported and required by EU;
- Additional information to explain the basis for reported information and the method of calculation;
- Data can be saved at any point in time, calculations are not processed or complete until final verification and submission;
- Summary table of reported or calculated obligations; and
- Final verification and submission on separate Declaration page, with legal agreement 'tick box'.

6.7 Specification and Cost

A typical specification will have to cover the following requirements:

- Proposed architecture
- Hardware details/costs (CPU/Memory/disk space/bandwidth)
- Software Components
- Functionality Breakdown
- Operating Requirements
- Manual Processes
- Automated Processes
- Use Cases
- Database Requirements
- Database to be used (SQL Server/Access/Sybase/ORACLE)
- Database schema (table definitions)
- Database stored procedures (automated processes)
- Other software required
- OS Requirements
- Details/Costs of other software packages
- Performance
- Specific performance requirements
- Will there be any extended searches
- Are there any SOD/EOD requirements (Start of Day/End of Day batch processes)
- Security
- User levels and permissions
- Network/Bandwidth

- Network requirements
- Backup and Contingency Requirements
- Uptime availability
- Backup processes replication
- Identified areas of High Risk
- Risk Areas
- Suggested development Schedule
- Resorting schedule

The current IT hardware and software is now over four years old and requires to be upgraded. It is suggested that the new system be designed using similar components to the current system. Initial costs for the hardware and software have been budgeted at €20 - 35,000 for the hardware and a further €35,000 cost to develop the software applications and licensing to provide the packaging dossiers, Packaging Data Bank and interfaces to the Packaging Register and Waste Register.

Bibliography

1. AEA Technology (2002) Project: Assistance in Implementation of the Directive 94/62/EC on Packaging and Packaging Waste for Estonia, Phare Project No. DM.ET.14.01/PW.

2. Argus in Association with ACR and Carl Bro ajs (2001) European Packaging Waste Systems - Main Report, European Commission DGX1.E.3

3. Baltic Environmental Forum Report (2002) “Ready for EU accession? Environmental Reporting Requirements for a future EU Member State”.

4. Department of Environmental Protection (1996) Environmental Information Systems in Moldavia, UNEP/GRID

5. Department of the Environment (2002) Consultation Paper on Recovery Targets in Northern Ireland for Packaging Waste.

6. DSM Environmental Services (1999) Feasibility Study: Domestic Solid Waste Diversion by Curbside Recycling, Sherman Texas

7. E-Business Policy Group (2002) Benchmarking National and Regional E Business Policies, Stage 1 Synthesis Report

8. Eco Alternatives Limited (2002) Collection Cost Projections, Strategic Unit Cabinet Office UK.

9. Ecotec Research & Consulting (2002) Maximising Recycling Rates: Tackling Residuals, Friends of the Earth and Waste Watch

10. Ecotec Research & Consulting Costs for Municipal Waste Management, Report to the EC

11. Ecotec Research & Consulting Financial and Incentive Schemes for Municipal Waste Management, Report to the EC

12. Ecotec Research and Consulting (1999) BEYOND THE BIN: THE ECONOMICS OF WASTE MANAGEMENT OPTIONS, A Final Report to Friends of the Earth, UK Waste and Waste Watch

13. EKO-KOM System (2004) Extract web site www.ekokom.cz

14. Environment & Heritage Service NI (2003) Municipal Waste Data Monitoring and Reporting Interim Guidelines.

15. Environment Agency (2003) Compliance Monitoring Strategy for the Producer Responsibility Obligations (Packaging Waste) Regulations 1997 (as amended)

16. Environment group research report (2003) Separate waste collection systems best practice review, research report /02

17. EPA United States (2002) Waste Transfer Stations – A Manual for Decision Making

18. Estonia Environment Information Centre (2001) Web Site Waste Section

19. Eunomia research and consulting (2000) Maximising recycling rates and tackling residuals, Final Report to Community Recycling Network

20. Harvard University (1995) Solid Waste Information System, Pacific Basin Research Centre

21. Kerry County Council (2002) Answer (A New Solid Waste Environmental Report), LIFE 99 ENV/IRL/000611

22. Mayor of London (2004) Rethinking Rubbish in London, Municipal Waste Management Strategy

23. National Waste Awareness Initiative (2002) Rubbish, Retailers and Research – Defining a National Campaign

24. PIC Estonia (2000) Tallinn Waste Management Plan, Summary

25. RDC-Environment & Pira International (2003) Evaluation of costs and benefits for the achievement of reuse and recycling targets for the different packaging materials in the frame of the packaging and packaging waste directive 94/62/EC

26. Scottish Executive (2003) Strategic Waste Fund, Guidance for Local Authorities

27. Stewardship Ontario (2004) How to Register with Stewardship Ontario and Report and Manage Your Materials, Waste Diversion Act.

28. Strategy Unit Cabinet Office UK (2002) Waste Not, Want Not – A Strategy for Tackling the Waste Problem in England

29. Taylor Nelson Sofres Consulting (2000) Cost-Efficiency Of Packaging Recovery Systems, The Case Of France, Germany, The Netherlands And The United Kingdom, Final Report DG Enterprise

30. M. C. O'Sullivan & Co (2001) Waste Management Plan for the Connaught Region, Connaught Local Authorities

31. Com (2004) 127 Final Proposal for a European Parliament Directive amending Directive 94/62/EC on Packaging and Packaging Waste.

32. Packendi Ja Pakendijäätmete Kogumis Ja Taaskasutussüsteemi Rakendamine Eestis, (2003) Harri Moora, Säästva Eesti Instituut.

33. Clemens Ploechl (2003) A class of it's Own – Standardisation of Solid Waste Analysis in the EU, Waste Management World March.

34. Estonia (2003) Historical demographical Data of the Administrative Division, www.library.uu.nl/wesp/populstat/Europe/estoniap.htm.

35. Deniz Koca (2000) Assessment of Different Methodologies / Studies Used to Determine the Amount of Packaging Waste thet Remains in Final Disposal, Lund University

36. Kirk Mcclure Morton (2002) Southern Waste Management Partnership – Waste Management Plan

37. Biffa (2002) Future Perfect, An Analysis of Britain's Waste Production and Disposal with Implications for Industry and Government for the Next Twenty Years

38. Baltic Times (2004) Newsletter, EBRD postpones decision on lending EUR 19m for pulp plant in Estonia

39. BEF (2000) 2nd BALTIC STATE OF THE ENVIRONMENT REPORT – Chapter Waste, Committee of the Environment of the Baltic Council of Ministers

40. Peep Mardiste (2002) Selection of the location for North-West Estonia regional landfill. Case study, Estonian Green Movement, foe.

41. European Union Secretariat (2003) Comprehensive monitoring report on Estonia's preparations for membership, http://www.eib.ee

42. Ministry of the Environment (2002), National Waste Management Plan, Tallinn

43. Council of Europe (2003) Structure and operation of local and regional democracy Estonia, www.local.coe.int

44. Toomas Pallo, (2000) Packaging and Packaging Waste Management in Estonia, Estonian Institute for Sustainable Development, SEI-Tallinn

Glossary

Bring Sites	Local sites with large banks of containers for householders to take or bring their recyclable materials.
Civic amenity site	An area where members of the public can bring rubbish to be thrown away, recycled or reused, usually managed by local authorities.
Commercial waste	Waste from buildings, which are used mainly for trade, business, sport, recreation or entertainment. For example a school, a restaurant or a supermarket.
Compliance scheme	An organisation that complies with the packaging waste regulations on behalf of its member companies. Businesses obligated under the packaging regulations can join a scheme and transfer their legal obligations to it. The scheme takes on responsibility for achieving the recovery and recycling obligations of its members.
Composite packaging	Composites are multi-layered sheet laminates which consist of dissimilar materials e.g. laminated juice cartons, as opposed to multi-material packages which are constructed of assembled components of different materials e.g. a bottle of wine which consists of the bottle, a cork and a label.
Composting	Aerobic and anaerobic treatment of biodegradable packaging waste. This is classed as recycling.
Cullet	Cleaned and crushed waste glass, used for recycling (glass in bottle banks becomes cullet).
Economic instrument	A policy tool that is designed to provide an economic incentive for organisations and individuals to change their behaviour towards the environment and aims to

	ensure that all environmental costs are included in the price of goods and services (i.e. that all external costs are internalised).
Energy from waste recovery (EFW)	Household waste, which includes packaging, has a calorific value similar to coal. As such, this waste can be burned at high temperatures to create energy in the form of heat and electricity. This process is called energy from waste.
EU Directive	EU stands for European Union, which is made up of the majority of the countries in Europe. Countries who are part of the EU have to follow its rules and laws, which means they all work together. A EU Directive is a type of law, which is issued by the EU, and all EU countries then have to put this into their own legal system. For example, the EU made a Directive that said all countries have to recycle a certain amount of packaging. Estonia then put this into its own law called the Packaging Act 2004.
Exporting	The supply of packaging materials or packaged goods from Estonia to countries outside Estonia.
Fly tipping	Waste that is dumped illegally by householders or businesses. Fly tipping is illegal and can carry a fine, or in some cases a more serious punishment.
Green Dot®	The Green Dot® is used throughout Europe as a recognised symbol indicating that a financial contribution has been paid to a national packaging recovery company, that has been set up in accordance with the principles defined in the European Directive for packaging waste and its national law. It is not a recycling symbol. The Green Dot trademark is operated independently by a number of organisations for industry in 14 countries. Companies using the Green Dot on their packaging are required to pay a licence fee for the

	use of the trademark.
Household waste	This includes waste from household collection, from services such as street sweeping, bulky waste collection, litter collection, hazardous household waste collection, separate garden waste collection, waste from civic amenity sites and wastes separately collected for recycling through bring or drop-off schemes, kerbside schemes and at civic amenity sites.
Importing	Receiving packaging materials or packaged goods into Estonia directly from countries outside Estonia.
Incineration	Controlled burning of waste to reduce volume, sterilise or to remove harmful chemicals. Energy may also be derived from the incineration of waste.
Industrial waste	Waste from any buildings occupied by a factory or industry.
Kerbside Collection	Any regular collection of recyclables from premises. (May include commercial or industrial premises as well as from households). In some schemes separate recyclable materials may be collected in a special bag or box.
Landfill	Usually a large hole in the ground, such as an old quarry or mine where waste is deposited. New landfills have engineered cells that are lined to prevent leachate from escaping.
Materials reclamation facility (MRF)	A place where materials for recycling are taken for sorting into material types before delivering to reprocessors (companies who recycle). A clean MRF sorts mixed source-separated dry recyclables into separate fractions such as plastic, glass, steel and aluminium. This sorting may be predominantly manual

	or may be automated.
Municipal Solid Waste (MSW)	Includes household waste and any other wastes collected by a waste collection authority, or its agents, such as municipal parks and garden waste, beach cleansing waste, commercial or industrial waste, and waste resulting from the clearance of fly-tipped materials
Obligated company	In the context of packaging and packaging waste, a company that is required to recover and recycle packaging from the end user. This can be undertaken directly or through an accredited packaging responsibility organisation.
Obligation	The amount of packaging obligated companies or schemes have to recover and recycle by obtaining compliance evidence.
Packaging Act 1995	These regulations followed the European Union law (called a Directive) that meant that all member nations had to put into place systems to recycle packaging waste. They define packaging, packaging waste and requirements including the packaging waste recovery targets for Estonia.
Packaging Act 2004	The new Act updates the requirements of the EU Directive and provides the legal framework for the organisation, collection and reuse of waste.
Packaging and Packaging Waste Directive	In 1994, the European Union passed a law (called a Directive) that meant that all member nations had to put into place systems to recycle packaging waste. Each country was allowed to decide on the best system for them, so long as they made sure that they could recycle

	at least 50% of a member states packaging waste. In Estonia, the government passed the Packaging Act to implement this Directive in 1995 and update the regulation in 2004.
Packaging waste	All packaging which ends up in the Estonian waste stream.
Packaging waste regulations	Legislation to reduce the amount of packaging that is landfilled, and increase the amount of packaging that is recycled and reused. Companies can do this themselves or register with a compliance scheme that will do this on their behalf.
Primary packaging	Packaging designed to be the sales unit sold to the final user or consumer at the point of purchase. For example, glass jars, beer cans or cereal boxes.
Producer responsibility	A mechanism for making the people who make (produce) items e.g. manufacturers, which may become waste or pollution, responsible for it. The packaging waste regulations are an example of producer responsibility law.
Producer Responsibility Organisation	An organisation accredited by Government with the responsibility to recover packaging and packaging waste on behalf of obligated companies.
Recovery	This is also a generic term for the 'take back' of material (packaging and packaging waste) as a whole and includes recycling and the burning of waste.
Recovery target	This is the amount of packaging waste that obligated companies and schemes must recover each year.
Recyclable	Waste that can be used readily in a similar or altered form.

Recyclate	The raw material to be processed into a recycled product. May not necessarily be the same as the end product, and has probably undergone some reprocessing.
Recycling	The process by which materials that would otherwise become solid waste are collected, separated or processed and returned to the economic mainstream to be reused in the form of raw materials or finished goods.
Recycling	Is defined in the Regulations as "the reprocessing in a production process of the waste materials for the original purpose or for other purposes". This includes composting, but excludes energy from waste.
Recycling target	This is the amount of packaging waste that must be recycled by obligated companies and schemes each year.
Reprocessing	The common term for the process by which packaging waste materials are recycled and/or recovered.
Reprocessor	A company who recycles materials by converting the recovered materials into another product.
Re-use	The act of using an item more than once. For example, refilling glass bottles with the same product.
Reused packaging	Reused packaging is any packaging that is being used for a second or subsequent time. Examples would include second-hand pallets, reusable plastic crates and milk bottles.
Secondary packaging	Packaging used to combine a number of single sellable units. The packaging can be sold along with the units or can be removed before being sold to the final user. If the packaging were to be removed it would not affect

	the characteristics of the product. For example, corrugated boxes and trays or shrink-wrap.
Tertiary packaging	Packaging used to aid handling and transport of a number of sales units. The packaging is specifically designed to prevent damage during transportation. Transport packaging does not include road, rail and air containers. For example, pallet stretch wrap and metal strapping.
Waste Act 2004	This new waste act updates the requirements of the EU Directives on waste, replacing the older 1998 Waste Act. It provides legislation to ensure the organization, collection and disposal of waste to meet specified standards.
Waste arisings	The amount of waste generated in a given locality over a given period of time.
Waste stream	There are three waste streams: household, commercial and industrial. Waste is channelled either to recycling, recovery or landfill.
Waste transfer station	A place where rubbish is delivered for sorting before it is landfilled, incinerated or recycled.
Wood	The EU added a new category of packaging to the regulations on 1 January 2000. It includes all wooden packaging on its maiden trip e.g. new pallets.

Appendix 1 Municipal Waste Survey Questionnaire

Appendix 1 Municipal Waste Survey Questionnaire

This Questionnaire was created in Microsoft Excel and uses an auto-entry system.

Municipal Waste Arising Survey

Prepared by the Ministry of Environment
National Packaging Waste Collection & Recovery

The following questionnaire has been prepared to collect information on performance indicators for municipal waste collection, recycling, and disposal from all Municipalities in Estonia. This information is required to formulate the development of a national packaging waste collection and recovery scheme to progress towards national and local targets and to enable Estonia to meet EU reporting obligations.

When completing the questionnaire please note:
• Financial information is not required;
• If you are unable to complete a question, please estimate as much as possible and return the completed questionnaire;
• It is not intended that this questionnaire should take more than 30 minutes to complete.

You may need to consult a number of officers in your authority to provide the information. We would be grateful if one officer would take responsibility for co-ordinating the response and for returning the completed questionnaire. We apologise for the short timescale, but this is necessary to keep within the new Packaging Act timescales for implementation.

Type the information for the first record and to move to the next field, press TAB. To move to the previous field, press SHIFT+TAB.

For any further information please contact the county officer.

Please return the completed questionnaire using the auto return) by the 4th June 2004.

Part A: Information about your municipality

A1 Name of your municipality:

A2 Name of county:

A3 Date on which this questionnaire was completed:

A4 Details of person completing the questionnaire:

Name:

Title:

Department:

Address:

Tel: Email:

Part B: Indicators to be measured for collection schemes

B1 Population of municipality:

B2 Population density (persons living per square kilometre)

B3 Number of households in the by municipality

Housing type	%
Rural	
Urban	
Residential	
Commercial	
Industrial	Total 0 %

B4 Approximate number of rural properties

B5 Approximate number of residences with gardens

B6 Approximate number of high-rise or apartment blocks

B7 Approximate number of commercial properties

B8 Approximate number of industrial units

Part C: Waste collection and types

C1 Waste Categories (Mixed wastes collected in the municipality or by others)

	Tonnes	%
Household		
Commercial		
Industrial		
Total	0	0

(If you collect both mixed and commercial / industrial waste please do not count twice)

C2 Has your municipality analysed the composition of household waste since 2000? (please select box)

Yes ☐ ☐ No (Go to Part D)

If YES

C3 Waste composition of mixed household waste

Waste Material	Waste found by weight
Paper & card	%
Plastic	%
Glass	%
Metal	%
Wood	%
Organic	%
Residual	%
Total	0 %

Part D: Separate collections for reuse, recycling or recovery

D1 Of the waste collected for disposal by your municipality or waste contractors is any collected separately for reuse, recycling or recovery?

Yes ☐ No ☐ (Go to Part E)

If YES

D2 Do you operate any household kerbside (house to house) schemes (excluding commercial or industrial waste)?

Yes ☐ No ☐ (Go to Part D5)

If YES

D3 Number of households serviced

D4 What is the waste composition of the separate (house to house) collections

Waste Material	Material collected for re-use, recycling or recovery
Paper & card	Tonnes
Plastic	Tonnes
Glass	Tonnes
Metal	Tonnes
Wood	Tonnes
Organic	Tonnes
Residual	Tonnes
Total	0 Tonnes

D5 Do you operate any Bring (containers for collection of different materials from householders) schemes (excluding commercial or industrial)

Yes ☐ No ☐ (Go to Part D8)

If YES

D6 How many of these separate collection facilities for householders are located in the municipality?

D7 What is the waste composition of the collection scheme?

Waste Material	Tonnes collected for re-use, recycling or recovery
Paper & card	Tonnes
Plastic	Tonnes
Glass	Tonnes
Metal	Tonnes
Wood	Tonnes
Organic	Tonnes
Residual	Tonnes
Total	0 Tonnes

D8 Do you operate any <u>commercial</u> (office based companies) or industrial (manufacturing based Kerbside schemes?

Yes ☐ No ☐ (Go to Part E)

If YES

D9 Number of commercial units serviced

D10 Number of industrial units serviced

D11 What is the waste composition of these commercial and industrial schemes?

Waste Material	Tonnes collected for re-use, recycling or recovery	
Paper & card		Tonnes
Plastic		Tonnes
Glass		Tonnes
Metal		Tonnes
Wood		Tonnes
Organic		Tonnes
Residual		Tonnes
Total	0	Tonnes

Part E: Organisations Operating Bring (Drop off) schemes for recycling or recovery

E1 Are there any private organisations operating schemes in your area for recycling and recovery (for example paper or bottle banks)?

Yes ☐ No ☐ (Go to Part F)

If YES

E2 Please complete the following

Name of Organisation	Materials	Tonnage

Part F: Materials sent to Sorting Facilities (MRF) or Transfer Station

(In order to avoid double counting of packaging wastes please answer the question below)

F1 Was any waste collected by you or on your behalf sent to a sorting facility (MRF)?

Yes ☐ No ☐ (Go to Part F4)

If YES

F2 Please specify material sent to MRF

	Tonnes
Segregated Materials	Tonnes
Mixed Waste	Tonnes
Other (specify)	Tonnes
	Tonnes
	Tonnes
Total 0	Tonnes

F3 Where segregated please breakdown by material type

Waste Material	Material collected for re-use, recycling or recovery
Paper & card	Tonnes
Plastic	Tonnes
Glass	Tonnes
Metal	Tonnes
Wood	Tonnes

Organic		Tonnes
Residual		Tonnes
Total	0	Tonnes

F4 Was any waste collected by you or on your behalf sent to a transfer station?

Yes ☐ No ☐ (Go to Part G)

If YES

F5 Please specify material sent to Transfer Station

Segregated Materials	Tonnes
Mixed Waste	Tonnes
Other (specify)	Tonnes
	Tonnes
	Tonnes
Total 0	

F6 Location (address) of transfer station(s)

Station 1

Station 2

Station 3

Part G: Final Disposal

G1 Please indicate the total tonnage of waste collected by you or by others that is disposed of **within** your municipality?

(Do not include material that is recycled) Tonnes

G2 Average distance (km) to landfill that waste travels Km

G3 Please indicate the total tonnage of waste collected by you or by others that is disposed of **outside** your municipality?
(Do not include material that is recycled) Tonnes

G4 Average distance (km) to landfill that waste travels Km

Part H: Publicity and Promotional Activities

H1 What methods if any has the municipality during the past year used to promote waste reduction, kerbside recycling and bring schemes?

Waste	Kerbside	Bring	Reduction	Recycling	Schemes
Advertising (TV/press/radio)					
Posters					
Leaflets					
Website					
Press and radio PR					
Schools and community links					
Canvassing (door-to-door discussions)					
Displays in town centres/county shows					
Parades					
Other (please comment)					

H2 Please comment on the success (or otherwise) of these activities

Part I: Other Comments

I1 Please use this space to provide any comment about the questionnaire or any of your responses

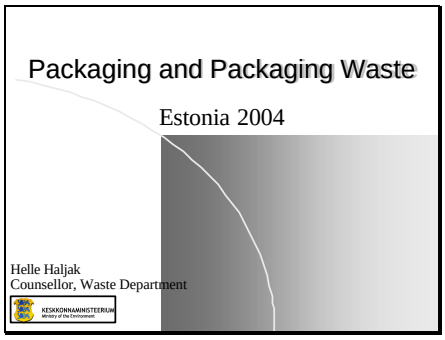
Thank you, for taking the time to complete the questionnaire

Please return it by clicking the send button 

Appendix 2 Presentation Material

Appendix 2 Presentation Material

1

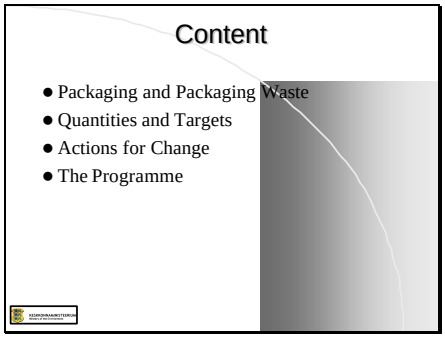


Packaging and Packaging Waste

Estonia 2004

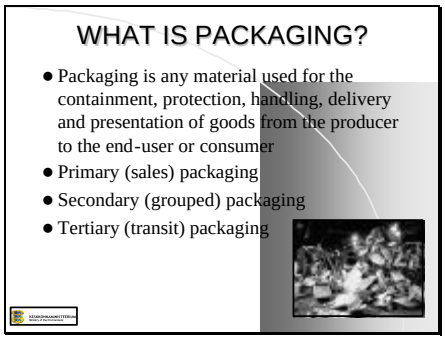
Welcome and introduction from chair or speaker.

2



The management of waste is a dynamic process that is continually improving as new environmental standards; equipment and levels of funding are introduced. Traditionally waste was managed at a local level with landfill being the most common route for disposal. More recently with EU policy this has moved to regional approaches and encouraged recycling and recovery from wastes when landfill will no longer be seen as the most economic or best environmental option. The introduction of packaging regulations across the EU member states has provided a platform for further improvement through the producer pays principle placing the burden of cost on the packaging waste producer. This presentation provides information on these requirements and how in Estonia we propose to improve the sustainable use of resources and meet the EU targets for recovery and recycling by implementing a nationwide recovery system.

3



First what is packaging?

Packaging is the term used to describe any material used for the containment, protection, handling, delivery and presentation of goods (from raw materials to processed goods) from the producer to the end-user or consumer.

There are broadly three categories:

Primary packaging, around the goods at the point of purchase by the end-user or consumer, e.g. a crisp packet;

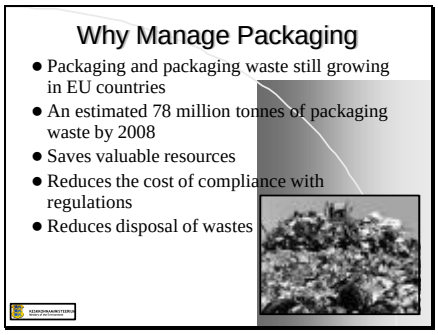
Secondary packaging, which groups items together until the point of sale, e.g. the box in which packets of crisps are supplied to the retailer;

Tertiary packaging, which allows handling and transport of grouped items, e.g. the pallet transporting the boxes of crisp packets.

The majority of all packaging is made from materials from six generic groups:
Paper, glass, aluminium, plastic, steel; and wood

In addition to these basic materials, packaging also contains other materials such as inks, staples, glue and varnish. In some instances more specialist materials such as textiles and ceramics can be used for packaging.

4



Packaging is crucial to the successful distribution of products. Packaging, irrespective of its type, serves a number of different purposes:

- It protects and/or contains the product;
- It makes handling and storage easier; and
- It makes it easier to identify the product.

Packaging is not the problem; it is the disposal of unwanted packaging to landfill. The consumer's preference for packaged products and social change on how these are presented on the market increases the amount across the EU by 3.5% each year. An estimated 78 million tonnes for the EU by 2008. This uses valuable resources and will incurring increasing costs to the producer of the packaging in both complying with the packaging regulations and disposal costs.

Estonia disposed of around 60,000 tonnes of paper and card packaging this year. It takes 2 to 3.5 tons of trees to make one ton of paper that is around 17 average sized trees per ton, so our total paper packaging requires over 1,000,000 trees. Pulp and paper is the 5th largest industrial consumer of energy in the world, using as much power to produce a ton of product as the iron and steel industry. Making paper uses more water per ton than any other product in the world. Recycled paper requires 50% less energy than new paper.

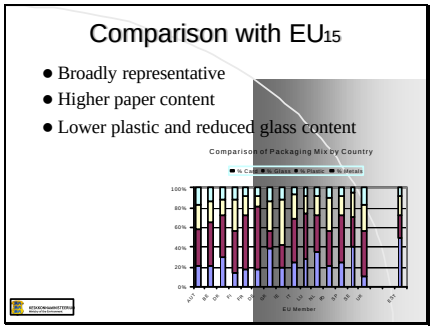
By managing packaging we reduce the demand on

resources and the associated costs of final disposal to landfill.

5

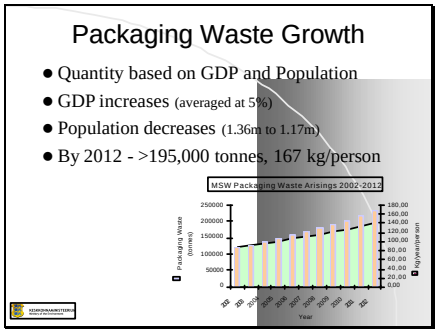
Packaging waste in Estonia represents approximately 20-30% of the solid municipal waste by weight. The total quantity of packaging produced in 2004 is estimated at about 132,000 tonnes 100 kg/year/person. This can be separated by material into the EU target constituents; paper and card (44%), glass (21%), plastic (17%), metals (8%) and wood (10%). MSW also includes commercial or business waste from the activities of offices, shops and catering establishments. Industrial waste from factories and industrial plant is separately collected and is relatively small.

6



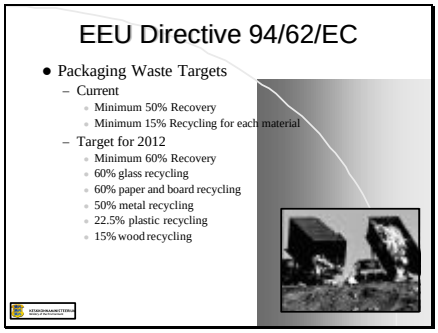
The percentage of each material is comparable with data from other EU countries and is broadly representative. The element of paper packaging is higher than the EU15 members in line with the reduction in plastic packaging. The percentage of glass is reduced due to the current collection of beverage glass implemented via the Packaging Excise Duty.

7



Data from the Ministry of Finance on the GDP (averaged at 5%) which is linked to retail sales, and population change from the UN to the period 2012 provide information to calculate packaging waste amounts and the amount generated annually per person. It can be seen that whilst the amount of packaging waste increases in line with the GDP and the inevitable increase in packaging associated with consumer activity the falling population (from 1.36m to an estimated 1,17m for 2012) stems the rise but does not prevent packaging waste increasing. It is also notable that the packaging waste per person rises to 167 kg/year/person by 2012, which was the EU15 average for 1999.

8

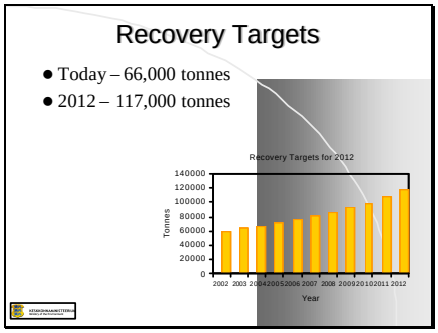


The EU Directive on Packaging and Packaging Waste 94/62/EEC addresses the need to conform to the EU waste management hierarchy, i.e. minimise the generation of waste and to increase reuse, recovery, and recycling of wastes. The implementation of the Directive on Packaging Waste (94/62/EEC) requires Estonia, and the other Member States to recover between 50% and 65% (by weight) of packaging waste, achieve a 25% recycling rate and within this general target, a minimum of 15% (by weight) for each packaging material.

The original Directive required revision of recycling and recovery targets after a 5-year period (completed in February 2004). The revised packaging directive (2004/12/EC) sets increased recovery and recycling targets to be achieved by 31st Dec 2008. Following accession Estonia and the other new members requested additional transition periods to implement the Directive. It has been proposed that the existing deadline was ambitious and that the new deadline should be 31 December 2012. If the new deadline is accepted, Estonia will be required to meet the revised targets of 60% recovery and 55% minimum and 80% maximum recycling of packaging waste. Specific material recycling within packaging waste, has an agreed minimum target of 60% for glass, 60% for paper and board, 50% for metals, 22.5% for plastics (recycled back into plastics), and 15% for wood. Higher recycling rates will necessarily mean increased collection of household waste packaging.

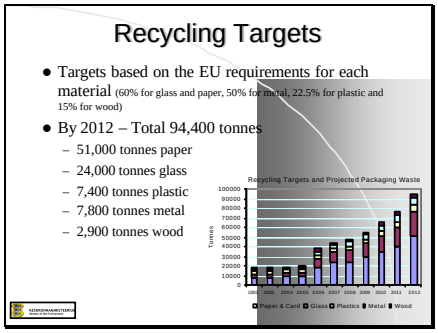
These targets may rise further by 31 December 2007, when targets and a deadline for the next 5-year period will be set.

9



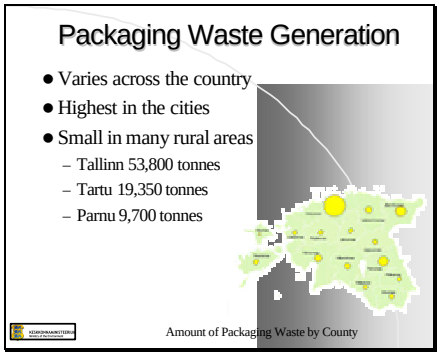
This required recovery target of 60% by 2012, combined with the anticipated growth in packaging gives an estimated increase in packaging and packaging waste to be recovered from today's 66,000 tonnes to 117,000 tonnes. Estonia's actual recovery for 2002 was estimated at only 17.8% - so a major step change was required to ensure that this process of recovery begins.

10



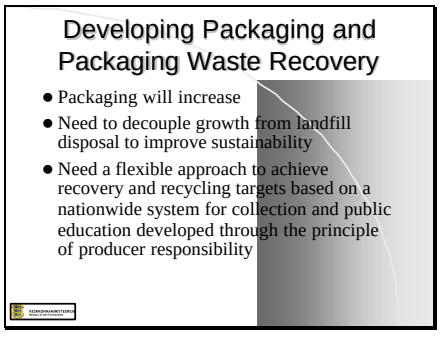
To illustrate the magnitude of the task this shows the quantities of the individual materials that have to be collected, transported and recycled. This equates to enough waste to fill 5,000 jumbo jets. Try and imagine them lined up on a runway. Yet we dispose of this valuable resource daily with little thought of any consequence. At present 80% of this waste is disposed of to landfill.

11



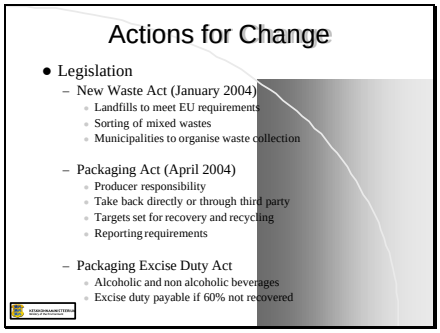
The generation of packaging waste for Estonia has been calculated and as would be expected it follows the population distributions. Of the current 132,000 tonnes of packaging waste Tallinn accounts for 41% whilst the island of Hiiumaa produces only 0.39%. The major cities and larger towns account for 64% of the population and it is here that the collection has to be initially focused, but rural areas are also important and have not been forgotten.

12



What must we do – with the consumer's increasing preference for packaged products and the influence of social and demographic changes on how those goods are packaged and presented, packaging will increase. Obviously we need to prevent the waste from going to landfill and recovery it for recycling. This will be done using the producer pays principle for waste and developing the appropriate infrastructure for collection, transport and sorting prior to recycling. Combined with this an education programme for the public will be required, as they have vital role in recycling of packaging waste.

13



The 1998 Waste Act has been replaced with a new Waste Act (2004) to further ensure the requirements of the European Union. This provides a legislative basis for the development of a waste recycling system, with the economic measures necessary for the recycling of waste including the collection and organisation of waste. The Act provides general requirements for the prevention of waste and handling of waste including the development of national, county and municipal plans that require a strategy for waste management. Municipalities will also organise the collection of waste within their region, establish waste collection and transfer via waste contractors. Landfill requirements include the meeting the relevant EU compliance standards by July 2009. Waste is required to treated prior to landfill deposition from July 2004 (where facilities exist) otherwise it can be accepted until Jan 2008.

Estonia did not apply for a transition period for the waste packaging recovery and recycling targets contained in the original directive. It was planned that an energy recovery programme now withdrawn would fulfil these targets, however the revised targets will require reconsideration and investment.

The earlier 1995 Packaging Act transposed into national legislation the EU Packaging Directive (94/62/EU) principles and set waste packaging recovery targets for Estonia. A number of new provisions were required for packaging regulation in terms of meeting the EU requirements and a new Packaging Act passed by Parliament entered force on the 1st June 2004. The existing provisions defined packaging and packaging waste, stated the requirements for packaging (provisions from the EU Essential Requirements Regulations), and with the new act now also includes the legal framework for the organisation, collection and reuse of packaging and packaging waste.

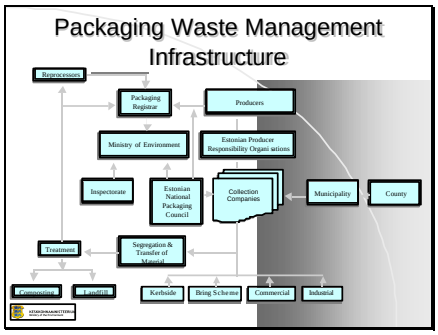
The Packaging Excise Duty Act covers packaging for

sales of alcoholic beverages (1997) and non-alcoholic beverages (1998). It has a clear objective to influence the recovery of packaging filled or imported into Estonia. If the importer or producer organises the collection and recovery of used packaging following the requirements of the Act, (60% recovery) the excise duty is not payable.

14

Packaging waste management is a complicated interaction between a large number of organisations; these include Government policy makers and regulators at national, regional and local levels; companies involved in waste management collecting or processing packaging; manufacturers, distributors and retailers; non governmental organisation and the public. There are perhaps 10 to 12,000 companies that could be affected as producers, importers and distributors in Estonia and currently there are some 30 waste management companies that are involved in the collection, transfer and recycling of packaging and packaging waste.

15



This diagram shows a typical infrastructure chart for the organisation and recovery of packaging and packaging waste and the complicated series of interactions that are required to establish a national packaging and packaging waste collection scheme.

The practicalities of packaging waste recycling and recovery is essentially an issue for the business in the private sector, given that the Estonian Government has adopted a market-based approach that places obligations on those businesses involved in the packaging chain. The private sector therefore has two key roles to play, namely as producers of packaging wastes, and as service providers for the recycling and recovery of packaging wastes. This latter sector is also deemed to include Packaging Waste Compliance Schemes, who have a role to play in ensuring that their obligations are met. Such obligations include not only the current generation of statutory targets, both also the need to anticipate and plan for the higher targets that have emerged from the review

of the Packaging Waste Directive.

16

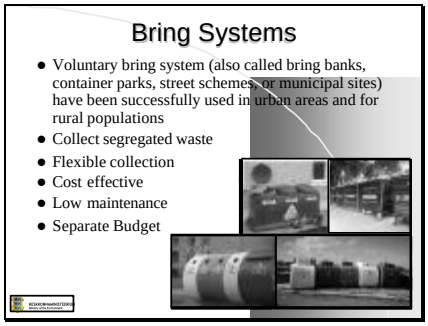
As producers, obligated businesses who handle and supply packaging waste must undertake all the requirements that have been set, with a full understanding, not only of the legislation but also the reasoning behind it. It is essential that these obligated businesses report their progress, and waste flows, enabling better tracking of packaging waste. It is also recognised that the private sector also have a key role to play in the recycling and reprocessing of packaging wastes, through the provision of services and facilities. This is clearly recognised in the National Waste Management plan.

A critical component of this approach will be to ensure that revenues are not only generated, but flow to the appropriate parties, i.e. from waste producers, to the waste collection companies, advertising campaigns and local groups undertaking activities that recycle and recover packaging wastes.

The development of a bring collection scheme is perhaps the easiest mechanism to start the process of recovering packaging and packaging waste from households. Bring schemes are a useful approach when there is no defined kerbside scheme (although they can be used together and reduce municipal cost); they are suitable for installation in multiple residency buildings and smaller communities that are difficult to service with direct collection. It allows different levels of segregation depending on space available/other local systems and flexibility in terms of collection rounds, as residents are not required to put out containers for collection. It does require more effort from householders (and hence public promotion) than a kerbside system, as they will have to store the separate fractions at home and place them in the containers. It also allows for the separate accounting of the cost for collection and recovery.

A range of facilities therefore will be required for the management of packaging wastes, including for example, collection, sorting, materials recovery, bulking and storage of materials, treatment, and re-processing. Such facilities will be distributed across Estonia, forming part of the network that is required to support more sustainable waste management practices.

17

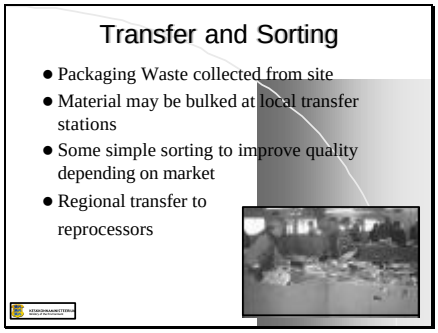


Since materials recovered from a mixed waste collection system generally give low quality recycled materials, selective collection systems are necessary. Generally separate collection begins with kerbside selective collection and voluntary bring systems, which either consist of a network of neighbourhood containers or a network of waste collection points.

The container system is best suited to more densely populated, urban areas, especially where there are a lot of flats and properties without a defined kerbside area. It is also used successfully for the collection of wastes for example in rural areas of Spain. The containers can be designed in a great variety of materials, shapes and sizes appropriate for the collection area and number of households served.

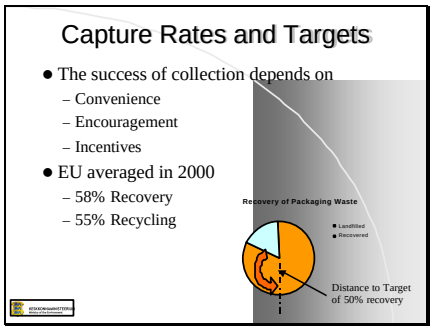
These usually consist of permanent, 3-6 m^3 or larger containers, (specially designed metal or plastic containers, large wheeled bins or Euro bins) placed on the street or at easily accessible public areas that are used by several households rather than providing individual containers to each household. These systems do not necessarily require uplift to be on a specific day and therefore are more appropriate for many areas because of the flexibility.

18



One advantage of 'bring' systems is that there no are requirements for the collection of packaging waste from the householder's premises, thus eliminating a door-to-door collection. The packaging waste still needs to be collected from the collection site. For most 'bring' systems a vehicle with a crane or lifting cradle is used to pick up the containers, when three quarter filled. An empty container is exchanged for the filled container at the same time. The containers are then taken to a transfer station where the waste can be bulked before being transferred to a sorting facility or reprocessing site, often some distance away. Bring schemes have less requirement for sorting than other forms of waste collection. The degree to which sorting facilities are required, and the complexity of their design, depends upon the requirement for sorting by the reprocessor.

19



The capture rates (the amount from municipal waste put directly into segregated collection) for recycled packaging are related to various social and economic factors. Studies show that the participation and hence recovery is dependant on economic status, tenure, employment status, length of residence, and age.

The effectiveness of the collection scheme also depends on:

The convenience of the scheme;

The scheme promotion to encouraging participation;

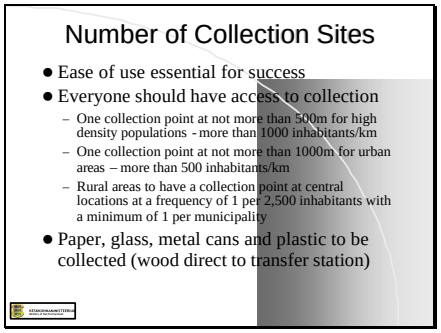
The role of mandating recycling (not accepting recyclates in regular household waste); and

Incentives - what would the householder pay otherwise?

Recovery and recycling rates for packaging waste in other EU countries vary; Denmark had the highest recovery (91%) and Germany the highest recycling (78%) in 2000. The average for the EU15 was over 50% for both in 2000.

Estonia has quite a challenge to increase from the current 17.8% recovery to over 50%.

20



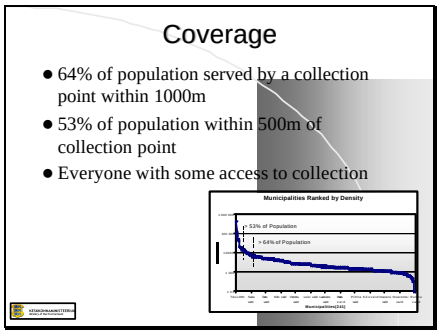
Typical ranges for the number of collection points that have been used in other countries range from 300 – 2000 metres for urban areas and 1 per 1000 - 3000 inhabitants for rural areas. It is proposed that as a starting point that we aim for:

One collection point at not more than 500 metres for high-density urban areas. A high-density urban area is defined as a population density of greater than 1000 inhabitants per km^2.

One collection point at not more than 1000 metres for urban areas with a population density of greater than 500 inhabitants per km^2.

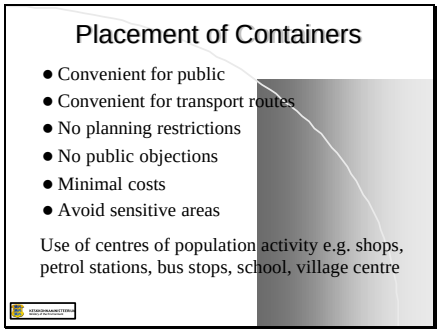
For rural areas a collection point will be provided at central locations at a frequency of 1 per 2,500 inhabitants with a minimum of 1 per municipality.

21



By using this approach it can be seen in the graph depicted in Figure 18 that some 64% of the population are served by urban schemes with a collection facility within 1000 metres and more than 53% of the population are within 500 metres of a collection point. There is obviously a strong link between recycling performance and provision of efficient facilities.

22

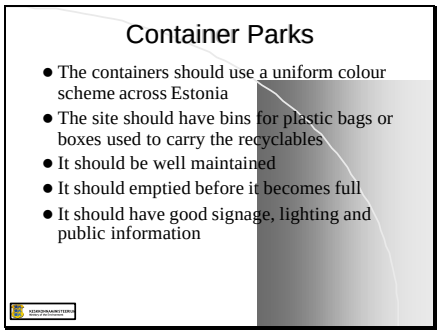


The Municipalities will organise location of these facilities directly or in conjunction with waste management contractors. The key factors in their decision process should include:

Near the centre of the collection area (easy to use by the public);
Convenient to good transport routes;
No planning or other restrictions that impact placement;
Minimal public objections (noise, odours and visual impact);
No or minimal costs of land (usually the land is provided free by the municipality, although some EU cities have been discussing fees) and construction (site levelling screening or fencing); and
Avoidance of sensitive areas (ecological, scenic or other sensitivities).

For many areas, especially in more rural locations where the distance to the nearest recycling facility is greater, they should be sited at or near centres of population activity – for example at a supermarket or near a petrol filling station, bus stop, school or village centre.

23



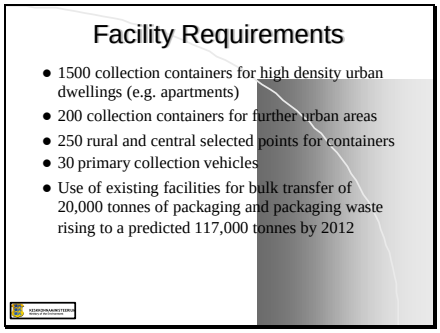
If possible collection containers should use a uniform recognised colour scheme across Estonia; this will aid householder recognition and is likely to improve participation. Existing recycling collection facilities will be incorporated readily into the overall scheme. The most common faults, to be avoided of bring schemes are:

There is not always a bin placed for litter such as plastic bags (most people carry the recyclables in a box or bag which must then be disposed of);
Untidiness around the bins due to a lack of maintenance;
The banks are not emptied often enough, becoming full and the public leaving bottles and cans in the vicinity;
Poor signage, lighting and public information.

24

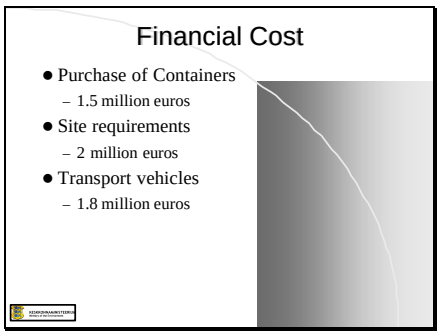
The National Waste Plan is already developing a number of waste transfer centres, which would handle municipal waste with both transfer and sorting facilities. The cost effective solution would be to collate the packaging waste at these sites. The sites are well distributed and serve all areas.

25



To implement this scheme for collection it would involve the locating of nearly 2000 container sites (actually 1,931, either with single multiple material banks or grouped individual material collection containers on municipal ground), throughout the municipalities. Of these collection points the majority are in urban areas (1,675) based on 1,475 in the high-density urban areas and 200 in lower density urban areas, the remainder being in the rural areas (256). In addition vehicles and the use of transfer stations will be required. These will handle 20,000 tonnes of packaging and packaging waste rising to over 100,000 tonnes in the future years.

26



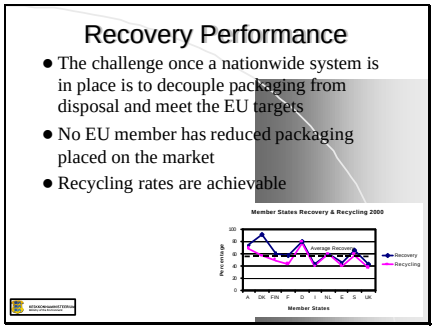
The financial costs for the collection of separated packaging and packaging waste has been estimated for the type, location, and facilities provided.

Purchase of Containers, 1.5 million euros

Site requirements, 2 million euros

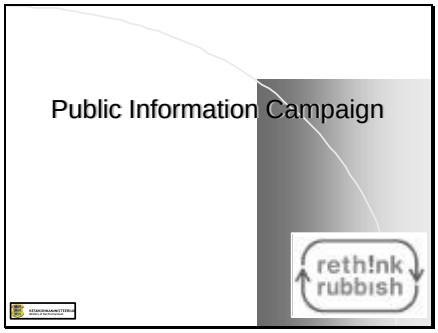
Transport vehicles, 1.8 million euros

27



This may seem a difficult task right now, but others have achieved it and as there is no real possibility of stopping the use of packaging we must work to prevent the landfill of this material and recover it.

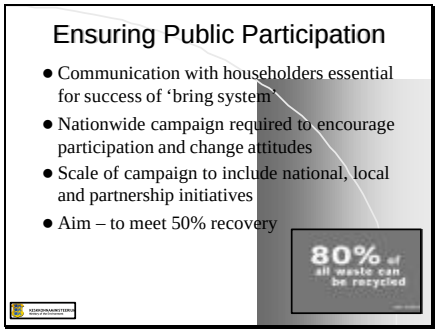
28



Public Information Campaign

Making it Happen

29

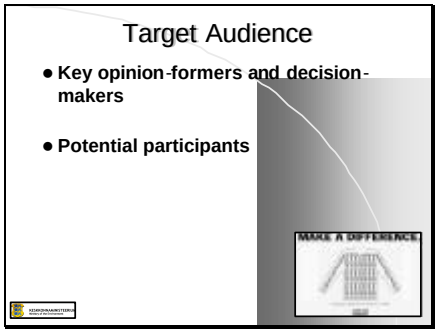


Effective communication with householders is essential to the success of any separate waste collection system. A public awareness, education and consultation programme should be carried out in advance of and during the implementation of a separate collection system.

Any nation-wide awareness campaign with local assistance and delivery, targeted predominantly at the general public, aims to encourage and maintain positive change in public awareness, attitudes and behaviour towards waste production and management. These initiatives aim to encourage people to adopt more responsible attitudes towards waste and to deal with it in ways that are more sustainable, such as reuse and recycling.

A sustained programme of public awareness and education should operate throughout the life of the collection system, as this is essential to maintain householder interest and participation in the scheme inform new householders in the area and keep users informed any changes that the operator wishes to make to the system over time.

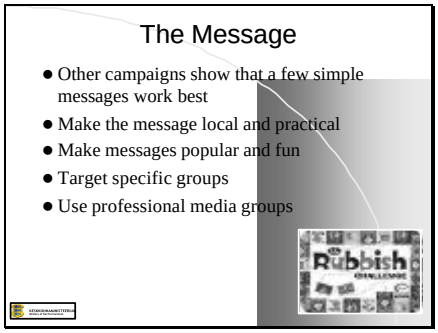
30



The target audience is divided into two groups.

- Key opinion-formers and decision-makers who influence people and communicate the messages. These include for example, local municipalities, local media operational staff and partner organisations as well as business policy-makers and leaders, Members of Government, NGOs and media
- Potential participants the public or more specifically– local residents and school children (8–14 years)

31

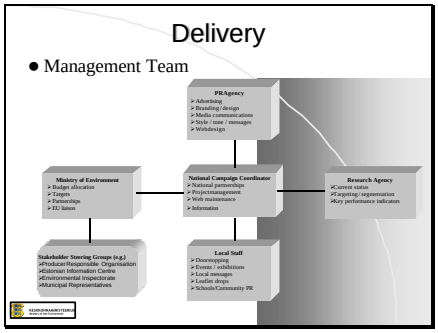


The greater the complexity of the message and the delivery, the more likelihood of confusion by local residents. The most effective campaigns are focused delivering a single message that is clear. A combination of direct messages that were popular and fun works best. The more locally-related the advice, the better understood and accepted by residents.

Other campaigns have found that females are the main recyclers in the home. To capture the female audience, TV or radio adverts need to be played at meal times, and road shows or posters can be set up at supermarkets.

Media campaigns with professional agencies have felt that the cost and effort was worthwhile.

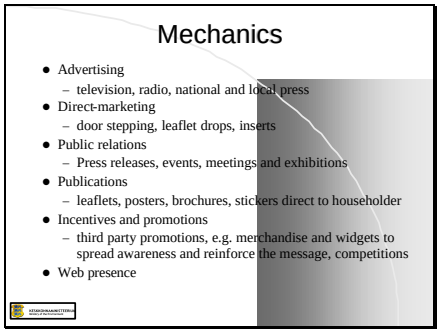
32



Successful campaigns need a full-time co-ordinator to liase at a national level with stakeholder groups (e.g. Ministry of Environment, County and Municipal staff, Environment Inspectorate) and to project manage external supporting organisations (e.g. PR Agency, Research Agency) and Campaign staff. To ensure that the impact of the Campaign is optimised, local delivery by trained Campaign staff will be important so that local knowledge can be imparted to householders (where, how to, when), the local community engaged, any problems identified and solved, and local “messages” developed.

The use of external Agents for PR and research is cost-effective and is an additional resource required for the Campaign. The Agents need a comprehensive brief, performance targets and a budget allocation. Project management of the Agents should be the responsibility of the National Campaign Co-ordinator.

33



Develop a combination of activities and tools in order to get the message across and generate action. These include for example:

Advertising – television, radio, national and local press;

Direct-marketing – door stepping, leaflet drops, inserts; and

Public relations. Press releases and photo opportunities targeting press and media, picking out newsworthy factors and key reasons of why it is of use. Develop a relationship with the media, building on existing links to support promotional activities; and Events, meetings and exhibitions.

Publications – leaflets, posters, brochures, stickers direct to householder;

Incentives and promotions – third party promotions, e.g. retailers and businesses with a local presence, merchandise and widgets to spread awareness and reinforce the message, competitions; and

Web presence.

34

3 years minimum campaign

Year 1

Research of existing situation (e.g. focus groups and face-to-face interviews)

PR/media/communications campaign on general waste awareness (e.g. TV, radio, newspapers)

Set up campaign team

Monitoring and review

Year 2

Action (e.g. door-stopping, mailing flyers)

Local events/exhibitions/partnerships

PR focus on slogans, single messages, specific waste streams

Monitoring and review

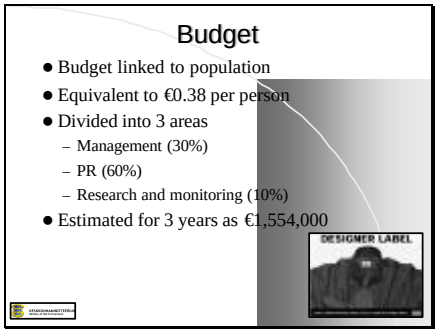
Year 3

Link to associated waste streams (e.g. compost) and campaigns

PR/media/communications reinforcement of messages

Monitor and review

35



The budget is linked to the population size (1,365,265 people) and other campaigns have targeted around €1.50 per person. This equates to the Estonian economy equivalent as €0.38 /person or €518,800 /year.

For a 3 year campaign, the projected budget would be €1,554,000

Year 1

Management Team and materials €155,400

PR Agency and materials for design and delivery of national campaign €310,000

Research Agency and materials €51,800

Year 2

Management Team and materials €155,400

PR Agency and materials for design and delivery of national campaign €310,000

Research Agency and materials €51,800

Year 3

Management Team and materials €155,400

PR Agency and materials for design and delivery of national campaign €310,000

Research Agency and materials €51,800

3 Year Campaign Budget €1,554,000