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The Feasibility of Introducing a Certification Scheme/Standard for Recycling Treatment Facilities

Revised Final Report

prepared for
DG Enterprise and Industry

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prepared for

DG Enterprise & Industry

by

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EXECUTIVE SUMMARY

Overview

The goal of this study is to evaluate measures – particularly certification schemes and standards – that allow the demonstration that waste exported from Europe to non-OECD countries is treated in an environmentally sound manner.

The Waste Framework Directive defines waste as any substance or object which the holder discards or intends or is required to discard. Taking into consideration all products discarded through municipal, household and industrial activities, approximately three billion tonnes of waste is generated in the European Union each year.[1] *The management of waste is regulated by EU level policies which aim to reduce the environmental and health impacts of waste and improve Europe's resource efficiency.*

There are three main practices of waste management in the Member States of the European Union. These are recycling, incineration and disposal (mainly to landfill). Europe recycles approximately 50% of its waste. Waste incineration, predominantly with energy recovery, occurs mainly in the EU-15 Member States, and especially in the more northern countries. Waste disposal (especially through landfill) is still significant in some Member States including the Baltic States, the Western-Balkan area and the UK. Other Member States such as Germany, Austria, the Scandinavian countries and to a lesser degree Belgium are increasingly abandoning the use of landfill.

An alternative to local treatment is the export of waste, which enables waste producers to reduce costs. Additionally, in the case of scrap metal for example, the export of waste materials can help establish local markets. Both industrial waste and specific fractions of household waste are exported out of the EU to non-OECD countries.

Legislative Background

In the EU, the Waste Shipment Regulation (WSR) sets guidelines for intra- and extra-EU shipments of hazardous and non-hazardous waste destined for recycling as well as for recovery and disposal. At international level, the export of waste is regulated by the provisions of the UN Basel Convention via its measures on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. In order to maintain interoperability between the legislative provisions, the text of the WSR refers to all relevant legislative measures and highlights the interlinking elements. With regard to the Basel Convention, the WSR points out that:

> "Council Decision 93/98/EEC (6) concerned the conclusion, on behalf of the Community, of the Basel Convention of 22 March 1989 on the control of transboundary movements of hazardous wastes and their disposal (7), to which the Community has been a Party since 1994. By adopting Regulation (EEC) No 259/93, the

[1] European Commission (2010**): Being wise with waste: the EU's approach to waste management,** downloaded from http://ec.europa.eu/environment/waste/pdf/WASTE%20BROCHURE.pdf

Council has established rules to curtail and to control such movements designed, inter alia, to make the existing Community system for the supervision and control of waste movements comply with the requirements of the Basel Convention."

Moreover, Article 49 of the WSR on the protection of the environment states that Article 4 of Directive 2006/12/EC (the waste recycling hierarchy) and other Community legislation on waste shall be respected. Further guidelines on Environmentally Sound Management of waste recycling (for specific hazardous substances and waste streams) are contained in Annex VIII of the WSR which also refer to the guidelines of the Basel Convention, the OECD, the International Maritime Organisation (on ship recycling) and the International Labour Organisation (on health and safety in ship breaking).

Under the relevant regulatory provisions, export to non-OECD countries of non-hazardous waste for recovery is either more strictly regulated than exports between Member States (through prohibition, full notification or national provisions) or it is equivalently regulated. Export between Member States only requires an identification form and a contract. In relation to the treatment of waste, there are no internationally binding resolutions.

The WSR controls shipments of waste both within the EU and between the EU and third countries. The WSR is the EU's legislative instrument implementing the United Nation's Basel Convention on the Control of Transboundary Movements of Hazardous Waste and their Disposal (the "Basel Convention"). The WSR prohibits all exports of hazardous waste to countries outside the OECD and all waste for disposal outside the EU/EFTA (Articles 34 and 36 of the WSR). The WSR's ban on exports of hazardous waste outside the OECD implements the Basel Convention's export ban from 1995, although the international ban has not entered into force.

Where waste shipments are not banned under the WSR, specific rules apply for different types of shipments requiring either prior written notification and consent or fulfilment of general information requirements (Titles II-IV of the WSR). Specific obligations are laid down concerning a duty to take back waste shipments which are found to be illegal or which cannot be completed as envisaged (Articles 22-25 of the WSR).

According to EU legislation, green[2], non-hazardous waste can, if destined for recovery, be shipped between Member States and to third countries provided certain information requirements are fulfilled. It must be ensured that the waste to be shipped is managed without endangering human health and in an environmentally sound manner[3].

[2] Green listed wastes are identified in Annexes III, IIIA and IIIB of the Waste Shipments Regulation. Green listed wastes are subject to the general information requirement laid down in Article 18 of the WSR.

[3] Articles 18, 49 and Annex VII. See also Commission Regulation (EC) No 1418/2007 concerning the export for recovery of certain waste to certain non-OECD countries

Waste Exports to Non-OECD Countries

Shipments of waste for recovery between OECD and non-OECD countries amount to almost 118 million tonnes per year. Asia is the main destination of EU waste. Between 1995 and 2007 trade in waste metals, paper and plastics between the EU and Asia expanded five-fold, 10-fold and 11-fold respectively. In 2006, around 3% of generated paper waste (over two million tonnes), 10% of metal waste (around nine million tonnes) and 71% of plastic waste (about ten million tonnes) from the EU-25 were exported to non-EU countries. This trend of increasing exports is anticipated to continue into the future.

The main recipient country for scrap metal from the EU is Turkey (a member of both the OECD and the Basel Convention), while China and India are the largest non-OECD recipients. The key destination for paper/cardboard and plastic waste is China, with Hong Kong often serving as a gateway for further transport into the mainland.

In addition to the above, a significant volume of electronic waste (e-waste) is traded with non-OECD countries, both for recycling and for the second hand circuit market. However, this trade also poses potential risks. While e-waste is of high value, due to the content of valuable substances such as copper, iron, silicon, nickel and gold, it can also contain toxic heavy metals and hazardous chemicals which, if handled inadequately, can harm human health and the environment. As there is no CN code for e-waste, it is difficult to identify statistics on its trade. Based on reporting requirements under the WEEE Directive, in 2010 over three million tonnes of WEEE were collected in the EU27 while reported quantities exported were just under five thousand tonnes. This low volume of exports could be explained by the fact that official figures do not include information on electronic items exported for second hand use; nor would they include any illegal exports.

One of the major driving forces behind waste exports is economic. Lower labour costs in developing countries, which may be combined with possibly weaker, poorly enforced or non-existent environmental and social regulations, translate into reduced costs for the disposal and treatment of waste. Many developing and emerging economies view the import of waste, even hazardous waste, from the West as a way to generate revenue. In addition, waste imports can provide income and employment for the poor. As such, there are arguments in favour of the waste trade from both the import and export side.

Despite the legislative controls in place, waste, particularly metal and e-waste, is frequently exported to developing countries, often in violation of international law[4].

Potential Certification Scheme for Waste Exports

Based on relevant existing regulatory provisions, as well as the Ship Recycling proposal, the Integrated Pollution Prevention and Control (IPPC) Directive and the Best Available Techniques Reference Document (BREF) on 'Waste Recycling Industries' a potential certification scheme for waste exports has been outlined. Details of the proposed scheme are

[4] See, for example, Europol (2011): **EU Organised Crime Threat Assessment (OCTA 2011), d**ownloaded from https://www.europol.europa.eu/sites/default/files/publications/octa_2011_1.pdf

given in Chapter 5, including a description of its operation as well as requirements for individual stakeholders.

The options considered are:

- *Option 1 – baseline: continue on-going initiatives;*
- *Option 2 - voluntary certification scheme;*
- *Option 3 - 'light' mandatory certification scheme; and*
- *Option 4 - mandatory certification scheme with third-party verification.*

Within the analysis of a voluntary certification scheme, both self-certification and third-party verification have been studied. As the differences in impacts between these approaches were found to be insignificant to the outcome of the evaluation, the voluntary scheme has not been divided into sub-options.

In the case of the mandatory certification scheme, two separate sub-options were identified, with self-certification and third-party verification. As the mandatory scheme would affect all market players, it is important to compare costs between the sub-options and their impact on stakeholders. It was found that the self-certification scheme could lead to a market advantage for larger companies, as they are expected to more easily manage the financial and administrative implications of the scheme. In both cases, the sub-options of the mandatory scheme need to clearly state the overarching goal of the scheme, which is the protection of human health and the environment, in order to avoid any inconsistencies with international free trade regulations.

In all cases, extensive consultation with relevant stakeholders and widespread dissemination of information regarding the expected results would be an essential part of launching the scheme. Table 1 (next page) summarises the advantages and drawbacks of mandatory and voluntary certification schemes.

As Table 1 shows, there are significant advantages and drawbacks to both voluntary and mandatory certification schemes. In the case continuing ongoing initiatives – under Option 1- other international initiatives such as the Basel Convention might result in changes to the regulatory environment as well as to the practices of waste management, but the nature and timing of these changes would be subject to agreement with other signatory countries.

The voluntary certification scheme would allow some initiative to be taken by dealers exporting waste who opt to participate in the certification scheme. This approach, however, would only be successful with a high take-up rate, where the results of the scheme could be readily identified. Furthermore, the costs of a certification scheme could possibly lead to fragmentation of the market. In order to achieve a significant impact with measurable results and to facilitate the transparency of waste export operations, a mandatory certification scheme is likely to be most appropriate. The principal benefit of a mandatory certification scheme is an actual and measurable impact on waste recycling practices for exported waste.

***Table 1**: A Comparison of Voluntary and Mandatory Certification Schemes*		
Type of Scheme	***Advantages***	***Drawbacks***
Voluntary Scheme	*• Voluntary schemes can allow for gradual adoption by the sector thereby letting the system develop and improve its mechanisms overtime.* *• Could provide additional commercial benefits for companies adopting the schemes especially in demonstrating corporate social responsibility.* *• Voluntary schemes can cover specific areas of waste management (e.g. export to non-OECD countries) that are not addressed by other quality control schemes.*	*• Varying levels of compliance can result in fragmentation within a sector and lead to inconsistent results.* *• Can increase uncertainty amongst stakeholders.* *• Attracting companies to join the scheme could require incentives.* *• Those companies currently using illegal transportation or environmentally damaging waste recycling in third countries are unlikely to participate in the scheme.* *• Market leaders would have to be convinced to join the scheme via, for example, extensive dissemination of information to consumers as a way of gaining competitive advantage.*
Mandatory Scheme	*• Mandatory schemes would result in a rapid 100% coverage of all waste dealers exporting waste, thus quickly reducing the number of companies using uncertified waste recycling plants and below-standard treatment practices.* *• Mandatory schemes enable customers and supply chain partners to make informed decisions.* *• Mandatory schemes can help to assure compliance and provide legal certainty for dealers with regard to article 49 of the WSR.* *• Mandatory schemes can support customs and control authorities to enforce compliance with article 49 of WSR.* *• Mandatory schemes could also support the implementation of European waste legislation.*	*• Mandatory Schemes can result in increased administrative and operational costs for companies.* *• SMEs might be particularly vulnerable to cost increases.* *• Waste recycling facilities might have difficulty dealing with the rapid increase in the amount of waste requiring higher technology treatment.* *• Auditors would have to be trained and reviews would have to be conducted in a very short timeframe, possibly resulting in a higher margin of error.*

The detailed assessment of the various options concluded that the most appropriate option would be Option 4, a mandatory certification scheme featuring third-party verification. Such a scheme would ensure that waste exported from the European Union would only be treated in waste recycling facilities which meet the requirements for environmentally sound management (ESM). This would also guarantee that treatment facilities are monitored continuously and meet the expected ESM standards. Through the implementation of such a mandatory scheme, harmonisation is ensured across the sector, by ensuring that all operations comply with the applicable rules and regulations.

In some manufacturing processes, self-certification is a cost and time saving approach. In the case of waste certification, however, it could result in a non-level playing field. This is because a waste certification scheme which involves more than a simple declaration from the waste dealers attesting that the waste they export is being treated in an environmentally sound way would require companies to assess local practices at treatment sites Some companies, generally the larger ones, will have the resources and expertise to carry out assessment in house at relatively low cost, whilst others (primarily SMEs) will be required to hire consultants to do this and will thus face higher costs.

Third-party attestation or verification, on the other hand, involves an independent certifying body and is therefore more likely to deliver consistency and a high level of confidence with regards the data reported. It can also lead to increased predictability in costs, as prices can generally be agreed with certification bodies for up to three year periods. In addition, certification bodies are generally accredited for a number of schemes and regularly provide information on their development, thus making the verification scheme more transparent. The involvement of certification bodies also ensures that the audit procedure is carried out in an impartial and objective manner and, as such, it is perceived as a more reliable and equitable way of carrying out certification when compared to self-certification.

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LIST OF ABBREVIATIONS

AQSIQ	Administration of Quality Supervision, Inspection and Quarantine
ASCBE	Accreditation Service for Certifying Bodies
B2B	Business-to-Business
B2C	Business-to-Consumer
BAN	Basel Action Network
BAT	Best Available Techniques
BREF	Best Available Techniques Reference Document
CB	Certification Body
CCIC	China Certification and Inspection Co
CEC	North American Commission for Environmental Cooperation
CEN	European Committee for Standardization
CENELEC	European Committee for Electrotechnical Standardization
CoP	Conference of the Parties
CPEs	Core Performance Elements
CSR	Corporate Social Responsibility
EEE	Electrical and Electronic Equipment
EEI	Energy Efficiency Index
EFTA	European Free Trade Agreement
EICC	Electronic Industry Citizenship Coalition
ELV	End-of-Life Vehicles (or, Vessels)
EMAS	Eco-Management and Audit Scheme
EMS	Environmental Management System
EPA	Environmental Protection Agency (USA)
ESM	Environmentally Sound Management
ETC-SCP	European Topic Centre on Sustainable Consumption and Production
ETS	Emission Trading Scheme
ETSI	European Telecommunications Standards Institute
EU	European Union
FIDH	International Federation for Human Rights
FoC	Flag of Convenience
GATT	General Agreement on Tariffs and Trade
HKSAR	Hong Kong Special Administrative Region
HWTF	Hazardous Waste Task Force
IAF	International Accreditation Forum
IPPC	Integrated Pollution Prevention and Control
ISO	International Standardisation Organisation
MLA	Multilateral Recognition Arrangements
OECD	Organisation for Economic Co-operation and Development

RMI	Raw Materials Initiative
ROHS	Restriction of Hazardous Substances
TFEU	Treaty on the Functioning of the European Union
TMW	Transboundary Movement of Waste
UNEP	United Nations Environmental Programme
WEEE	Waste Electrical and Electronic Equipment
WFD	Waste Framework Directive
WITSnet	Waste International Tracking System
WSR	Waste Shipment Regulation
WTO	World Trade Organisation
YPSA	Young Power in Social Action (Bangladesh)

1. INTRODUCTION

1.1 Background to Study

In November 2008, the European Commission launched the European Union (EU) Raw Materials Initiative (RMI). One of the key features of European regulation is to strengthen implementation and enforcement of waste legislation, focusing on more sustainable use of raw materials. Although considerable progress has been made since 2008, the study specification notes that one of the key remaining challenges is that a large proportion of EU waste is illegally exported to non-OECD countries, where treatment often results in damage to the environment and a loss of material for European industry.

In the RMI Communication of February 2011, the Commission recognised the need to address this problem within the context of the existing Waste Shipment Regulation, in order to ensure that EU waste would always be treated in facilities in an environmentally sound manner, both inside and outside the EU. One important measure identified was the proposal to examine the feasibility of applying a certification scheme for all recycling facilities which receive EU waste, especially for waste exported to facilities outside the OECD (essentially Africa and Asia) where environmental protection controls are often less stringent than in the EU.

The focus of this report is the export of waste from the European Union to third countries. While the export of waste can contribute to the loss of valuable and critical raw materials, the aim of this report is rather to assess how shipments of waste from Europe to third countries can be monitored, to ensure that they are being treated in an environmentally sound manner. The implementation of the measures discussed in this report may have important implications for the efficiency of raw materials recovery and could have beneficial impacts for receiving countries, by encouraging more efficient extraction processes. In addition, as technology improves and the cost of efficient extraction processes fall, there may be increased incentives for European Member States to export less waste and maintain the recycling process within the EU, to ensure the retention of these valuable raw materials.

Poor environmental management of waste recycling operations can have far-reaching and long-term consequences. These include contamination of soil, water and air, which can have potentially lethal impacts on human health. In some countries, the livelihood of thousands of people – especially those living in poverty - can depend on the waste treatment sector. Governments may thus be inclined to tolerate looser regulatory measures regarding the environmentally sound management of waste in order to maintain the economic benefits for disadvantaged people. It is essential that global waste recycling operations are undertaken in such a way that they minimise any threat to human health and the environment.

The Waste Shipment Regulation defines the obligations and enforcement measures which need to be taken by Member States and waste dealers, so that any waste exported is transported and treated in a manner broadly equivalent to those that exist in the EU,

that is, rules that require that waste is treated in an environmentally sound manner. According to Article 49.2 of the WSR the competent EU authority shall:

> *"require and endeavour to secure that any waste exported is managed in an environmentally sound manner throughout the period of shipment, including recovery (...) or disposal (...) in the third country of destination."*

When applied to intra-EU waste shipments, the effectiveness of this regulation is strengthened by the need for waste operators to hold a permit or undergo registration, in line with the EU Waste Framework Directive. However, this system can be circumvented, especially when the plant receiving the waste does not need a permit (i.e. when the plant is outside the EU). Currently there is no mechanism in place that would require authorities and/or dealers to demonstrate that exported waste is treated in line with the WSR.

1.2 Study Objective

The purpose of this study is to evaluate potential measures which would allow the demonstration and verification that waste exported from the EU will be treated in an environmentally sound manner and complies with Article 49 of the EU Waste Shipment Regulation, in particular through a certification scheme or a standard.

The study outlines how these measures might function and what legal and operational instruments and resources would be needed to put them into practice. It also presents the advantages and disadvantages of the options. Finally, the study considers how the EU could put forward a certification scheme/standard which is compatible with international rules (including WTO obligations). Attention is also given to standardisation schemes.

The broad objectives of this study have been defined as follows:

- to explain how to establish an EU benchmark or standard for recycling and other treatment of waste in the EU so that equivalence of third country plants can be measured against EU norms;
- to identify how non-OECD countries receiving EU waste may demonstrate that the treatment plant in their jurisdiction meets such a benchmark;
- to identify the means available to, and required by, EU dealers/notifiers and authorities to be able to independently verify that such a certification scheme/standard is met by third country plants; and
- to identify the administrative burden that the proposed scheme/standard would present for organisations.

This report provides an overview of waste management practices and streams for exported waste, based on a detailed analysis presented in the progress report. The report analyses conditions for the introduction and implementation of a certification

scheme for the treatment of waste in an environmentally sound manner at waste recycling facilities in third countries. Moreover, the report describes the essential elements of such a waste certification scheme, and identifies and compares possible options for its introduction. Specifically, this report seeks to:

- summarise trends in the management and export of waste, identifying main known destinations and impacts in receiving countries;
- provide a description of existing EU, third country and international (e.g. ISO, UN) standards applying to waste recycling plants and/or to other similar plants;
- evaluate what measures would be necessary to ensure that waste exported from the EU to third countries is treated in an environmentally-sound manner;
- provide a detailed description of how a certification scheme or standard would function, how it would be monitored and what measures would need to be taken by third country plants to demonstrate and/or verify that they are broadly in line with the benchmark of Environmentally Sound Management (ESM) as described in existing practices such as the IPPC Directive and BREF notes;
- present a series of options - considering both voluntary and mandatory schemes-, outlining advantages and disadvantages for all stakeholders and authorities directly and indirectly affected; and
- make recommendations on the most suitable option for further consideration.

Throughout the course of the project the legal definitions of waste, recycling, recovery etc. are applied as used in the Waste Framework Directive. Practices related to the environmentally sound treatment of waste are summarised in the project Progress Report, which is presented in the Annex of this report.

1.3 Approach to the Study

In order to identify options for the introduction of a certification scheme as well as quantify the impacts that might arise from its implementation, an extensive literature review has been undertaken. The review covered relevant statistics and publications, as well as an analysis of waste generation and management practices in Member States and in non-OECD countries. In addition, discussions have been held with stakeholders representing key industry sectors. However, the views expressed in the report remain those of the consultants and are not necessarily supported by all stakeholders.

An analysis of the possible functioning of a certification scheme has been carried out. The analysis included a review of the advantages and drawbacks of certification and standardisation schemes, a detailed review of the practical operation of a certification scheme and the possible requirements that it might place on the key stakeholders (waste generators, waste dealers responsible for export of waste and receiving facilities). This assessment provides the basis for the evaluation of the individual options, as it allows for the identification of the costs and benefits that might arise during the course of implementation.

Following the identification and detailed assessment of the options, they were analysed and compared based on their associated costs and benefits for different stakeholders. This comparison provided the basis for the selection and recommendation of the most suitable option to ensure compliance with relevant international regulations and to assure that waste exported to third countries is treated to a standard similar to that applied in the EU.

The approach to the evaluation of impacts is based on the European Commission's *Impact Assessment Guidelines*. For monitoring and evaluation, a combined list of indicators is proposed - under section 4 of this report - to assess ESM of individual waste recycling facilities.

1.4 Structure of this Report

The remainder of this report has been organised as follows:

- Chapter 2 provides a background on waste management practices and waste export from the European Union;
- Chapter 3 describes the concept of environmentally sound management;
- Chapter 4 presents the framework for standardisation and certification;
- Chapter 5 presents the key elements of standardisation/certification schemes;
- Chapters 6-9 present the assessment of the options;
- Chapter 10 contains a summary and comparison of the options; and
- Chapter 11 presents the conclusions and recommendations.

2. WASTE MANAGEMENT PRACTICES AND WASTE EXPORT FROM THE EUROPEAN UNION

2.1 Overview

The Waste Framework Directive (WFD) defines waste as any substance or object which the holder discards or intends or is required to discard. Taking into consideration all products discarded through municipal, household and industrial activities approximately three billion tonnes of waste is generated in the European Union each year.[5] The management of waste is regulated by EU level policies which aim to reduce the environmental and health impacts of waste and improve Europe's resource efficiency.

The European Union's approach to waste management is based on the three principles of:

- waste prevention;
- recycling and reuse; and
- improving final disposal and monitoring.

Waste prevention is a key factor in any waste management strategy. A reduction in the quantity of waste generated, as well as a reduction in the presence of dangerous substances in products, will lead to simpler disposal. Waste prevention is closely linked with improving manufacturing methods and influencing consumers to demand greener products and less packaging.

Recycling and reuse is the preferred method if the waste cannot be prevented. The aim is to recover as many of the materials as possible, preferably by recycling. The European Commission has defined several specific 'waste streams' for priority attention, including packaging waste, end-of-life vehicles, batteries as well as electrical and electronic waste. EU directives now require Member States to introduce legislation on waste collection, reuse, recycling and disposal of these waste streams, with several Member States already managing to recycle over 50% of their packaging waste.

Improving final disposal and monitoring means the safe incineration of waste, with landfill only used as a last resort if waste cannot be recycled or reused. Both landfilling and incineration need close monitoring, due to their potential for causing severe environmental damage. The EU has recently approved a directive setting strict guidelines for landfill management. The EU's Landfill Directive and the Waste Incineration Directive set standards and limits for the release of pollution into the air or into groundwater. The European Union also aims to reduce emissions of dioxins and acid gases such as nitrogen oxides (NO_x), sulphur dioxides (SO_2), and hydrogen chlorides (HCl), which can be harmful to human health.

[5] European Commission (2010)**: Being wise with waste: the EU's approach to waste management,** downloaded from http://ec.europa.eu/environment/waste/pdf/WASTE%20BROCHURE.pdf

The Waste Framework Directive[6] sets out the responsibilities of Member States with regard to the treatment of waste. Waste treatment in this context is identified as "*recovery or disposal operations, including preparation prior to recovery or disposal*".

Recovery refers to all waste reuse, recycling, composting, and waste-to-energy processes (primarily waste incineration with high calorific value). Disposal includes waste incineration without energy recovery and landfill. Box 2.1 below highlights some of the provisions of the WFD on reuse and recycling.

Box 2.1: **WFD on Reuse and Recycling**

Article 11:
2. In order to comply with the objectives of this Directive, and move towards a European recycling society with a high level of resource efficiency, Member States shall take the necessary measures designed to achieve the following targets:

(a) by 2020, the preparing for re-use and the recycling of waste materials such as at least paper, metal, plastic and glass from households and possibly from other origins as far as these waste streams are similar to waste from households, shall be increased to a minimum of overall 50 % by weight;

(b) by 2020, the preparing for re-use, recycling and other material recovery, including backfilling operations using waste to substitute other materials, of non-hazardous construction and demolition waste excluding naturally occurring material defined in category 17 05 04 in the list of waste shall be increased to a minimum of 70 % by weight.

Source: European Commission (2008) Waste Framework Directive, downloaded from http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:312:0003:0030:EN:PDF

The WFD introduces a five-step waste hierarchy where prevention is the best option, followed by re-use, recycling and other forms of recovery, with disposal such as landfill as the last resort. In choosing the most appropriate method, Member States shall take into consideration measures that encourage the best overall environmental outcome. Liability for the treatment and disposal of waste lies primarily with the original waste producer. In the case of waste being transported out of the territory of the EU, Member States may specify different conditions of liability. Further details of the relevant legislative provisions can be found in Annex I.

An increase in productivity and purchasing power is associated with increased waste generation. Table 2.1 below lists the most prominent waste streams in Europe as identified by Eurostat for 2008 (the latest date for which statistics are available), including hazardous as well as non-hazardous waste.

[6] European Commission (2008): **Directive 2008/98/EC** of the European Parliament and of the Council of 19 November 2008 on Waste, downloaded from:
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:312:0003:0030:en:PDF

Table 2.1: Most Relevant Waste Streams for EU 27 in 2008	
Type of waste	**Amount Generated (million tonnes)**
Total waste	2,611
Mineral waste (except combustion wastes, contaminated soils and polluted dredging spoils)	1,631
Household and similar wastes, mixed and undifferentiated materials	240
Combustion waste	156
Metallic waste	99
Animal and vegetal waste (except animal waste of food preparation and products, animal faeces, urine and manure)	86
Wood waste	68
Paper and cardboard waste	58
Dredging spoils	49
Sorting residues	45
Glass waste	16
Plastic waste	15
Source: Eurostat	

The waste streams identified in Table 2.1 represent 31% of the total waste generated and 82% of all non-mineral waste generated in 2008. Quantities and types of waste generated vary between EU Member States, as do methods of disposal and recovery. Inconsistencies in reporting strategies and data collection methods may further contribute to these variations.

2.2 Current Practices in Waste Management

2.2.1 Waste Arisings

The types and quantities of waste produced, amongst other factors, influence Member States approaches to treatment and disposal. Consumer wastes such as glass, metal, paper and plastic (which are more-or-less industry independent) can be found in the highest quantity in Member States with the largest populations including France, Germany, Italy, Spain and the UK.

The UK produces the largest amount of mixed waste and household waste, which may be a result of a less focused approach to separate collection of waste. Germany, on the other hand, has the largest quantity of sorting residue. Finland generates the largest amount of wood wastes. This could be expected, considering the significance of the country's wood-industry; nonetheless, the quantity of wood waste is considerably higher than in other large Member States with significant wood industry, such as France, Germany or Austria.

Not all waste data can be linked to industry structure; occasionally inconsistencies in reporting strategies and data collection methods contribute to higher than expected figures, e.g. the high level of rubber waste in Portugal, the high level of animal and vegetable waste in Romania.

2.2.2 Waste Treatment

Due to the regulatory measures introduced at both the EU and national levels, particular trends can be identified with regard to the preferred waste treatment methods. An example is the Landfill Directive (Council Directive 31/1999/EC), which obliges Member States to reduce the amount of municipal solid waste in landfill by 65% compared with 1995 levels, by 2016.

As the Directive does not give binding specifications on what to do with the waste, this has led to increased waste incineration in some Member States that have the possibility to set up a capital intensive network of waste incinerators.

Incineration, with and without energy recovery, have both increased slightly in the EU27, even though this is not a viable option for waste treatment at an acceptable cost in all Member States. Incineration requires capital intensive investment and is heavily taxed in certain parts of Europe.

The individual Member States have adopted different approaches. While Sweden has scrapped its incineration tax scheme as a response to the financial crisis, some Member States such as Belgium (Flanders) and Denmark have maintained such taxes, while at the same time Germany, for example, does not impose taxes on landfill disposal or incineration.

In general there is more incineration in Western Europe (EU 15) than in Eastern Europe (EU 12). Figure 2.1 (overleaf) shows the level of recycling (green), disposal (blue) and incineration (red) in Member States.

Europe recycles approximately 50% of its waste. As Figure 2.1 shows, waste disposal (especially landfill) is still significant in some Member States including the Baltic States, the Western-Balkan area and the UK. Other Member States such as Germany, Austria, the Scandinavian countries and to a lesser degree Belgium are increasingly abandoning the landfilling of waste. Further details on waste management practices can be found in the Annex of this report.

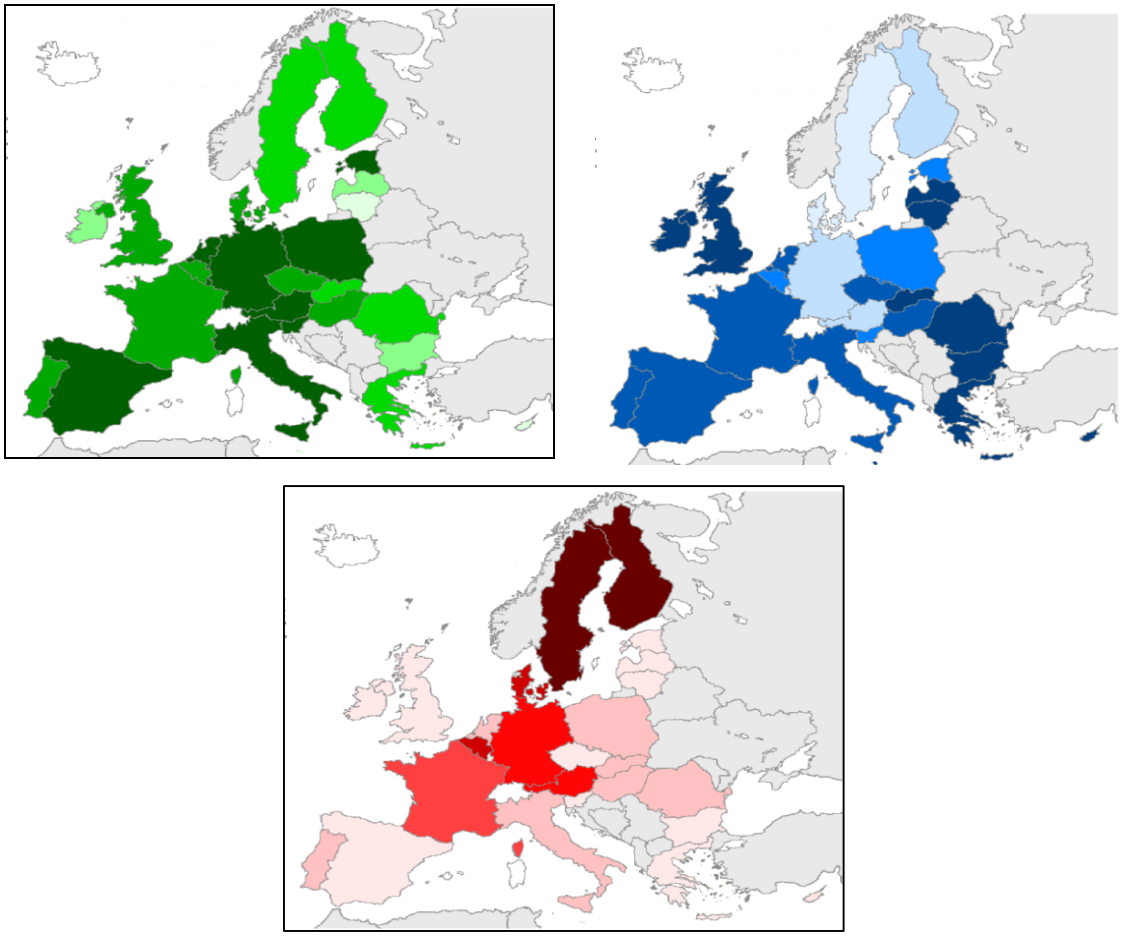

Figure 2.1: Overview of the Rate of Recycling (in green), Disposal (in blue) and Incineration (red) in Member States in 2008
Note: darker colours indicate higher levels of waste recycled, disposed and incinerated
Source: Arcadis own compilation

2.3 Waste Export

2.3.1 Introduction

An alternative to local treatment is the export of waste, which can enable waste producers to reduce costs. Both industrial waste and specific fractions of household waste are being exported outside of the EU to non-OECD countries.

The technological standards of waste-receiving facilities in third countries vary from state-of-the-art treatment facilities to backyard operations. Whilst waste treatment systems in the EU are heading towards zero emissions, systems in many developing countries are still sub-standard. Open dumping, landfilling and incineration may be used to deal with recycling residues. Lack of capital and lack of access to advanced and sustainable technologies often hampers investment in improved waste management systems.

2.3.2 Volumes of Waste Exports and Future Trends

Waste exports from the EU have increased in recent years and continue to grow. It is estimated that one in seven containers leaving the EU contains waste and, of these, one in ten do not comply with relevant environmental regulations[7].

Shipments of waste for recovery between OECD and non-OECD countries total almost 118 million tonnes per year. Trade with non-OECD countries in e-waste, containing valuable metals, is particularly significant. While these electronic products are of high value due to valuable substances such as copper, iron, silicon, nickel and gold, they can also contain toxic heavy metals and hazardous chemicals, which, if handled inadequately can harm human health and the environment. Scrap metal trade is also important; Box 2.2 provides information on this trade. Other common waste shipment items include end-of-life vehicles (ELVs) and batteries.

Box 2.2: Scrap Metal Trade

Annual scrap metal exports from the EU have been growing significantly in the last decade. The volume of ferrous waste and scrap traded internationally in 2008 was estimated at 71 million tonnes, with a value of approximately US$ 48 billion. The vast majority of this (80% of the volume and 88% of the value) originates from OECD countries. In addition, OECD countries are the main importers of scrap (75% of the volume and 80% of the value).

The quality of traded scrap metal is highly variable. Individual containers can include a wide range of quality, from low grade metal ash (often containing highly toxic metals in high concentrations) to relatively high grade pieces of waste metal. Scrap metal itself is not considered hazardous; however, shipments of scrap metal often lack information about possible impurities. Shipments can be contaminated with hazardous substances such as heavy metals, toxic substances or even explosives.

Export of scrap metal for recycling is legal, provided that it is treated in suitable facilities and the scrap metal is not contaminated. However, under unsatisfactory conditions and operations it can be highly polluting and harmful.

Source: Indonesian-Swiss Country-Led Initiative (Cli) To Improve The Effectiveness Of The Basel Convention Second Meeting (2010): ***Transboundary Movements of Hazardous Waste Impacts on Human Health and the Environment - Impacts on Human Health and the Environment****, Wildhaus, Switzerland*

The amount of waste produced in the EU does not appear to be reducing. Modelling results, based on the assumption that no great changes to policies or implementation mechanisms will take place in the near future, predict that overall waste generation in the European Union will peak at around 2016, and then plateau until 2030, but there will not be any decline[8]. Trends affecting waste generation include an increasing

[7] Ruessink and Wolters (2009): *Time to End Illegal International Shipments of Waste*, article downloaded from Greenport, Hampshire, http://www.greenport.com/

[8] Institute for European Environmental Policy (2010): **Final report – Supporting the Thematic Strategy on Waste Prevention and Recycling**, October 2010, downloaded from http://ec.europa.eu/environment/waste/pdf/Final%20Report%20final%2025%20Oct.pdf

amount of complex products such as personalised medicine, electronics and consumer products. Electronic waste is already one of the largest components of exported waste materials. Another trend is the increase in nano-materials, including nano-bio and e-technologies, which are expected to create a spectrum of new materials. As these products become readily available in larger quantities, their prices are expected to drop, increasing consumers' willingness to throw them away[9].

With regards to future waste export streams, it is expected that the quantity of **metal waste** exported from the EU27 will significantly increase in the future (it is predicted to almost treble between 2004 and 2020). The percentage of total metal waste generated is expected to increase at a much lower rate (less than double). This suggests that less metal waste will be retained and used within the EU27.

It is expected that the export of **paper waste** will continue to grow; it already represents a large percentage of the total waste generated. It is assumed that the export of paper waste will stabilise at 90% by 2020. The European Commission also expects that **plastic waste** (in particular plastic waste for recycling and recovery) will increase. Rising levels of recycling in terms of volume and proportion appear to be driving an increase in the level of export of plastic waste for reprocessing.

2.3.3 Regulatory Framework

The Waste Shipment Regulation (WSR) lays down legally binding provisions on both intra- and extra-EU shipments of hazardous and non-hazardous waste destined for recycling, recovery or disposal. According to these provisions, green, non-hazardous waste can, if destined for recovery, be shipped between Member States and to third countries provided certain information requirements are fulfilled. It must be ensured that the waste to be shipped will be managed without endangering human health and in an environmentally sound manner[10]. In case of exports to third countries outside the OECD, certain provisions governing trade apply. EU Regulation No 1418/2007 reflects the procedures chosen by importing countries. The Commission periodically updates this implementing regulation by transposing information received from the countries concerned. On 23 July 2012, the Commission adopted Regulation No 674/2012 reflecting new information provided by third countries on the applicable procedures.

At international level, the export of waste is regulated by the provisions of the UN Basel Convention via its measures on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. In order to maintain interoperability between the legislative provisions, the text of the WSR refers to all relevant legislative measures and points to the interlinking elements. With regard to the Basel Convention, the WSR notes that:

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9 Antonis Mavropoulos (nd): **Waste Management 2030+**, published online at Waste management World, downloaded from http://www.waste-management-world.com/index/display/article-display/8267238380/articles/waste-management-world/volume-11/issue-2/features/waste-management_2030.html

10 Articles 18, 49 and Annex VII. See also Commission Regulation (EC) No 837/2010 of 23 September 2010 amending Regulation (EC) No 1418/2007 concerning the export for recovery of certain waste to certain non-OECD countries

> *"Council Decision 93/98/EEC (6) concerned the conclusion, on behalf of the Community, of the Basel Convention of 22 March 1989 on the control of transboundary movements of hazardous wastes and their disposal (7), to which the Community has been a Party since 1994. By adopting Regulation (EEC) No 259/93, the Council has established rules to curtail and to control such movements designed, inter alia, to make the existing Community system for the supervision and control of waste movements comply with the requirements of the Basel Convention."*

Moreover, Article 49 of the WSR on the protection of the environment states that Article 4 of Directive 2006/12/EC (the waste treatment hierarchy) and other Community legislation on waste shall be respected. Further guidelines on ESM are contained in Annex VIII of the WSR, which also refers to the guidelines of the Basel Convention, the OECD, the International Maritime Organisation (on ship recycling) and the International Labour Organisation (on health and safety in ship breaking).

The export of hazardous waste from the EU to non-OECD countries is prohibited under the Basel Convention and the WSR. Shipment of non-hazardous waste for recycling or recovery to non-OECD countries is either prohibited, allowed under the full procedure, which includes the identification of the shipment, or allowed under a country-specific procedure. The procedure applied for the waste shipments depends on the country of destination and the relevant provisions of Regulation No 2007/1418/EC, regarding the export of the particular type of waste. Regulation 2007/1418/EC takes into account responses by non-OECD countries concerning their rules on import of green-listed non-hazardous wastes[11] which can, if destined for recovery, be shipped between Member States and to third countries provided certain information requirements are fulfilled. It must be ensured that the waste to be shipped is managed without endangering human health and in an environmentally sound manner[12].

In addition to the legislative measures, Decisions and guidelines published by the OECD also impose requirements on ESM for waste. The OECD has developed a green and amber list according to the risk associated with waste types (included as Annex III and IV of the WSR). Box 2.3 summarises the key provisions of the OECD Decision on waste.

Box 2.3: OECD Decision on Waste

The Organisation for Economic Co-operation and Development (OECD) has introduced requirements for its Member Countries via its Decision C(2001)107 on the Control of Transboundary Movements of Wastes Destined for Recovery Operations. The transboundary movements of wastes are supervised and controlled under a specific intra-OECD Control System, which is based on two types of procedures:

[11] Green listed wastes are identified in Annexes III, IIIA and IIIB of the Waste Shipments Regulation. Green listed wastes are subject to the general information requirement laid down in Article 18 of the WSR.

[12] Articles 18, 49 and Annex VII. See also Commission Regulation (EC) No 1418/2007 concerning the export for recovery of certain waste to certain non-OECD countries

Box 2.3: OECD Decision on Waste

A. Green Control Procedure: for wastes that present low risk to human health and the environment and, therefore, are not subject to any controls other than those normally applied in commercial transactions; and
B. Amber Control Procedure: for wastes presenting sufficient risk to justify their control.

Wastes subject to these control procedures are listed in appendices 3 and 4 to Decision C(2001)107/FINAL, these are the so-called Green and Amber lists of wastes. The control of waste shipments is carried out by national competent authorities and Customs Offices, through the use of notification and movement documents.

This Control System aims at facilitating trade in recyclables in an environmentally sound and economically efficient manner, by using a simplified procedure as well as a risk-based approach to assess the necessary level of control for these materials. Wastes exported outside the OECD area, whether for recovery or final disposal, do not benefit from this simplified control procedure

*Source: OECD (nd): **The OECD Control System for Waste Recovery**, downloaded from:*
http://www.oecd.org/document/52/0,3746,en_2649_34395_2674996_1_1_1_1,00.html

Non-hazardous waste for recycling or recovery is shipped freely between EU Member States when the provisions of article 18 of the Waste Shipment Regulation are fulfilled, primarily identification of the shipment and its involved actors (as required, for example, in Annex VII of the WSR). In relation to the transport of hazardous waste, the provisions of the Basel Convention apply. The provisions of the legislative framework relating to ESM are described further in Section 3 of this report.

2.3.4 Main Challenges

Despite the legislative controls in place, waste, particularly metal and e-waste, is frequently exported to developing countries, often in violation of international law[13]. Illegal shipments are most likely to occur without administrative follow-up under application of Directive 1013/2006/EC on shipments of waste, or in breach of the conditions described in the notification file. This means that shipments are administratively legal but the files accompanying the cargo may lack information on the possible waste recycling conditions in the country of destination.

There are suggestions that Waste Electrical and Electronic Equipment (WEEE) is also exported under the guise of 'second hand products', rather than waste, in order to avoid compliance with the WSR and export controls[14].

As there is no CN code for WEEE, it is difficult to identify statistics on its trade. Based on reporting requirements under the WEEE Directive, in 2010 over three million tonnes of WEEE were collected in the EU27 while reported quantities exported were just

[13] See, for example, Europol (2011): **EU Organised Crime Threat Assessment (OCTA 2011), d**ownloaded from https://www.europol.europa.eu/sites/default/files/publications/octa_2011_1.pdf

[14] See, for example, Caravanos, et al. (2011): *Assessing Worker and Environmental Chemical Exposure Risks at an e-Waste Recycling and Disposal Site in Accra, Ghana*, Blacksmith Institute Journal of Health and Pollution, Vol 1, no 1 pp.16-25.

under five thousand tonnes. This low volume of exports could be explained by the fact that official figures do not include information on electronic items exported for second hand use; nor would they include any illegal exports.

Similar problems appear to arise with exports of 'waste vehicles'. Due to the relatively high value of metals and components, vehicles have become an attractive product to trade. Vehicles bound for export, which have been certified as being in working order or repairable, can be classified as second hand and hence not as waste. The EU waste shipment correspondents' guidelines on the shipment of waste vehicles provide more detailed information on this[15].

The ELV recycling chain has been facing challenges such as illegal operators dismantling vehicles without suitable environmental protection measures and waste shipments with erroneous waste transport codes. An additional concern is the so-called *paper exports,* which means that transactions are happening only on paper without the actual export of a vehicle. This can give illegal dismantlers the possibility to perform any illegitimate action since the vehicle theoretically no longer exists in the country of export[16].

2.4 Receiving Countries

2.4.1 Introduction

The most frequent recipient country for scrap metal from the EU is Turkey (a member of both the OECD and the Basel Convention), while China and India are the largest non-OECD recipients. The main destination for paper/cardboard and plastic waste is China, with Hong Kong often serving as gateway for further transport into mainland China.

Overall, Asia is the main destination of EU waste. Between 1995 and 2007 trade in waste metals, paper and plastics between the EU and Asia expanded five-fold, 10-fold and 11-fold respectively. In 2006, around 3% of generated paper waste (over two million tonnes), 10% of metal waste (around nine million tonnes) and 71% of plastic waste (around ten million tonnes) were exported from the EU-25 to non-EU countries. This trend of increasing exports is anticipated to continue into the future.

2.4.2 Regulatory Regimes in Receiving Countries

Further to the measures listed in the Waste Shipment Regulation, the European Commission has requested responses from countries to whom OECD Decision

[15] Available from the European Commission DG Environment, downloaded from http://ec.europa.eu/environment/waste/shipments/pdf/correspondents_guidelines9_en.pdf

[16] Association of European Vehicle and Driver Registration Authorities (2011): **De-registration and recycling of end-of-life vehicles**, downloaded from https://www.ereg-association.eu/actualities/index.php?action=show_article&news_id=160

C(2001)107/Final on the control of transboundary movements of wastes destined for recovery operations does not apply.

Certain countries that have not issued a written confirmation that the waste may be exported to them from the Community for recovery are considered to have a procedure of prior written notification and consent. As Regulation 1418/2007/EC is directly applicable for Member States, requests from the non-OECD countries have the force of law. DG-Trade keeps track of incoming reactions and offers information in an online database[17].

Regulation 1418/2007/EC is updated on a regular basis, and has already been amended by Regulation 740/2008/EC with regard to the procedures to be followed for export of waste to certain countries. The amendment deals with the export of green waste for recovery to non-OECD countries such as China, India or Malaysia.

Beside the legislative measures, European Union Member States also provide summary tables regarding the different regulatory regimes in waste receiving countries to assist dealers of green-list waste.

Table 2.2 below, summarises the key regulations regarding the import of waste in the most important receiving countries.

Table 2.2: Regulatory Regimes in Receiving Countries

Country	Regulatory System
Egypt	**Egypt** allows the import of certain products as 'used goods' which are considered waste under EU legislation. In addition, whilst efforts have been made to streamline procedures for import inspection, other decrees recognise certification of inspections conducted by outside accredited agencies.
China	**China** ratified the Basel Convention in 1990 and by the late 1990s it began passing laws and regulations to better regulate the recycling, storage, and disposal of imported wastes, as well as banning imported waste that could not be used as raw materials. The Government's strategy to manage the environmental risk of imported waste includes prohibition, import licensing, inspection, quarantine and penalties.
Hong Kong	Under **Hong Kong's** Waste Disposal Ordinance (WDO), any import and export of prescribed hazardous, non-recyclable and contaminated waste for whatever purpose, and import and export of other waste for a purpose other than recycling, must be authorised by the EPD through a permit (the list of substances can be found in the sixth schedule of the WDO). Further to the Basel Convention, the Hong Kong Special Administrative Region (HKSAR) signed a Memorandum of Understanding with Mainland China in 2000, which was updated and renamed as the "Co-operation Arrangement on Control of Waste Movements between the Mainland and HKSAR" in 2007. It requires the transboundary movements of waste between these two areas, or waste shipments overseas via the ports of the Mainland or the HKSAR, to follow the Basel Convention's prior informed consent mechanism.

[17] European Commission, DGTRADE (2009): **Wider Agenda**, Environment, downloaded from http://ec.europa.eu/trade/issues/global/environment/waste.htm

Table 2.2: Regulatory Regimes in Receiving Countries	
Country	**Regulatory System**
India	In **India**, according to Regulation 1418/2007/EC the export of metal, paper/cardboard and plastic waste to the country is allowed under application of specific procedures. These procedures are described by the Ministry of Environment and Forest of India in its Hazardous Waste (Management, Handling and Transboundary Movement) Second Amendment Rules, 2009.

Source:
World Intellectual Property Organisation (nd): ***Decree by the Minister of Foreign Trade & Industry No.770 /2005*** *issuing the executive regulation to implement import and export Law no.118/1975 as well as inspection and control procedures of imported and exported goods, downloaded from http://www.wipo.int/wipolex/en/text.jsp?file_id=191626 last accessed 27.05.2012.*
World Trade Organisation (2005): ***Trade Policy Review Report*** *by EGYPT, WT/TPR/G/150WTO 2005, downloaded from http://www.wto.org/english/tratop_e/tpr_e/g150_e.doc.*
European Commission (2011): ***Study on the Role of Customs in Enforcement of European Community Legislation Governing the Protection of the Environment and its Best Practice****, downloaded from http://ec.europa.eu/taxation_customs/resources/documents/common/.*
Ministry of Environment and Forest (2008): Notification, The Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008, downloaded from http://www.moef.nic.in/legis/hsm/HAZMAT_2265_eng.pdf.

A more detailed assessment of regulatory provision in receiving countries can be found in Annex I of this report.

2.5 Impacts of Waste Export on Receiving Countries

2.5.1 Introduction

One of the major driving forces behind waste exports is economic. This includes the developing economies' increasing demand for secondary raw materials. Additionally, low labour costs in developing countries, sometimes combined with weak, poorly enforced or non-existent environmental and social regulations, translate into reduced costs for waste treatment. Sometimes, used products are exported to developing countries where they can be re-used or salvaged, thus increasing product life. However, other items are exported as waste and are unsalvageable.

Some developing and emerging economies can view the import of waste, even hazardous waste, from the West as a way to generate income. In addition, waste imports can generally provide income and employment for the poor. As such, there are arguments in favour of the waste trade from both the import and export side.

The impacts of exported waste on non-OECD countries vary considerably and can be influenced by the level of economic and infrastructural development. Environmental, social and economic impacts often reinforce each-other and can result in the multiplication of hazards.

2.5.2 Environmental Impacts

Inadequate waste management poses a threat to the environment. The degree of hazard posed by inadequate waste treatment technologies varies and is largely dependent upon the specifics of the individual facility as well as the materials that are being processed.[18] The most common environmental impacts of inadequate waste treatment include an increase in greenhouse gases, air-, water- and soil pollution, leachate[19], littering etc.

Processing e-waste, for example, involves various procedures such as de-manufacturing, dismantling, shredding, burning, and dissolution in strong acids. From an environmental standpoint this can be very harmful for the receiving region, as it can result in localised pollution. However, the pollutants can spread, resulting in the contamination of an entire region; affecting water, air, soil and biota[20]. These impacts are further magnified if the region is ill-equipped to manage it.

Environmental impacts can arise, for example, from the inadequate disposal or recovery of mobile phones which, in addition to plastics, can contain copper, nickel, lead, cadmium and zinc. If disposed in landfill under certain conditions, electronic circuit boards may leach lead and, if the landfill is not lined with an impermeable barrier, substances may migrate into groundwater and eventually into lakes, streams or wells, and give rise to potential exposure to humans and other species[21].

Table 2.3 summarises some of the health hazards that can arise from working with e-waste components under inappropriate working conditions. There may be significant differences in the working conditions at different waste recycling facilities in non-OECD countries, thus the level of risk to human health may also differ.

Table 2.3: Potential Occupational Hazard of Computer / E-Waste Components

Computer / E-Waste Component	Potential Occupational Hazard
Cathode ray tubes (CRTs)	Silicosis; Cuts from CRT glass in case of implosion; Inhalation or contact with phosphor containing cadmium or other metals.
Printed circuit boards	Tin and lead inhalation; Possible brominated dioxin, beryllium, cadmium, mercury inhalation.
Dismantled printed circuit board processing	Toxicity to workers and nearby residents from tin, lead, brominated dioxin, beryllium, cadmium and mercury inhalation; Respiratory irritation.

18 Ministry of Environment, Japan (2011): **Study on Criteria and Requirement on Environmentally Sound Management of Hazardous Wastes and Other Wastes**, 31 March 2011 Final Report

19 Leachate is the liquid that drains or 'leaches' from the waste source.

20 Robinson (2009): *E-waste: An assessment of global production and environmental impacts*, Science of the Total Environment Vol 408, pp183 – 191.

21 Basel Convention, Mobile Phone Partnership Initiative (2008): **Guidance document on the environmentally sound management of used and end-of-life mobile phones**, downloaded from http://archive.basel.int/industry/mppi/MPPI%20Guidance%20Document.pdf

Table 2.3: Potential Occupational Hazard of Computer / E-Waste Components	
Computer / E-Waste Component	**Potential Occupational Hazard**
Chips and other gold plated components	Acid contact with eyes and/or skin may result in permanent injury; Inhalation of mists and fumes of acids, chlorine and sulphur dioxide gases can cause respiratory irritation or cause severe effects including pulmonary oedema, circulatory failure, and death.
Plastics from computer and peripherals, e.g. printers, keyboards, etc.	Probable hydrocarbon, brominated dioxin, and heavy metal exposures
Computer wires	Brominated and chlorinated dioxin, polycyclic aromatic hydrocarbons (PAH) (carcinogenic) exposure to workers living in burning works area.
Miscellaneous computer parts encased in rubber or plastic, e.g. steel rollers.	Hydrocarbon including PAHs and potential dioxin exposure
Toner cartridges	Respiratory tract irritation; Carbon black possible human carcinogen; Cyan, yellow and magenta toners unknown toxicity
Secondary steel or copper and precious metal smelting	Exposure to dioxins and heavy metals
Source: Puckett et al (2002): Exporting Harm; The High-Tech Trashing of Asia, downloaded from: http://www.ban.org/E-waste/technotrashfinalcomp.pdf.	

End-of-life ships also contain high levels of hazardous waste which can be severely detrimental to the environment, especially where there is a lack of knowledge, infrastructure or resources to deal with such waste in an environmentally sound manner. According to a report studying the implications of ship-breaking in Bangladesh[22], the average weight of an unladen ship is over 13 000 tons. It is estimated that 95% of it is comprised of steel, which is generally coated in paint containing lead, cadmium, organotins, arsenic, zinc and chromium. Other harmful substances include: sealants containing PCBs; ammonia, asbestos; and oil (engine oil, bilge oil, hydraulic and lubricant oils, residual oil and grease). Due to the geographical location of the industry, there is an especially adverse effect on the coastal inter-tidal zone and its habitat. Potentially hazardous waste in the form of liquid, metal, gaseous and solid pollutants are present in large quantities due to the size of the vessels. End-of-life ships therefore pose serious implications for the health of air, soil and water.

Burning plastics (for example burning away the plastic cover of copper cables), generates greenhouse gases and fumes which may be toxic when carried out in an uncontrolled manner. These fumes can cause harm not only to the local area around the site of burning; airborne particles can travel through the air and cause environmental degradation far beyond the site. In addition, by-products from incineration, such as ash and slag, can also negatively affect the environment when discarded. The disposal of

[22] Hossain, and Islam, (2006): **Ship Breaking Activities and its Impact on the Coastal Zone of Chittagong, Bangladesh: Towards Sustainable Management.** Young Power in Social Action (YPSA), Chittagong, Bangladesh, available at: http://ypsa.org/publications/Impact.pdf.

plastics in landfill sites also has implications for the environment. Even bio-plastics. are also responsible for the release of greenhouse gases in landfill sites[23].

2.5.3 Social and Health Impacts

The social impacts of exported waste are closely interlinked and include issues such as health risks, working conditions, child labour, poor sanitation, hazardous conditions, etc. Different types of waste tend to have similar social impacts, although some impacts are more severe than others.

Many different types of waste contain toxic and hazardous substances, while others present risks during the processing procedure. Developing countries often have limited or non-existent labour and health regulations. This, coupled with poor working conditions and inadequate sanitation, can have serious health implications.

The recovery of metal is the main element of managing end-of-life mobile phones, for example. Through the processes of shredding and melting, with inadequate protective measures, workers can potentially be exposed to dust particles and metal fumes. Additionally, if batteries have not been removed before shredding, they can release caustic substances and may cause electrical short circuits and fire, which may give rise to its own releases of toxic emissions[24].

The ship-breaking industry is also characterised by dangerous working conditions. In addition to risks from exposure to hazardous substances, workers face the risk of injury such as cuts, bruises, burns, falls, scrapes, fire, electric shocks, etc. There are also risks from excessive noise, toxic gas explosions, and collapse/fall of metal plates from upper decks[25].

In the plastic waste industry, one of the main risks is from the contamination of plastic waste with unknown substances[26]. Chipping and melting plastic can have negative impacts on human health, especially if this process takes place in an unventilated workplace, through emissions of hazardous heavy metals, such as lead, cadmium, mercury and chromium, which were commonly used in plastics in the past. Current regulations ban various harmful substances from plastic production; nevertheless, despite these regulations, a 2007 study in the United States detected these substances

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23 European Commission (2011): **Plastic Waste in the Environment**, in association with BIO Intelligence Service and AEA Technology, Brussels, European Commission.

24 Basel Convention, Mobile Phone Partnership Initiative (2008): Guidance document on the environmentally sound management of used and end-of-life mobile phones, downloaded from http://archive.basel.int/industry/mppi/MPPI%20Guidance%20Document.pdf

25 Hossain, and Islam, (2006): **Ship Breaking Activities and its Impact on the Coastal Zone of Chittagong, Bangladesh: Towards Sustainable Management**. Young Power in Social Action (YPSA), Chittagong, Bangladesh, downloaded from: http://ypsa.org/publications/Impact.pdf.

26 Lardinois and van de Klundert (1995): **Plastics recycling in developing countries; A booming business?** downloaded from: http://collections.infocollections.org/ukedu/en/d/Jgq953e/3.1.html

present in plastics being imported into America[27]. Heavy metals pose serious risks to human health.

Support for the protection of workers at dumpsites in developing economies may be limited. Regulatory authorities in developing countries may simply not have the capacity to prohibit waste picking and, even if they did, they are likely to meet with objections from the large numbers of poor people who survive on earnings from this activity. Furthermore, informal sector entrepreneurs and workers frequently lack the technologies to optimise recycling methods and to deal with new waste materials, including lack of access to financing (e.g. bank loans). Working conditions for itinerant waste buyers may be further complicated by other factors, such as harassment and extortion from local authorities and larger enterprises[28].

Child labour occurs in many developing countries. It is generally driven by an economic situation whereby families rely on child labour in order to survive. Although most child labour is related to agriculture[29], it can also include working at waste treatment facilities. It is therefore likely that waste received from Europe and other industrialised countries will contribute to the labour demand as well as providing the potential of earning a living.

Box 2.4: Child Labour in Kenya and India

Many factors attract children to work on dumpsites. Poverty and the potential for quick money is a major driving force. According to a study carried out in Dandora, Nairobi's largest dumpsite, a child can earn between 200 and 400 shillings (€ 2-5) per day from the sale of collected plastics and metals.

The BBC (2010) reported that in Govandi, Mumbai, children can earn anywhere between US $1 and $6 a day. In addition to cash there is generally access to food which is also dumped on site. However, rather than helping to break the inter-generational cycle of poverty, child labour and lack of education reinforces it.

The study carried out in Dandora estimates that close to 10,000 people work onsite and of this the majority are children under the age of 18. Some are as young as 10. Some are full-time workers while others work part-time on weekends or during school holidays.

Children often drop out of school in order to earn money for themselves and their families on the dumpsite. The majority of child workers are male.

Source:
ANPPCAN (nd): Combating Child Labour in Embakasi, downloaded from http://www.anppcankenya.co.ke/index2.php?option=com_content&do_pdf=1&id=43 and ,
BBC (2010): From Rubbish Dump to School Room in Mumbai, downloaded from http://www.bbc.co.uk/news/10133159

Ship-breaking yards also employ children, as child labour is generally less expensive than adult labour. In this instance, boys are generally employed rather than girls due to

27 Dillon, P. (2007): **Toxic Heavy Metals Found in Packaging in Violation of State Laws**, Toxics in Packaging Clearinghouse, downloaded from: http://des.nh.gov/media/pr/documents/070717.pdf

28 Lardinois and van de Klundert (1995): **Plastics Recycling in Developing Countries; A Booming Business?** downloaded from http://collections.infocollections.org/ukedu/en/d/Jgq953e/3.1.html

29 International Labour Organisation (2010): **Facts on Child Labour 2010**, available from: http://www.ilo.org/global/publications/WCMS_126685/lang--en/index.htm

the physical strength required. According to FIDH and YPSA[30], around 10% of the workers at Chittagong's shipbreaking yards in Bangladesh are under 12 years old, 15-20% of the workforce is under 15 years old and 25% is under 18 years. Children can earn about 120 taka (€1.15 or $1.50) for 15 hours work.

2.5.4 Economic Impact

The driving force behind waste exports to non-OECD countries is economic. Waste has grown in importance as an international commodity and major international container ports have become important hubs for the transportation of this waste[31]. The reasons behind this have been examined from both the standpoint of the exporting country and from that of the receiving country.

For the exporting country, the main incentive to export waste lies in the difference in costs and capacities between domestic and overseas treatment, as well as the need to achieve recycling targets. Treating waste in accordance with the environmental and social standards in place in industrialised nations can be costly, whereas developing countries and emerging economies tend to offer a more competitive alternative. Cheaper labour in developing countries drives recycling costs down. Less stringent environmental, social and health regulations also allow for lower treatment costs[32].

For the receiving country, waste from industrialised nations can be a source of valuable raw materials, particularly for countries with limited natural resources of these marterials, and can create job opportunities. Precious metals such as gold, silver, platinum, palladium or rhodium can be recovered from various waste shipments at a much lower cost than in industrialised nations. This can be viewed as an efficient and welcome opportunity for countries with a growing production economy, leading to a growing demand for recycled raw materials.

Raw materials feed the domestic market which, in turn, encourages industrial growth. In addition, there is a market, particularly in Africa, for used and discarded items such as car parts and electronic equipment which can be re-used. Overall, waste can generate employment opportunities, industrial growth and it can fill the gap in the domestic market for cheap recycled raw materials[33].

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30 International Federation for Human Rights (2008): **Childbreaking Yards**, Child labour in the Ship Recycling Industry in Bangladesh, downloaded from http://www.fidh.org/IMG/pdf/bgukreport.pdf

31 Ruessink and Wolters (2009): **Time to End Illegal International Shipments of Waste**, article downloaded from **Greenport**, Hampshire, available at: http://www.greenport.com/features101/tugs,-towing,-pollution-and-salvage/guidelines/time-to-end-illegal-international-shipments-of-waste

32 ibid.

33 Sonak, *et al* (2008): **Shipping Hazardous Waste: Implications for Economically Developing Countries**, International Environmental Agreements, (2008), Vol 8, pp 143–159.

3. ENVIRONMENTALLY SOUND MANAGEMENT OF WASTE

3.1 Overview

The concepts of both Environmentally Sound Management (ESM) of waste and the Transboundary Movement of Waste (TMW) comprise a legal framework in which a certification scheme to ensure ESM of exported waste could be fitted. Table 3.1 outlines the legislative elements covering ESM and TMW.

Table 3.1: International Regulations Covering ESM and TMW

Level	Instrument	Nature	Covering
International	UN Basel Convention	Treaty binding all Parties	TMW ESM
International	OECD Decision C(2001)107	Comparable to treaty binding Commission and several MS	TMW
International	OECD Recommendation C(2004)100	Not binding (reporting requirement)	ESM
European	Regulations 2006/1013/EC and 2008/1418/EC	Directly binding for Member States	TMW
European	IPPC Directive 96/61/EC	Binding, requesting adaptation by Member States	ESM

Provisions relating to the environmentally sound treatment of waste of the above listed legislative measures are described in the following subsections.

3.2 The Basel Convention

Managing hazardous or other waste in an environmentally sound manner is a fundamental obligation of the Parties of the Basel Convention. Work is being carried out in this context to help Parties, in particular developing countries, to apply ESM principles. A number of technical guidelines have been developed within the Basel Convention, and some are listed in Annex III of the OECD Recommendation. They consider waste such as used tyres, plastic waste, lead-acid batteries, ships, biomedical and healthcare waste[34].

The export ban, or Basel ban, is an amendment of the Basel Convention. It bans exports of all forms of hazardous waste from the world's wealthiest and most industrialised countries of the OECD to all non-OECD countries. Wastes are listed

[34] For a full list of the Basel technical guidelines, please refer to: http://www.basel.int/techmatters/techguid/frsetmain.php

according to their level of hazard; the A-list is deemed hazardous and export is forbidden, while the B-list it is not hazardous and therefore not subject to the export ban.

In 1999 "the Basel Declaration on environmentally sound management" was adopted, moving from the concept of ESM to its implementation. The objective involves preventing, minimising, recovering and disposing of wastes in an environmentally sound manner, while taking into account social, technological and economic constraints. This entails the use of cleaner technologies, the promotion of institutional and technical capacity-building, the transfer of environmentally sound technologies, the development of training and information exchange, etc. Work is being carried out to help apply ESM principles, in particular in developing countries which may lack infrastructure, know-how, technology, etc. In addition, a set of criteria have been established to enable Parties to assess ESM. They are similar to the OECD's Core Performance Elements (CPEs) (see section 3.3 on OECD Legislation).

In 2011 a declaration on the prevention and minimisation of hazardous wastes was adopted. It highlighted waste management as part of the life-cycle of materials and resources, and called Parties to reduce hazardous waste generation and ensure ESM of unavoidable wastes. A new strategic framework has been introduced for the implementation of the Basel Convention for 2012-2021. It focuses on the element of partnership between the Convention and the Parties and seeks to strengthen ESM of hazardous and other wastes.

3.3 OECD Provisions

OECD Member Countries adopted a Council Recommendation on the Environmentally Sound Management of Waste [C(2004)100] in 2004, which includes a set of 11 policy recommendations for governments and a set of six criteria or "Core Performance Elements" (CPEs) for waste management facilities.

The implementation of the six CPEs by a recovery facility is an indication that waste is managed in an environmentally sound manner within that facility. The six CPEs are:

- to have an applicable environmental management system (EMS) in place;
- to take sufficient measures to safeguard occupational and environmental health and safety;
- to have an adequate monitoring, recording and reporting programme;
- to have an adequate training programme for personnel;
- to have an adequate emergency plan; and
- to have an adequate plan for closure and after care.

In addition, a Guidance Manual was published by the OECD in 2007. This publication aims at facilitating the implementation of an environmentally sound waste management policy by governments, as well as by waste treatment facilities. Every element of

Recommendation C(2004)100 is explained in detail through various types of information (such as technical, financial and regulatory) as are the different CPEs.

3.4 European Union

ESM is addressed in various Directives and Regulations related to waste and environmental protection, where managing waste in an environmentally sound manner is an underlying principle. Some EU requirements mirror the OECD CPEs. The general principle of ESM was underlined in the Waste Framework Directive (1975) and the Hazardous Waste Directive (1991), both of which included environmental protection principles, the waste hierarchy, permitting and inspection requirements, etc. The Waste Framework Directive also addresses ESM through the application of standards for permits.

The Best Available Techniques Reference Documents (BREFs) are of key importance for defining ESM. The BREF entitled 'Waste Treatment Industries'[35] contains the determined BAT for each waste treatment sector. Member States are required to take the BREF into account when determining best available techniques (BAT).

The Waste Shipment Regulation also addresses ESM. It stipulates that, in the case of exports of waste from the Community for disposal or recovery, the competent authority of dispatch shall require and endeavour to secure that any waste exported is managed in an environmentally sound manner throughout the period of shipment, including recovery or disposal in the third country of destination. The authorities must also prohibit an export if it has reason to believe that the waste will not be managed in an environmentally sound manner.

Other EU Directives which contribute to ESM include:

- Landfill Directive 1999/31/EC and the Landfill Acceptance Decision 2003/33/EC;
- Waste Incineration Directive 2000/76/EC;
- Directive on Agricultural Use of Sewage Sludge 86/278/EEC;
- Titanium Dioxide Industry Waste Directives 78/176/EEC, 82/882/EEC, 92/112/EEC;
- Batteries Directive 91/157/EC;
- Packaging and Packaging Waste Directive 94/62/EC;
- Directive on Disposal of PCBs and PCTs 96/59/EC;
- End-of-life vehicles (ELV) Directive 2000/53/EC;
- WEEE Directive 2002/95/EC; and
- RoHS Directive 2011/65/EU.

[35] European Commission (2006): **Integrated Prevention and Control Reference Document on Best Available Techniques for the Waste Treatment Industries**, downloaded from http://eippcb.jrc.es/reference/BREF/wt_bref_0806.pdf

Of special interest with regard to ESM is Directive 61/1996/EC on Integrated Pollution Prevention and Control, which addresses industrial installations with a high pollution potential, including many waste management installations. Such installations may only operate if the operator holds a permit containing requirements for the protection of air, water and soil, waste minimisation, accident prevention, and (if necessary) site clean-up. These requirements must be based on the principle of the use of best available techniques (BAT). One key element here is that permits are granted to installations on the basis of BAT.

3.5 North American Commission for Environmental Cooperation

Although the regulatory framework for waste management is very different in the USA than in Europe, there are still potential lessons from North American experience. The North American Commission for Environmental Cooperation (CEC) is an international organisation created by Canada, Mexico and the United States. It aims to address regional environmental concerns, to help prevent potential trade and environmental conflicts, and to promote the effective enforcement of environmental law.

In 2001, CEC set up the Hazardous Waste Task Force (HWTF) with the mandate to promote the environmentally sound management of hazardous waste and hazardous recyclable materials as well as to track their transboundary movements. Non-hazardous wastes are not covered by the CEC and therefore the approach is narrower than that of the OECD.

4. FRAMEWORK FOR CERTIFICATION AND STANDARDISATION

4.1 Certification

4.1.1 Objectives of Certification

Certification refers to the confirmation of certain characteristics and/or standards of a process, object, person, or organisation. This confirmation is often, but not always, provided in the form of external review, evaluation, assessment, or audit. Conformity assessment to the certification is generally evaluated by accredited third parties. Evaluation is undertaken against a threshold consisting of a set of criteria. The outcome of the evaluation is the approval or rejection of the certification.

Box 4.1: General Requirements for Process Certification

In order to achieve process certification, on-going reviews are necessary. Reviews include several key criteria such as:

- audits and key process indicators must exhibit acceptable results;
- complete requirements are understood and followed;
- complete process owners/stakeholders are trained for the initial cycle;
- acceptable team behaviour;
- team understanding that certification is only the initial step for improvement; and
- team understanding that personnel will be measured from this point on for continuous improvement in the process.

Direct benefits of Process Certification can include continuous process monitoring, probe checks and reduced product inspection time, with concurrent increased machine efficiency and utilization.

Indirect benefits can include the use and wider implementation of controlled, certified processes to meet standards and increase customer satisfaction.

Source: Best Manufacturing Practices, Best practice: Process Certification, downloaded from http://www.bmpcoe.org/bestpractices/internal/udlp/udlp_11.html

The set of criteria against which operations and processes are measured are based on the outstanding risks identified prior to certification. Conditions of certification and the number of parties involved (such as accreditors, certifiers, auditors) may vary from scheme to scheme. Certification can be voluntary as well as mandatory.

An example of mandatory certification comes from Denmark, where a form of energy and heating certification has been in place since the 1980s. Energy certification at the time of sale became mandatory in 1997 for smaller buildings and apartments, and at regular intervals it also became mandatory for larger buildings. A key feature of the Danish scheme is that all results and data from the certificates are reported to a central register. This information has been used to assess the energy savings potential and to develop policy actions for energy efficiency in the entire building stock[36].

[36] International Energy Agency (2010): **Energy Performance Certification for Buildings**, downloaded from http://www.iea.org/papers/pathways/buildings_certification.pdf

Environmental certification schemes are helpful in identifying procedures that have a potentially harmful impact on the environment, as well as for improving the environmental performance of companies and procedures. These certification schemes are typically run by third party organisations that establish environmental standards for goods and services and then certify suppliers' offerings against them. Certification programmes usually maintain a catalogue of goods and services that are certified to their standards.

The potential waste certification scheme seeks to develop a set of basic criteria to assess whether ESM is being achieved for waste exported out of the European Union to non-OECD countries. The introduction of ESM at waste recycling facilities in non-OECD countries seeks to ensure that social, environmental and economic aspects of the receiving countries are taken into consideration to a similar level than within the European Union.

4.1.2 Types of Certification Scheme

Certification schemes can be classified according to their mode of implementation:

- mandatory certification; or
- voluntary certification.

as well as according to the method of attestation:

- self-certification; or
- third-party verification.

Certification schemes can also be classified according to their objectives. Schemes which set **good practice** or baseline standards keep standards up to a minimum level. They can be seen as a benchmark on social, environmental and economic performance and exclude organisations which do not meet these standards. Entry barriers are low in a bid to enable an industry-wide certification and exclude bad practice. On the other hand, schemes which set **stringent practices** or above baseline standards entail requirements which are far from common practice within the industry. Organisations which implement these standards can often target niche market segments of the industry[37].

4.1.3 Relevant EU Provisions

Table 4.1 below summarises the key EU legislative provisions that could be relevant for certification schemes for non-EU waste recycling facilities. Certification schemes, especially mandatory certification, must not result in unfair practices and competitive advantage for one country over another.

[37] Muradian and Pelupessy (2005): *Governing the Coffee Chain: The Role of Voluntary Regulatory Systems*, World Development, Vol. 33, No. 12, pp. 2029–2044, 2005

Table 4.1: EU Provisions Relevant for Certification Schemes	
EU provisions	**Relevance**
Treaty on the Functioning of the European Union: Rules on the Internal Market	Certification service-providers may benefit from the freedom of establishment and freedom to provide services as enshrined in Articles 49 and 56 of the Treaty on the Functioning of the European Union (TFEU) and relevant provisions of the Directive on Services. They shall face no unjustified restrictions when establishing in another Member State. Equally, they should face no unjustified restrictions when providing services across borders. Certification schemes must also not result in de facto barriers to trade in goods in the internal market.
Treaty on the Functioning of the European Union: Rules on State Involvement	Certification schemes supported by public bodies, such as regional or national authorities, may not lead to restrictions based on the national origin of producers or otherwise impede the single market. Any support for certification schemes granted by a Member State or through State resources within the meaning of Article 107 of the TFEU, must comply with State aid rules.
Treaty on the Functioning of the European Union: Rules on competition	Certification schemes may not lead to anticompetitive behaviour, including in particular on a non- exhaustive basis: • horizontal or vertical agreements restricting competition; • foreclosure of competing undertakings by one or more undertakings with significant market power (such as preventing access of competing buyers to supplies and/or access of competing suppliers to distribution channels); • preventing access to the certification scheme by market operators that comply with the applicable pre-requisites; and • preventing the parties to the scheme or other third parties from developing, producing and marketing alter-native products which do not comply with the specifications laid down in the scheme. Consumer information and labelling requirements. The labelling, advertising and presentation of food must not be such as it could mislead consumers. The EU takes into account its international obligations, in particular the requirements set out in the WTO Agreement on Technical Barriers to Trade, when it introduces a conformity assessment procedure in a given piece of legislation.
Source: *Commission Communication — EU best practice guidelines for voluntary certification schemes for agricultural products and foodstuffs, downloaded from* http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2010:341:0005:0011:en:PDF	

4.2 Standardisation

4.2.1 Objectives of Standardisation

Standardisation is the process of voluntarily formulating and implementing technical standards across a variety of countries and organisations. These technical standards are mutually agreed upon and implemented consistently by stakeholders. Thus standardisation is particularly important in ensuring the compatibility of products used around the world. In such cases, technical standards agreed by the key manufacturing companies can ensure that products (such as screws, plugs or electric devices) are interchangeable and can operate in a safe and reliable manner across countries.

Standards aim to prove to the users that products, processes or services are fit for purpose. Occasionally, though, the expectations of the users may differ from the actual purpose. In addition, it is often difficult for the users to spell out the desirable quality of the process, product or service. Standards help by identifying the optimum parameters for the performance of a process, product or service (e.g. product standards) and the method for evaluating product conformity (such as test method standards and quality control standards)[38].

Standardization can be undertaken at four different levels. These are the international, national, association (or industry) and company levels. While the procedures for preparing standards might differ at the various levels, one common feature is that all standards stem from a consensus between all parties who refer to and use the standards in their daily work. It is at the national level that the standardisation requirements of individuals, companies and the industry are coordinated and integrated into purposeful national standards. At the same time, national level standards serve as a basis for international agreements on standards, which help to promote world-wide exchanges of goods and services[39].

Compliance with standards can be certified by independent third parties, as in the case of quality management and environmental management standards. Thus there is a close link between standardisation and certification.

4.2.2 Standardisation Bodies in the EU

There are a number of key organisations in the EU responsible for the development of standards. These are listed in Box 4.2.

[38] United Nations Industrial Development Organisation (2006): **Role of Standards,** a guide for small and medium-sized enterprises, working paper, downloaded from http://www.unido.org/fileadmin/media/documents/pdf/tcb_role_standards.pdf

[39] Ibid

Box 4.2: Standardisation Bodies in the European Union
CEN (European Committee for Standardization): A system of formal processes to produce standards, shared principally between 28 National Members, 8 Associate Members and two Counsellors. **CENELEC (European Committee for Electrotechnical Standardization):** Prepares voluntary electrotechnical standards that help develop the Single European Market/European Economic Area for electrical and electronic goods and services removing barriers to trade, creating new markets and cutting compliance costs. In the case of CEN and CENELEC, European standards are developed according to the principles of national delegation, whereby their members - the National Standards Bodies (NSBs) of the EU Member States and EFTA states - are responsible for developing European consensus. Moreover, representatives of the consumers as well as industry players are also involved with discussions related to the development and implementation of standards. **ETSI (European Telecommunications Standards Institute):** Officially responsible for standardization of Information and Communication Technologies (ICT) within Europe. These technologies include telecommunications, broadcasting and related areas such as intelligent transportation and medical electronics.
Source: European Commission, DG Enterprise and Industry, downloaded from http://ec.europa.eu/enterprise/policies/european-standards/key-players/index_en.htm

4.3 Applicability to Waste Recycling

The current project seeks to identify the most appropriate measures by which ESM of waste exported to non-OECD countries can be assessed. Both standardisation and certification could establish a threshold, composed of environmental and social conditions, above which the export of waste would be deemed acceptable. Table 4.2 below summarises the potential advantages and drawbacks of certification and standardisation in ensuring the application of ESM at waste recycling facilities outside EU borders.

Table 4.2: Advantages and Drawbacks of Certification and Standardisation Systems

System	Advantages	Drawbacks
Certification	Independent, third party verification ensures that management processes are properly calibrated against the rest of the industry.	Focus tends to fall on ensuring certification, as opposed to improving conditions. Renewing certification becomes the target; the focus is on passing the next audit.
	Staff responsibility is improved as procedural elements are highlighted, allowing for the identification of weaknesses.	Increased costs in relation to the scheme.
	Consistency in procedures, increased management control and reporting obligation.	In the case of voluntary schemes, the industry could become fragmented.

Table 4.2: Advantages and Drawbacks of Certification and Standardisation Systems		
System	**Advantages**	**Drawbacks**
Certification (continued)	Transparency of operations (including waste stream routes) is highlighted when certification is being applied across the industry.	
	Technological development is easier and on-going as weaknesses are highlighted.	
	Non-compliance is penalised immediately.	
Standardisation	Widely understood form of industrial policy.	Impact on social issues such as child labour or working conditions is unclear.
	Provides a pragmatic approach with regards to the effects of pollution on the environment.	Standardisation can discourage development of technologies which may otherwise result in higher levels of ESM.
	Low costs of implementation from a political perspective.	Penalties for violating standards can to be too low and enforcement can be weak.
		Standardisation committees can be dominated by large companies, which can further strengthen their market position by introducing standards that SMEs might have difficulties in meeting.
		Standards need to be revised frequently in response to rapidly changing circumstances. However, in practice their development tends not to keep up with the pace of change.
		Higher financial costs from the point of view of companies, including the administrative cost of implementing the system of standards and the monitoring and enforcement costs.
		There could also be political costs if the standards are stringent and businesses are adversely affected.
Sources: United Nations Economic and Social Commission for Asia and the Pacific downloaded from http://www.unescap.org/drpad/vc/orientation/M5_lnk_1.htm and ANSI-ASQ National Accreditation Board downloaded from http://www.anab.org/resources/value.aspx		

As well as ensuring ESM, measure proposed through both standardisation and certification, targeting improvement in recycling technology can also lead to enhanced efficiency of the recovery process, which can benefit both the exporting as well as the receiving country by securing access to raw materials.

The most crucial aspect of evaluating ESM at waste recycling facilities external to the EU is monitoring compliance. As Table 4.2 summarises, standardisation does not necessarily require regular quality audits, its main aim is to establish technological standards based on voluntary consensus and to assure reliable quality and consistency

of operation while meeting environmental targets. However, as we discuss in the next section, quality and environmental management standards are often linked to certification, with independent audit. Standardisation is a pragmatic approach to quality control that relies on the joint acceptance and initiative of the stakeholders. Its implementation is largely dependent upon the technical specification.

Certification, on the other hand, encompasses a broader array of procedural elements. The first pillar of certification – as with standardisation – is the set of criteria which the process is required to meet. The second pillar is the periodic review of operation which ensures consistency of the procedures. The regular verification of the quality of procedures is in line with the 2004 OECD Guidelines on ESM of waste recycling facilities[40], which highlights that the implementation of ESM shall contribute to maintaining competitiveness and facilitating further technological developments among the market players.

The OECD guidelines also note that, since ESM practices differ from country to country, as well as from waste type to waste type, a non-mandatory approach would be most efficient for treatment facilities. While the technological standards and legislative frameworks vary depending on the receiving country, the increasing quantity of shipments, as well as the lack of integrated ESM approach, suggests that a more comprehensive approach should be adopted.

In order to ensure that the implementation of ESM is carried out consistently across countries, however, a voluntary approach might be more suitable. A chain of custody approach could be adopted which traces each stage of the procedure. In relation to the export of waste, a focus on waste dealers could substantially reinforce the commitment of stakeholders. Dealers are the final point where European legislation can directly control the movement of shipments. Therefore, dealers would need to ensure and certify that their contacts – the recipients of the exported waste – have the necessary technological skills and know-how for the waste to be treated in what is considered an environmentally sound manner.

Taking into account the variety of products, the technological processes and the number of sectors involved in the export of waste, the introduction of a certification system might offer a broader quality control mechanism. Certification may also contribute to positive impacts including reduced health risks as well as a reduction in child labour as a result of a wider dissemination of ESM practices.

A potential certification scheme could validate that waste dealers are:

- exporting waste to locations where treatment facilities are using ESM throughout their operation; and
- monitoring treatment facilities to ensure they continue to meet ESM standards.

[40] OECD (2004): **Guidance Manual of Environmentally Sound Management of Waste**, downloaded from http://www.oecd.org/dataoecd/23/31/39559085.pdf

The implementation of the certification scheme could also potentially highlight key export routes for particular types of waste and thereby support the reduction of illegal exports.

4.4 Current Certification and Standardisation Schemes in Waste Management

4.4.1 Background

While there are currently only a limited number of certification or standardisation schemes which address quality control procedures directly related to the treatment of waste exported outside EU territory, there are certification schemes that set requirements relating to the environmental strategies of organisations.

The two most widely recognised and applied standardisation and certification schemes in the EU are the International Standardisation Organisation (ISO) quality management and environmental management standards and the EU Eco-Management and Audit Scheme (EMAS).

In addition to these schemes, there are a number of other potentially-relevant schemes. These include:

- WEEELABEX: WEEE;
- R2 and E-steward;
- AQSIQ-certification;
- Pre-authorised facilities under the Waste Shipment Regulation;
- EuCertPlast; and
- Electronic Industry Citizenship Coalition (EICC)

These schemes are discussed further below.

4.4.2 ISO Management Standards

Some of the most commonly used and recognised management standards have been developed by the International Standardisation Organisation (ISO). This is a network of national standards institutes from 163 countries with its headquarters located in Switzerland[41]. Compliance with the management standards is certified by third-party organisations, not the ISO itself.

The five main steps of certification of compliance with an ISO standard are:

- application or contract;
- initial or preliminary assessment/document review;
- certification assessment;

[41] International Standardisation Organisation (2011): **ISO 14000- Environmental Management** downloaded from www.iso.org

- certification; and
- certification maintenance[42].

Continuation to each step depends on the successful completion of the previous one. The evaluation of environmentally sound management is included in the preliminary assessment phase, where the organisation's EMS manual, applicable regulatory requirements, training programmes and development plans are reviewed.

ISO 9000

ISO 9000 is a set of voluntary quality management standards. It consists of standards and guidelines relating to quality management systems and related supporting standards. The ISO 9000 standards introduce quality management principles and the use of the process approach through which continuous development can be achieved.

ISO 9001 is used to establish the quality management system. Certification is not mandatory and companies implementing the quality standard can decide to self-certify. However, organisations choosing this quality standard are more likely to be audited by either their clients or a third party. Certification can serve as a business reference between the organisation and potential clients, especially when supplier and client are new to each other, or far removed geographically, as in an export context.

The aim of ISO 9004 is to extend the benefits obtained from ISO 9001 to all parties in the supply chain, including employees, owners, suppliers, partners and society in general. ISO 9004 provides guidance on a wider range of objectives than ISO 9001, particularly in managing the long-term success of an organisation.

ISO 19011 covers auditing of quality and environmental management systems. It provides guidance on internal or external audits, and information on auditor competence. Moreover, it provides an overview of how an audit programme should operate and how management system audits should take place[43].

ISO 14000

ISO 14000 is a set of voluntary Environmental Management Standards that serve as a strategic framework within which individual organisations can develop their own environmental management systems. Within the requirements of the standard, organisations are responsible for setting their own targets and performance measures with the standard serving to assist them as a strategic measure.

Within the ISO 14000 family, there are several standards relating to different applications and procedures. These include environmental management systems, environmental labels, life-cycle assessment as well as greenhouse gas accounting and

42 Gregory J. Hale and Caroline G. Hemenway (nd): **ISO 14001 Certification: Are You Ready?,** downloaded from http://www.qualitydigest.com/jul/iso14k1.html

43 International Organisation for Standardisation (2009): **Selection and use of the ISO 9000 family of standards**, downloaded from http://www.iso.org/iso/iso_9000_selection_and_use-2009.pdf

verification. The ISO 14001 standard deals with environmental management systems. It specifies requirements that an organisation has to meet in order to implement an EMS according to the standard.

As with ISO 9000, certification under ISO 14000 is voluntary. The ISO 14000 system helps planning, monitoring, auditing, corrective action, and review activities and enables the company to take steps in order to meet new objectives. Companies which seek third-party certification must demonstrate that they are aware of the environmental impacts that may have arisen or that may arise from the organization's activities. They must also demonstrate that they are taking steps to control them and are monitoring progress[44]. Compliance with the standards is audited annually.

The standard does not itself set specific environmental performance criteria. Instead, it presents general environmental management principles or guidelines. The procedural elements of the standard are integrated into the everyday operation of the companies. As shown in Box 4.3, there is no specific ISO standard for the ESM of exported waste. However, there are a number of standards in place to address environmental management including life cycle issues, all of which could potentially be relevant for the proposed waste certification scheme.

Box 4.3: ISO Standards Relevant to the Management and Treatment of Waste

- ISO 14004 provides guidance on the development and implementation of environmental management systems;
- ISO 14010 provides general principles of environmental auditing (now superseded by ISO 19011);
- ISO 14011 provides specific guidance on auditing an environmental management system (now superseded by ISO 19011) ;
- ISO 14012 provides guidance on qualification criteria for environmental auditors and lead auditors (now superseded by ISO 19011) ;
- ISO 14013/5 provides audit programme review and assessment material;
- ISO 14020+ covers labelling issues;
- ISO 14030+ provides guidance on performance targets and monitoring within an Environmental Management System;
- ISO 14040+ covers life cycle issues; and
- ISO 14051:2011 covers environmental management – Material flow cost accounting – General framework.

Source: Planet SA (2010): SMEs and the Environment in the European Union, downloaded from http://ec.europa.eu/enterprise/policies/sme/business-environment/files/main_report_en.pdf

The most recent survey (2008) by the ISO identified 38,419 ISO 14001 certified companies within the EU27. Analysis of the data from the 2008 survey indicates that 4,704 SMEs in the construction sector (FA45) have an ISO 14001 registration, 3,066 SMEs in the metal sector (DJ27) and 2,633 SMEs in other business activities (KA74)[45].

[44] Stander, L. and Theodore, L. (2008): **Environmental Regulatory Calculations Handbook**, Appendix B, John Wiley and Sons, downloaded from:
http://onlinelibrary.wiley.com/doi/10.1002/9780470118511.app3/pdf

[45] Planet SA (2010): **SMEs and the Environment in the European Union**, downloaded from http://ec.europa.eu/enterprise/policies/sme/business-environment/files/main_report_en.pdf

4.4.3 Eco-Management and Audit Scheme

The Eco-Management and Audit Scheme (EMAS) is a voluntary EU environmental certification scheme which was implemented by Regulation No.1836/93 and has been transposed by all EU Member States. The regulation underwent a revision in 2009, with the aim of increasing participation and encouraging more organisations to commit themselves to improving their environmental performance.

Participation in EMAS requires companies to carry out annual updates of its environmental policy targets as well as taking actions to implement these targets. Third party verification by independent auditors is also a prerequisite of the scheme.

EMAS had been adopted by over 4 500 organisations and implemented at over 9 000 sites all over Europe. Implementation begins with an environmental review to assess the impacts of the organisation's operations. The scheme requires participants to establish an internal Environmental Management System with continuous review and corrective actions. Once an organisation has prepared a public environmental statement, third party verification takes place which reviews compliance with the EMAS requirements. The European Commission has recognised that some of the elements of the ISO 14001 standard are similar to that of the EMAS and therefore considers the ISO standard to be a stepping stone for EMAS.

The ISO 14001 environmental management system requirements are now an integral part of EMAS III (Annex II of EMAS III). However, EMAS takes into account additional elements, such as increased involvement of employees as well as public reporting of environmental performance.

4.4.4 WEELABEX: WEEE

WEEELABEX: WEEE is a certification scheme created specifically for electrical and electronic equipment (EEE). It is based on European standards for the collection, treatment, recovery and recycling of WEEE (end-processing is not covered under the scheme) developed by the WEEE Forum. Initially, only operators having contracts with WEEE Forum members are required to implement the standards, especially logistics companies and electronic waste processing firms. However, the standards are expected to be adopted on a voluntary basis by parties with whom the WEEE Forum members do not have contracts. In time, the European standards organisations will translate at least parts of the WEEELABEX requirements into formal EN standards[46] that confer a set of rules for all operators on the market to comply with the Directive.

The WEEELABEX project is run by the WEEE Forum in co-operation with stakeholders from the producers' community and the processing industry. The WEEE Forum unites 39 WEEE producer responsibility organisations (or compliance schemes) from 22 EU Member States and represents approximately two thirds of officially reported WEEE collection in Europe. The costs of the WEEELABEX scheme is

[46] EN standards are European standards that have been adopted by one of the three recognized European Standardisation Organisations (ESOs): CEN, CENELEC or ETSI.

estimated to be over €1 million, half of which is covered by the Commission's Life programme; total costs are estimated at €1,064,000[47].

At its meeting in Amsterdam on 1 April 2011, the General Assembly of the WEEE Forum approved the standards (consolidated into version 9) and decided that they would not be subject to modifications for a period of 18 months (that is until 1 October 2012). During those 18 months, some 10 WEEE producer responsibility organisations in the WEEE Forum have voluntarily committed to implementing the standards in their contracts and to gain experience in 2012. All other WEEE systems in the WEEE Forum will have the requirements in place by 31 December 2013 or 2014 (for Eastern Europe).

Certification under the WEELABEX scheme will be voluntary and the project does not aim to turn the certification programme into a mandatory requirement. However, if in the future, some elements of the WEEELABEX scheme are accepted as standards, their implementation will become obligatory for all companies.

The ultimate goal of the project is to create a pool of WEEELABEX auditors who will inspect WEEE operators (i.e. collection sites, logistics sites, transporters and facilities involved in dismantling, de -pollution, preparation for re -use, disposal and recycling). Operators that comply with the WEEELABEX standards will be identified by a quality label or mark.

4.4.5 Other Certification Schemes

R2 and E-steward

Current initiatives in the United States[48], aiming to create a network of responsible waste collection and processing entities, include the R2 and the E-steward programme. Industry stakeholders in the United States, together with the US Environmental Protection Agency (EPA), developed the e-Steward certification scheme and the R2 standards for electronics recyclers to demonstrate that they meet specific standards to safely recycle and manage electronics[49].

The e-Stewards certification programme for electronics recyclers is designed to provide market incentives that drive the certification of the entire recycling chain that is managing toxic materials. In addition, efforts are underway to develop a programme which would qualify or certify companies who collect and transport electronics. This aims to increase the total volumes of electronics managed in a globally responsible

47 WEEE Forum (nd): **WEEELABEX kick-off on 20 November in Barcelona**, downloaded from http://www.weee-forum.org/news/weeelabex-kick-off-on-20-november-in-barcelona, last accessed 30.05.2012

48 Examples from the United States are presented in this report in order to provide a comprehensive overview of certification schemes currently in place, although the circumstances in which they operate are very different from that in the EU.

49 United States Environmental Protection Agency (2012): **Certification Programs for Electronics Recyclers**, downloaded from http://www.epa.gov/wastes/conserve/materials/ecycling/certification.htm

manner[50]. An example of how voluntary standards and certification procedures work alongside each other is presented in Box 4.4.

Box 4.4: Voluntary Standards and Certification for ESM of E-waste

A voluntary standard created by industry trade groups, called Responsible Recycling (R2), got off the ground in January 2009 to provide improved environmental guidelines for recyclers. In April 2009, the Basel Action Network (BAN), a watchdog group, along with a coalition of environmental groups, took the standard a step further with their e-Steward certification, which prohibits exporting waste to facilities in the developing world which are ill-equipped to handle it.

R2 prohibits the export of hazardous e-waste to developing countries, the use of prison labour for managing hazardous waste and sensitive data, and the dumping of hazardous materials in municipal landfills.

According to the Basel Action Network, R2 alone is inadequate for the task of ensuring a high degree of responsible recycling. However, there have been an increasing number of recyclers applying for both R2 and e-Stewards certifications due to market demands. To make things more cost-effective for recyclers, BAN ensures that R2 certification is provided as long as the more rigorous e-Stewards standard requirements are met at the same time.

Source: Popular Mechanics (2010), The Ever-Changing Landscape of E-Waste Recycling downloaded from http://www.popularmechanics.com/science/environment/recycling/changing-e-waste-recycling-landscape; and

Waste and Recycling News, BAN to add e-waste certification standards downloaded from http://www.2degreesnetwork.com/groups/waste-management/news/180179/

Waste Certification Schemes

There are a number of additional waste certification schemes which are currently being used to reflect the quality of waste recycling and waste management, these are summarised in Table 4.3 below.

Table 4.3: Additional Waste Certification Schemes

Waste Certification Scheme	Description
AQSIQ-certification	The system has been developed by the Chinese General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ) for pre-shipment control on waste imports into China. Certification is mandatory for anyone who wants to export waste material to China. Registration is required only for those companies that have a contract with a Chinese company buying recyclables/scrap. Companies that ship exclusively through brokers located outside of China do not need to register. Successful applicants are issued a registration certificate valid for three years. The scheme is managed by the General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China, which is a Chinese central government

[50] E-Stewards (2010): **Background and history**, downloaded from http://e-stewards.org/about/

Table 4.3: Additional Waste Certification Schemes	
	department, which grants the AQSIQ certificate.
Pre-authorised facilities under the Waste Shipment Regulation	The Scheme implements Article 14 of WSR, providing that the competent authorities of destination which have jurisdiction over specific recovery facilities may decide to issue pre-consents to such facilities. "Pre-consent" is granted to the facility by the competent authority of its jurisdiction. It indicates that a Member country has granted pre-consent (pre-authorisation) for quantities of certain wastes to be accepted by one or more designated recovery facilities within its jurisdiction, in conformity with IV, paragraph 2.2(a) of Decision C(92)39/FINAL. Details on the company, the location, the expiry of pre-consent, the OECD codes or relevant waste types, and total quantity pre-consented is also indicated when known. Competent authorities can grant up to a maximum of three years of pre-consent to recovery facilities (article 14(2)).[51]
EuCertPlast	EuCertPlast is the culmination of a project funded by the European Commission under the Eco-Innovation programme. This Europe-wide scheme was developed by various partners within the plastics industry, including converters, recyclers and collectors, and is expected to increase recycling rates and transparency within the industry. The certification aims to standardise transparency, waste traceability, and environmentally friendly best practices within the plastics recycling industry and is expected to increase plastic recycling rates.
Electronic Industry Citizenship Coalition (EICC)	Open to electronic manufacturers, software firms, ICT firms, and manufacturing service providers, including contracted labour, that design, market, manufacture and/or provide electronic goods or other materials or services to ICT firms. Members adopt the EICC Code of Conduct as operating principles for their companies and suppliers.[52]

The process of pre-authorisation of waste treatment facilities article 14 of the Waste Shipment Regulation could be a highly relevant element of a potential certification scheme/standard for waste exports. Further assessment on the implementation mechanism of such pre-authorisation as well as its possible implications can be found in the following chapter.

[51] Department for Environment, Food and Rural Affairs (2007): **Explanatory Memorandum to the Transfrontier Shipment of Waste Regulations**, downloaded from http://www.legislation.gov.uk/uksi/2007/1711/pdfs/uksiem_20071711_en.pdf

[52] Information from the Electronic Industry Citizenship Coalition, downloaded from http://www.eicc.info/

4.5 Missing Elements

4.5.1 ESM Best Practice Indicators

In line with the European Commission's *Impact Assessment Guidelines*[53], a number of indicators have been identified which could facilitate the assessment of the various policy options and demonstrate improved environmental management of facilities. Although not fully comprehensive, the guidelines provide an overview of the essential aspects that must be evaluated for an environmentally sound treatment of waste. These indicators are summarised in Table 4.4.

These key indicators are proposed to provide a measure of whether waste exported from the EU to third countries is treated in an environmentally sound manner. The indicators are not designed to evaluate countries, markets or sectors, but rather the operation of individual companies and facilities. From the point of view of waste recycling and waste export, the evaluation of the individual facilities is crucial for the planning of any future certification scheme, as it would contribute to the creation of a threshold based on the indicators identified below.

4.5.2 Indicators

As the descriptions under Chapter 3 of current certification and standardisation schemes show, there are no specific criteria or indicators defining environmentally sound management of waste in the EU. However, a number of indicators are set out in guidelines, as well as reports on the environmental impact of waste management in non-OECD countries.

A list of such indicators is presented in Table 4.4 summarising the core elements of ESM as listed in the OECD Guidance Document[54] and in the report on Key Environmental Indicators[55]. The indicators in the table are also in line with the requirements of the Ship Recycling Directive[56], which includes the following measures to reduce environmental, health and safety risks and ensure a high quality of recycling operations:

- control and inventory of hazardous materials;
- requirement for ship-owners to hold a ready for recycling certificate issued by the Member State whose flag they are flying prior to any recycling activity; and

53 European Commission (2009): **Impact Assessment Guidelines,** downloaded from http://ec.europa.eu/governance/impact/commission_guidelines/docs/iag_2009_en.pdf

54 OECD (2004): **Guidance Manual of Environmentally Sound Management of Waste**, downloaded from http://www.oecd.org/dataoecd/23/31/39559085.pdf

55 OECD (2008): **Key Environmental Indicators**, downloaded from: http://www.oecd.org/dataoecd/20/40/37551205.pdf

56 European Commission (2012): **Regulation of the European Parliament and of the Council on Ship Recycling,** European Commission 2012/0055 (COD) downloaded from http://ec.europa.eu/environment/waste/ships/pdf/Ship_Recycling_reg_en.pdf

- develop a ship recycling plan which includes information concerning the establishment, maintenance and monitoring of the safe-for-entry and safe-for-hotwork criteria as well as treatment of the hazardous materials and waste generated by the recycling.

Moreover, the relevant sections of the Commission's Impact Assessment Guidelines[57] have also been listed to provide a comprehensive overview of the issues that are expected to arise in connection with the assessment of the facilities.

Table 4.4: **Indicators for ESM**

Area	OECD CPEs	Questions
The likelihood or scale of environmental risks	CPE1: Have an applicable environmental management system in place**.**	*Does the technology implemented at the facility affect human health, damage crops or buildings or lead to deterioration in the environment (soil or rivers, etc)? Does the facility have an applicable environmental management system in place?*
Health and Safety	CPE2: take sufficient measures to safeguard occupational and environmental health and safety	*Does the technology implemented at the facility affect the health and safety of individuals/populations, including life expectancy, mortality and morbidity, through impacts on the socio-economic environment (working environment, income, education, occupation, nutrition)?* *Does it increase or decrease the likelihood of health risks due to substances harmful to the natural environment?*
Monitoring and Reporting	CPE3: have an adequate monitoring recording and reporting programme	*Does the treatment facility have an adequate monitoring recording and reporting programme in place?*
Training	CPE4: have an adequate training programme for the personnel	*Does the treatment facility have an adequate training programme for its personnel in place?*
Emergency Plan	CPE5: have an adequate emergency plan	*Does the treatment facility have an adequate emergency plan in place?*
Closure and After Care	CPE6: have an adequate plan for closure and after care	*Does the treatment facility have an adequate plan for closure and after care in place?*
Social impacts in third countries		*Does the option have a social impact on third countries that would be relevant for overarching EU policies, such as preventing illegal use of child labour?* *Does it increase poverty in developing countries or have an impact on income of the poorest populations?*

[57] European Commission (2009): **Impact Assessment Guidelines,** downloaded from http://ec.europa.eu/governance/impact/commission_guidelines/docs/iag_2009_en.pdf

Table 4.4: **Indicators for ESM**		
Area	**OECD CPEs**	**Questions**
Third countries and international relations		*How does the option affect trade or investment flows between the EU and third countries? How does it affect EU trade policy and its international obligations, including that of the WTO?* *Does the option concern an area in which international standards, common regulatory approaches or international regulatory dialogues exist?* *Does it affect EU foreign policy and EU/EC development policy?* *What are the impacts on third countries with which the EU has preferential trade arrangements?* *Does it affect developing countries at different stages of development (least developed and other low-income and middle income countries) in a different manner?* *Does the option affect goods or services that are produced or consumed by developing countries?*

The questions relating to the indicators serve as an indication for evaluating ESM at waste recycling facilities in non-OECD countries. However as the receiving countries have differing degrees of technological capacity as well as environmental and social challenges, the indicators should reflect country specific challenges.

Adapting these indicators in the certification procedure can allow for a closer and more precise description of the state of waste recycling facilities. The use of indicators can yield special benefits in relation to the development of technological capacity and in identifying high performers.

However, indicators are not expected to give an all-encompassing analysis of the situation, they serve as a baseline upon which on-site assessments can be conducted. Certification systems therefore are generally based upon a series of evaluation tools that include regular assessment of the facilities.

4.5.3 Quality Control at Receiving Facilities

Current quality and environmental management certification schemes apply only to the sites that are maintained and managed by the organisations implementing the scheme. Although the requirements of the schemes take account of supply chain issues, these focus primarily on suppliers, rather than customers. In cases where waste is re-sold to shredders or other parties, these facilities would need to obtain separate certification.

Assessing the technological capacity of waste recycling facilities and establishing a set of conditions to which they must adhere to are crucial elements of any certification scheme applicable to waste recycling in third countries. An effective scheme should not prevent facilities from participating in the legal trade of waste but rather encourage

them to undertake developments in order to provide better service, which might also result in a possible increase in the extraction rate. For a certification scheme to be effectively applied across regions, it is important that facilities with different levels of technological development are able to meet the requirements. Furthermore, any proposed certification scheme must remain flexible to encompass new technological developments and relevant standards and facilitate the involvement of waste recycling facilities to increase collaboration and disseminate new knowledge.

Control Measures in Receiving Countries

Provided that current trends of increasing waste generation and export from Europe continue, along with a continuous rise in quantities of waste generated in receiving countries while technologies and facilities remain inadequate, it is possible that receiving countries may limit the amount of waste they allow to enter their countries.

The Chinese authorities have already placed restrictions on the quantity and type of waste imported into the country (see Box 6.1 in Chapter 6) and it is possible that similar measures may also be introduced in other countries.

These limitations could provide a strong incentive for the introduction of a waste certification scheme, as it would seek to control the treatment of waste exported outside the EU and in turn facilitate recycling within Europe.

5. KEY ELEMENTS OF A CERTIFICATION SCHEME

5.1 Basic Features

A number of key issues need to be addressed prior to formulating a framework for a potential certification scheme. These are summarised in Table 5.1. There are a number of potential answers to these questions; some of the responses will vary, depending on which of the three options for certification schemes is selected (discussed in Section 5.4).

Table 5.1: Key Questions for Waste Certification Scheme Development

Question	Answers
Whom does the certification concern?	There are a number of potential targets for certification. **The main target would be dealers exporting waste for treatment outside the EU to waste recycling facilities in third countries**. These organisations are located in the EU and could thus be subject to EU regulations, if a mandatory scheme was introduced. However, a voluntary scheme could be open to organisations located outside the EU, which would enable treatment facilities in third-party countries to seek certification.
What are the main concerns regarding recycling treatment facilities?	Inadequate standards of ESM for waste exported outside the EU, lack of global waste recycling strategy/minimum standards.
Why certify?	• Market demand: to project an image of environmentally sound management of waste by dealers; • To promote sustainable use of waste; • Protection of the market from illegal waste recycling facilities.
How could the strategy be implemented?	Develop a waste recycling certification scheme, either solely for dealers exporting waste or a wider scheme that would enable waste recycling facilities to be certified directly
What is the specific purpose of the certification?	Scope: to ensure waste arising from European companies is treated in an environmentally sound manner outside the EU as well as within. Focus: criteria for waste recycling plants based on: • life-cycle approach; and • waste- specific requirements.
Level of commitment: compromises?	Agreement must be reached with dealers (and potentially waste recycling facilities) and their associations regarding the type (voluntary, mandatory) of a certification scheme.
How could dealers/recycling plants be certified?	A mandatory scheme would require dealers to seek certification; a voluntary scheme would need to encourage dealers (and treatment facilities) through publicity etc.
How could credibility be maintained and improved?	Periodic revision of criteria, review of numbers, types and locations of participants etc. effective oversight of certification and verification activities..

The question of which organisations should seek certification is a critical one. Dealers exporting waste from the EU are the most obvious, as they are companies located (or registered) within the EU and therefore subject to EU regulation and the last stakeholders in the waste chain responsible for the waste before it is exported. It would not be possible for the EU to implement a mandatory certification scheme on companies based outside the EU, such as treatment plants in third countries.

However, a voluntary scheme could potentially be targeted directly at third country treatment plants as well as dealers, allowing treatment plants to seek certification themselves and then offer their services to EU-based dealers. There are precedents for this with the ISO 14000 standards, for example, and with the inclusion of EU-owned overseas facilities under EMAS.

5.2 Management and Implementation

5.2.1 Introduction

The following sections give an overview on the management of a possible certification scheme and the primary tasks of the main stakeholders involved, as well as their interlinking functions. An overview of the key participants within the Scheme and their connections to each other can be seen in Figure 5.1.

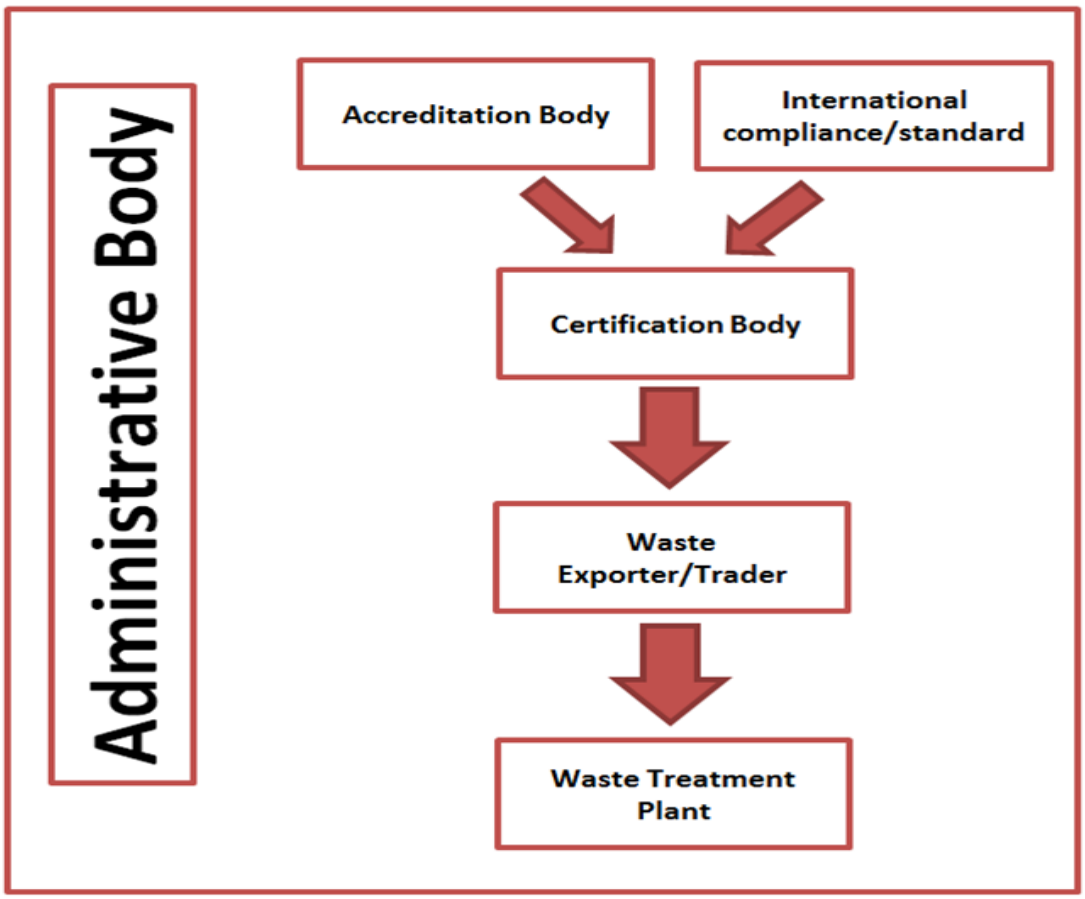

Figure 5.1: Participants within the Certification Scheme

The three main bodies responsible for management and implementation of a certification scheme would be the:

- administrative or management body;
- accreditation body; and
- certification body.

Out of the three actors, the administrative body is most central to the functioning of the certification scheme and would be required under all three options for certification schemes discussed in Section 5.4.

5.2.2 Administrative and Management Body

The central element of the certification scheme is a professional, cost-efficient, reliable and transparent administration body that works in conjunction with, or as part of a public body, with policy makers and stakeholders. The main tasks of the administrative body include:

- to further develop and promote the scheme;
- ensure its reliable and impartial implementation;
- negotiate internationally to ensure scheme's recognition;
- maintain the scheme website and related technical information;
- ensure a fair consideration of all interests in scheme development and implementation; and
- collect and administer finances for development and implementation

One of the most important roles of the administrative body is to raise awareness of the scheme among accreditation and certification bodies. This could involve, for example, organising regular events for the various participants and providing information channels through which information and data relevant for the scheme can be disseminated.

Organisations seeking certification under the scheme (waste dealers involved in export of waste or, under some options, waste recycling facilities) could be enabled to download from and upload information to the scheme website. The administrative body could also collate information for the certification bodies, based upon which regular audits within the scheme are carried out. An example of the type of information that could be provided on the scheme website is given in Box 5.1.

Box 5.1: **Potential Content of a Scheme Website**

The scheme's website should provide compliance assistance information for those involved in the export of waste from the European Union. This should include information on:

- European regulations regarding the export of waste;
- European environmental regulations;
- stakeholders involved in the scheme;

Box 5.1: **Potential Content of a Scheme Website**
• management of the scheme; • requirements of the Scheme; • log-in system for waste dealers and receiving facilities to comply with scheme requirements; • entry related information for dealers (including local contacts); and • links to additional information. Transparency of the scheme is essential, therefore the website needs to provide information related to the underlying principals, the aim, the internal mechanism as well as the key staff of the certification scheme. The website would need to be able to respond to the log-in request of potentially hundreds of dealers and facilities at the same time and handle the related data transfer quickly and efficiently.

The implementation of the Scheme could draw on the findings of related projects, such as SUSPROC which has been supporting the Directorate General for Environment in the elaboration and implementation of the Thematic Strategy on Prevention and Recycling of Waste since 2004[58].

There are a number of options to consider for the administrative body:

- a body which is financially and administratively independent from the Commission;
- a semi-independent body partly supported by the Commission; or
- a committee under Commission organisation.

These options have different implications for funding and synergies with relevant regulations. Option *a)* would imply that financing for the management of the scheme would be provided by stakeholders (or potentially Member States). Option *b*) would incorporate external as well as EC financing and option c presumes that financing of the certification scheme would rely solely on EC financial support.

With regard to synergies with relevant regulatory measures, all three options would be viable while option c offers the most direct synergies.

5.2.3 Accreditation Body

The role of the accreditation body (or bodies) is to oversee and manage international and national organisations that will award and review certification under the scheme (certification bodies). The accreditation body would be responsible for identifying and appointing certification bodies based on a set of accreditation requirements. Accreditation demonstrates confidence that the certification bodies have the resources and technical competence to undertake the work, that correct and valid evaluation and quality control mechanisms are used and that the work is carried out impartially.

[58] European Commission Joint Research Centre (2011): **Waste and Recycling**, downloaded from http://susproc.jrc.ec.europa.eu/activities/waste/

The accreditation body verifies the impartiality, independence and competence of certification bodies and the auditing procedures. Its main role would be to oversee the following tasks:

- accreditation of certification bodies;
- international compliance;
- scheme implementation/ revisions and auditing; and
- endorsement of national specifications to standard.

To ensure effectiveness and efficiency, the Accreditation Body (or bodies) would need to work closely with existing organisations in the field of accreditation, including accreditation bodies under existing EU regulations, such as EMAS. In addition, it would be useful to coordinate with other organisations for example, the International Accreditation Forum (IAF) which is the world association of Conformity Assessment Accreditation Bodies and other bodies interested in conformity assessment in the fields of management systems, products, services, personnel and other similar programmes of conformity assessment.

The purpose of IAF is to ensure that its members only accredit bodies that are competent to do the work they undertake and are not subject to conflicts of interest. Additionally it seeks to establish mutual recognition arrangements, known as Multilateral Recognition Arrangements (MLA), between its accreditation body members thereby ensuring that accredited certificates are deemed reliable anywhere in the world.

5.2.4 Certification Bodies

The role of certification bodies (CB) is to identify whether organisations applying for certification are fulfilling the requirements. The certification bodies are responsible for awarding certificates and reviewing the implementation of the scheme at the individual organisations. The CB should be able to fulfil the following requirements:

- maintain accreditation to the scheme;
- operate in a non-discriminatory manner so as not to impede or inhibit access by applicants;
- make their services accessible to all applicants whose activities fall within the declared field of operation, independent of the size or membership status of the applicant;
- ensure that the relationship between the CB and each organisation applying for certification does not compromise the CB's independence;
- be responsible for decisions relating to granting, maintaining, extending, suspending, reducing, and withdrawing certification, and make these decisions impartially;
- decide whether or not to certify an organisation on the basis of the information gathered during the evaluation process and any other relevant information;
- have a legally enforceable agreement for the provision of certification activities to clients. Contract and agreements for certification should take into account the responsibilities of the parties;

- provide, regularly update, and make available upon request a list of the organisations it has certified; and
- have a substantial European presence.[59]

The certification procedure of the scheme should be in line with ISO requirements for certification and accreditation, as it is an internationally recognized and administered procedure.

Box 5.2: Example of a Verification Methodology

The EU ETS Commission Decision of 18 July 2007 establishing guidelines for the monitoring and reporting of GHG emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council sets out the following verification methodology:

1. Strategic analyses: review the monitoring plan and other documents submitted by the reporter. Understand the sources of GHG emissions and the data and calculation procedures, and systems used to determine GHG emissions.

2. Risk analysis: analyse the inherent risks and control risks related to the scope and complexity of the emission sources and procedures that could lead to material misstatements. Develop a verification plan commensurate with the risk analysis. The plan includes a list of activities schedule of activities, and process explaining how the activities will be conducted. It also includes a data sampling plan.

3. Verification: conduct a site visit when appropriate to inspect monitoring equipment, conduct interviews, and collect documentary evidence. Implement the verification plan including review of a sample of the data. Confirm validity of information used to calculate uncertainty level, verify that the reporter is implementing their approved monitoring plan, and identify missing data. Determine misstatements and non-conformities.

4. Internal Verification Report: prepare an internal report that documents the findings of the verification process. This is retained by the verifier but not submitted. The report is used to determine whether the emissions report contains material misstatements or other issues.

5. Verification Report: this report presents the verification methodology, findings, and verification opinion. The verifier submits the report to the reporter, and the reporter then includes it with their annual emissions report to the government agency implementing the EU ETS. The annual emissions report is satisfactory if the verifier finds no material misstatements or material non-conformities. The material misstatement criteria are 5% for small and medium sources and 2% for large sources.

Source: Commission Decision of 18 July 2007 establishing guidelines for the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council, downloaded from
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2007:229:0001:0085:EN:PDF

The CBs would be responsible for auditing/verifying the compliance of the companies and would therefore visit the waste recycling facilities where the waste exported by the

[59] US Environmental Protection Agency (nd): **Information from the Energy Star program: Conditions and Criteria for Recognition of Certification Bodies for the ENERGY STAR Program**, downloaded from http://www.energystar.gov/ia/partners/downloads/mou/Conditions_and_Criteria_for_Recognition_of_Certification_Bodies.pdf

EU companies is treated. The requirements of the verification procedures will depend on the content of the certification scheme. An example of verification methodology requirement is presented in Box 5.2. The example illustrates that the verification procedure involves assessing the data provided by the stakeholders in their certification documents as well as undertaking a site review to collect documentary evidence and to confirm the validity of environmental data

5.2.5 Timeline and Steps

Overall, a period of two to four years can be envisaged as necessary for the development and introduction of a new EU Waste Export Certification Scheme. Following the development of the basic criteria and the EU wide strategy for detailed implementation, the subsequent phases are:

- organisation of scheme development;
- standard setting;
- public consultation;
- standard testing;
- introduction of waste export standard; and
- implementing the certification administration system

5.3 Requirements for Stakeholders

5.3.1 Background

Introducing environmentally safe practices at waste treatment facilities external to the border of the European Union would require action not only by the treatment facilities themselves but also by dealers and waste generators. The following sections detail the possible requirements that could be introduced by the certification scheme. The potential impacts of these requirements depend on the type of certification scheme and are therefore assessed under the different policy option scenarios in sections 6 - 9.

The proposed elements of the requirements are in line with the proposed regulatory provisions of the European Parliament and of the Council on ship recycling.

5.3.2 Requirements on Waste Generators

The Basel Convention defines waste generator as "*any person whose activity produces hazardous wastes or other wastes or, if that person is not known, the person who is in possession and/or control of those wastes*".

The Convention deals, for the most part, with the management and treatment of hazardous waste. In the case of non-hazardous waste, the generators can range from manufacturers of goods to the households and businesses that dispose of the products after use. Except in cases where extended producer responsibility (EPR) schemes are in place, the waste generators may not be aware of the destination of their waste.

The OECD defines EPR as an environmental policy approach in which a producer's responsibility for a product is extended to the post-consumer stage of a product's life cycle. An EPR policy can be characterised by:

- the shifting of responsibility (physically and/or economically; fully or partially) upstream toward the producer and away from municipalities; and
- the provision of incentives to producers to take into account environmental considerations when designing their products.[60]

In the European Union, a number of mandatory EPR schemes have been introduced, including the WEEE Directive (2002/96/EC) which includes a requirement that users of electrical and electronic equipment from private households should have the possibility of returning WEEE at least free of charge.

The proposed waste certification scheme would not affect the liability of generators unless they themselves act as exporter of waste.

5.3.3 Requirements on Waste Dealers

A definition for dealer is provided by the Waste Shipment Regulation as:

> *"anyone who acts in the role of principal to purchase and subsequently sell waste, including such dealers who do not take physical possession of the waste, and as referred to in Article 12 of Directive 2006/12/EC"*

The role of waste dealers is a particularly important one, as they can take ownership of the waste and can decide on its destination for treatment. In the case of waste exports, the dealers can serve as the final point of contact in the waste chain for European legislators.

Under the proposed certification scheme, waste dealers would achieve certification if all waste treatment facilities receiving their shipments comply with the ESM standards of the scheme. The certification scheme would serve to ensure that: "*waste exported from Member States will have to be treated in safe and environmentally sound waste treatment facilities.*"

In order to fulfil the requirements of the certification scheme, dealers would be obliged to maintain an updated list of the waste treatment facilities to which they ship waste. This list should contain information on the following:

- the location and management of the facility;
- the amount of waste per type the treatment facility deals with annually;
- the technology used at the facility for waste treatment, including the efficiency of recovery;

[60] OECD (nd): **Environment Directorate, Extended Producer Responsibility**, downloaded from http://www.oecd.org/document/19/0,3746,en_2649_34281_35158227_1_1_1_1,00.html

- the environmental controls in place at the facility;
- whether an environmental management system is in place;
- other environmental and quality control schemes in place;
- measures to safeguard occupational health and safety;
- monitoring, recording and reporting programme in place;
- staff training programme;
- emergency plan; and
- plan for after-closure and after-care.

The waste dealer would be allowed to modify its list of facilities at any time, provided the facility meets the requirements/is certified. It would be essential to ensure that data and information shared via the certification scheme would not lead to the disclosure of commercially confidential information.

Similar to the provisions of the proposal on ship recycling, waste dealers would be required to keep an inventory of the waste contained in each individual shipment. The inventory would be specific to each shipment and identify all types of materials carried as waste. Tracking of the exported waste shipments could also be a prerequisite for complying with the certification.

These two requirements would serve to assure both the identification of the waste carried on board as well as the technological suitability of the waste treatment facilities.

5.3.4 Requirements for Waste Treatment Facilities

Classification of waste treatment facilities is an essential element of any proposed certification scheme. The classification would help to identify whether the facility is carrying out environmentally sound management, as well as any inconsistencies or gaps regarding technology and skills at the treatment facilities.

Requirements for waste treatment facilities under the proposed certification scheme would primarily focus on the technological status of the facility and the expertise of the staff. Depending on the option selected, waste treatment facilities may be able to seek certification themselves. In this case, they would be responsible for ensuring that the steps set out in Box 5.3 were undertaken. However, where only waste dealers can be certified, it would be their responsibility to ensure that the waste treatment facilities to which they send waste meet the requirements of the scheme and undertake the steps.

Box 5.3: Key Steps in Achieving Certification

Step 1: waste dealers would need to identify the waste treatment facilities they intend to use as a destination for exported waste. If the scheme allows waste treatment facilities to seek certification directly, they would be responsible for this step.

Step 2: the dealer would then have to register the facility as a destination for waste export, download and complete an application document that will be available on the certification, website naming the waste treatment facilities it plans to use. This application could include a self-assessment against the certification requirements for ESM. The administrative body will decide if it will accept the certification application or not. If the scheme allows waste treatment facilities to seek certification directly, they would be responsible for this step.

Box 5.3: Key Steps in Achieving Certification

Step 3: an on-site inspection is carried out by an inspector from the certification body selected by the waste dealer (or treatment facility). Assessing the ESM, health and safety measures, technological standards, capabilities and training of staff would all be key elements of the inspection protocol. After inspection, the inspector will produce an inspection report.

Step 4: the certification body assesses the information collected on site and decides whether to certify the dealer (or the facility) or not. If all the waste treatment facilities listed as a waste destination for the dealer comply with the standard requirements, the certification body will deliver the certificate to the waste dealer. The certificate will be subject to annual surveillance audits for all waste dealers. A similar process would apply to individual waste treatment facilities, if the scheme allows waste treatment facilities to seek certification directly.

Step 5: the certification body signs a contract with the dealer/facility which clarifies the conditions and requirements of using the label of the waste certification scheme.

Step 6: entities (dealers or facilities) that receive certification under the scheme are free to advertise their certified status to the market. They would also be listed in a Europe-wide public data base of certified entities which will be available on the certification website.

The certification of dealers (or waste treatment facilities) and the surveillance audits conducted under the certification scheme would fulfil similar purposes to the ship-recycling plan specified under the EC proposal on ship recycling, providing information on the conditions, technology and skills implemented at the treatment facility sites.

5.3.5 Technical Standards for Waste Treatment Facilities

The preparation of technical standards is an essential element of the certification scheme. Technical standards provide the baseline upon which the certification of the waste treatment facilities can be based. The standards will also serve as a point of reference for any inspection of the documents presented during the application procedure as well as physical checks.

The technical standards to fulfil ESM requirements of the waste certification scheme could cover:

- Waste acceptance procedures:
  - waste delivery and tipping hall;
  - processing hall;
  - output storage hall;

- Waste treatment operations:
  - recycling or reclamation of metals and metal compounds;
  - recycling or reclamation of other inorganic materials;
  - pre-process storage;
  - pre-sort and initial screen;
  - materials stream (glass and container);
  - product storage;
  - onward processing;

- Emissions and monitoring
  - emissions to air, water, groundwater (including fugitive emission);
  - litter control;
  - fugitive emissions monitoring;
  - odour control and monitoring;
  - noise control and monitoring;
  - pest control;

- Guidelines and manuals:
  - accident management plan;
  - procedures manual;
  - process efficiency guidelines;
  - training records;
  - emissions monitoring;
  - incident records (pollution and accidents);

The technical standards against which the facilities can be certified can be developed in conjunction with the stakeholders and the administrative body of the certification scheme. The standards should also be subject to a public consultation process.

5.3.6 Requirements for Expertise at Waste Treatment Facilities

Due to the rapid pace of development within the industry, adequate and up-to-date technical competence is essential for the efficient management of waste treatment facilities. Waste treatment facilities will face requirements with regard to the capabilities of the staff, the know-how and expertise applied. The following list presents an initial framework of the areas that would need to be assessed in relation to the compliance of the facilities:

- number of staff;
- roles and responsibilities;
- proof of technical competence (certificate); and
- management responsibilities.

The above listed aspects take into consideration the lack of harmonised approach for proof of competence in the Europe Union in this specific field and at the same time reflect the level of risk that might arise from inadequate training.

5.4 Defining the Options

5.4.1 Introduction

This section provides an overview of the options for a possible certification scheme, highlighting their main features. The detailed analysis of each option is then presented in separate chapters (6 to 9), setting out their potential benefits and costs and the

likelihood of these impacts arising. The potential impacts on the key stakeholders are presented under each option. The options are:

- **Option 1**: continue on-going initiatives (baseline option);
- **Option 2**: a voluntary, industry-led, scheme;
- **Option 3**: a "light" mandatory scheme, involving self-certification. Under this Option all aspects of the scheme are integrated apart from third party verification, which is dependent upon the choice of the individual companies; and
- **Option 4**: a mandatory scheme fully implementing the certification scheme including third party verification.

5.4.2 Option 1: Continue On-going Initiatives (Baseline Option)

This is the baseline option against which the other options are evaluated. Under this option, the EU would adopt no additional requirements related to the export of waste to non-OECD countries. No EU-specific certification scheme, for dealers exporting waste (or waste treatment facilities) would be introduced.

The Baseline Option does not, however, assume that no improvement is made in the environmentally sound management and treatment of waste. Under this Option, stakeholder collaboration would continue, along with negotiations involving forums such as the Basel Convention and the OECD. This could result in clarification, suggestions and even the introduction of standards for certain aspects of waste treatment. However, under this Option there would be no certainty that the challenges identified in Section 2.4 will be addressed.

5.4.3 Option 2: Voluntary Scheme

The introduction of a voluntary certification scheme would allow waste dealers (and potentially also waste treatment facilities in third countries) to decide whether to accept the conditions of a scheme. By seeking certification, the stakeholders would confirm that the quality of their services adhere to the requirements of the scheme.

Voluntary certification schemes for various types of goods and services have grown significantly in recent years. This has been particularly prevalent in the agricultural products and foodstuffs sector. However, as section 4 showed, there is limited experience with voluntary schemes for waste management. Nevertheless, by examining experience in other sectors it may be possible to draw assumptions and inferences with regards the potential impacts of a voluntary waste certification scheme.

Voluntary certification schemes can be classified in various ways:

- self-declaration scheme vs. third party attestation scheme;
- Business-to-Business scheme (B2B) vs. Business-to-Consumer scheme (B2C);

- assessment of products and processes (mostly B2C) vs. assessment of management systems (mostly B2B); and
- baseline standards vs. above baseline standards

Table 5.2 below summarises the key characteristics of voluntary certification schemes.

Table 5.2: Classification of Certification Schemes			
Type of attestation	**Self-declaration**	**Certification (third-party attestation)**	
Audience	B2C	B2C	B2B
Objects of specified requirements	Products and processes	Mostly products (including services and processes)	Mostly management systems
Content of requirements	Mostly above baseline	Mostly above baseline	Baseline and above baseline
Source: Commission Communication – EU best practice guidelines for voluntary certification schemes for agricultural products and foodstuffs (2010/C 341/04)			

Since it is the decision of the individual stakeholders whether to seek certification, the scheme would need to encourage stakeholders to recognise the benefits the scheme can bring, in order to achieve its objectives.

5.4.4 Option 3: Light Mandatory Scheme (self-certification)

Any form of mandatory certification scheme could only be applied to companies based (or registered) in the EU, as these companies are within its jurisdiction. It could therefore only apply to dealers exporting waste to third countries.

The introduction of a light mandatory scheme would allow for dealers to self- certify that the waste treatment facilities they used met the requirements of the scheme. They could do this through direct inspection of facilities themselves; however the involvement of third party auditors would also be possible. Under this scheme dealers would either need to possess the necessary knowledge and capacity to assess their and the receiving facilities' operations according to the requirements of the scheme, or to contract external organisations with this expertise.

Mandatory certification would require a legal framework. In the case of an EU-wide mandatory waste certification scheme, this would be one of the EU legislative instruments presented in table 5.3 below.

Table 5.3: Legislative Elements for the Implementation of a Mandatory Scheme	
Type of Legislation	**Function**
Regulation	A Regulation is similar to a national law. It is binding in its entirety and directly applicable in all EU Member States.
Directive	Directives set out general rules to be transferred into national law by each Member State as they deem appropriate. The national authorities have the choice of form and methods by which to apply the directive.
Decision	A Decision shall be binding in its entirety, however it specifies particular issues and persons to whom it is addressed and shall be binding only on them.
Source: European Commission (2012): ***Legislation****, downloaded from: http://ec.europa.eu/legislation/index_en.htm*	

Under Option 3, waste dealers would achieve certification by self-certifying that all of the waste treatment facilities to which they ship waste comply with the ESM standards of the waste certification scheme. The certification scheme would help to assure that: *waste exported from Member States will have to be treated in safe and environmentally sound waste treatment facilities.*

In order to fulfil the requirements of the certification, dealers would be obliged to maintain an updated list of the waste treatment facilities to which they transport waste shipments.

5.4.5 Option 4: Mandatory Scheme (third-party verification)

A mandatory certification scheme would entail all elements of the light mandatory scheme presented under Option 3 and in addition would require third party verification that the treatment facilities used by dealers met the requirements of the scheme.

Under Option 4, a certificate would only be granted if there was independent, third party verification and regular quality control. This would include regular independent audits to review the operations of both the waste dealers and the receiving facilities. Only dealers holding a valid certificate would be entitled to ship waste originating in the EU to any third country waste treatment facility.

In order to maintain the effective functioning of mandatory certification schemes, there would need to be a system for overseeing the implementation and verification procedures. Therefore, there would need to be strong and consistent enforcement to effectively implement and verify the requirements. The need for effective market surveillance is critical to ensure a level playing field for market actors and to protect consumers.

6. OPTION 1: CONTINUE ON-GOING INITIATIVES

6.1 Overview

Under the baseline option, no change would be made to the current EU system for regulation waste exports. Consequently, under Option 1 no certification scheme would be implemented at the European level. This does not mean, however, that there would be no changes in waste export practices, as other on-going initiatives that might result in further restrictions on exports, or modifications of current practices would continue. One such element is the work being undertaken through the Basel Convention on EMS requirements for member countries.

International initiatives, such as the work of the Basel Convention impact on the way wastes are being recycled and managed, could reinforce any additional steps taken by national governments or the European Union. Box 6.1 below summarises the core principles of environmentally sound management under the work of the Basel Convention as well as the recommendations that have been identified as necessary for their implementation.

Box 6.1: ESM Recommendations Identified from the Work of the Basel Convention

Environmentally sound management is defined in the Basel Convention as taking all practicable steps to ensure that hazardous wastes or other wastes are managed in a manner which will protect human health and the environment against adverse effects which may result from such wastes. The Basel Guidance Document on the Preparation of Technical Guidelines for the Environmentally Sound Management of Wastes Subject to the Basel Convention identifies the following recommendations for ESM:

General:

1. there exists a regulatory infrastructure and enforcement that ensures compliance with applicable regulations;
2. sites or facilities are authorized and are of an adequate standard of technology and pollution control to deal with the hazardous wastes in the way proposed, in particular taking into account the level of technology and pollution control in the exporting country;
3. operators of sites or facilities at which hazardous wastes are managed are required, as appropriate, to monitor the effects of those activities;
4. appropriate action is taken in cases where monitoring gives indication that the management of hazardous wastes have resulted in unacceptable emissions; and
5. persons involved in the management of hazardous wastes are capable and adequately trained in their capacity.

Country-specific:

1. take steps to identify and quantify the types of waste being produced nationally;
2. use best practice to avoid or minimize the generation of hazardous waste, such as the use of clean methods;
3. provide sites or facilities authorized as environmentally sound to manage its wastes, in particular hazardous wastes; and
4. enforcement and monitoring could be enhanced through international cooperation.

Sources:

Basel Convention (1994): Guidance Document on the Preparation of Technical Guidelines for the Environmentally Sound Management of Wastes Subject to the Basel Convention, downloaded from http://www.basel.int/Implementation/TechnicalMatters/DevelopmentofTechnicalGuidelines/AdoptedTechnicalGuidelines/tabid/2376/Default.aspx

Ad Interim Project Group on ESM Criteria, Partnership for Action on Computing Equipment (PACE) (2011): Environmentally Sound Management (ESM) Criteria Recommendations

In its tenth Conference of the Parties (COP) meeting in 2011, the Basel Convention adopted Decision BC-10/3, calling for a more systematic and comprehensive effort on the environmentally sound management of wastes. The Decision suggests the development of a framework for the environmentally sound management of hazardous wastes and other wastes, including consideration of ways in which the framework and its elements might be linked to the issue of transboundary movement of hazardous and other wastes.[61] The framework is intended as a reference tool for stakeholders participating in the management of such wastes, including government, industry, intermediaries and waste management facilities[62].

In addition, Regulation 1418/2007/EC concerning the export of certain types of wastes is updated on a regular basis, and has already been amended – by Regulation 740/2008/EC – with regard to the procedures to be followed for the export of waste to certain countries. The amendment deals with the export of green waste for recovery to non-OECD countries such as China, India or Malaysia.

Consequently, under Option 1, compliance with the work of the Basel Convention could be ensured by explicitly incorporating its elements into the Waste Shipment Regulation as a criterion in Article 12 or as a clarification (binding definition) for treating waste in an environmentally sound manner in Article 49. This would contribute to a clearer, more precise definition of what is meant by the environmentally sound treatment of waste without introducing a certification scheme.

Furthermore, there are additional elements that might impact on the quantity of waste which can be exported to certain receiving countries, as some non-OECD countries are initiating restrictions on waste imports. One of the most important recipient countries for exported EU waste is China. In 2008 China introduced new measures to its waste import policies, which prohibit the import of solid wastes that cannot be used as raw materials or that pose a serious risk to the environment. Moreover, in April 2011 there was an announcement that these regulations would be tightened even further, with the new regulations becoming effective by August 2011. Under the new regulation, the shipping of solid waste refers to the import of waste into mainland China and for the first time includes waste shipments from Macao, Hong Kong and Taiwan – routes that were previously used by dealers as a back-door method to circumvent the 2008 customs regulations[63].

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61 Basel Convention (2011): **Developing Guidelines for Environmentally Sound Management**, downloaded from http://www.basel.int/Implementation/LegalMatters/CountryLedInitiative/OutcomeofCOP10/DevelopingguidelinesforESM/tabid/2669/Default.aspx

62 Basel Convention (2012): Draft framework for the environmentally sound management of hazardous wastes and other wastes, downloaded from http://www.basel.int/Implementation/LegalMatters/CountryLedInitiative/OutcomeofCOP10/DevelopingguidelinesforESM/TechnicalExpertGroup/Meetings/SecondMeeting/MeetingDocuments/tabid/2854/Default.aspx

63 Hoggard, S. (2012): **The Scrap hits the Fan**, World Packaging News, available at: http://www.worldpackagingnews.com/2012/02/the-scrap-hits-the-fan/

The new regulation forbids the transhipment of waste between Chinese ports, and the transferable or "to order" Bills of Lading of imported solid waste. In addition, vessels carrying imported solid waste are required to be supplied with four certificates from the shipper prior to loading and original documentation and image data must be kept on-board for at least three years. If documentation is incomplete, the importer/consignee is responsible for returning the cargo to the port of origin and incurring all costs involved. Box 6.2 describes the impacts of these changes.

Box 6.2: Impacts of Tightening Regulations in China

According to the Ministry of Environmental Protection, in 2010 China imported over 40 million tonnes of solid waste which could be used as raw materials, including waste paper, plastic, ferrous and non-ferrous metal. The US is the top waste dealer to China, accounting for 24% of the total import volume, Japan is in second place with 19%, followed by Germany at 15%, the United Kingdom at 9% and Belgium at 4%.

As a direct result of the regulation changes **plastic scrap imports through Guangzhou, China's gateway for raw materials, fell by more than 80**% in September and October 2010, as local customs officials tightened enforcement. For the first two quarters of 2010, imports of scrap plastic through Guangzhou remained stable, averaging 520 000 tonnes; however, after the regulation this dropped drastically to 240 000 tonnes during the third quarter, a 35% year on year decline. However, by the end of October only 22 000 tons were recorded as having been imported – a drop of 82% year on year.

On 1st August 2010, the Guangzhou Customs department was designated as a pilot site for the strict implementation of the new waste import policies. Guangzhou was chosen due to the high volumes of recycled plastic arrivals: 1.3 million metric tons of plastics scrap imports, approximately 20% of China's total imports in 2011. As an intended result, plastic recycling in Guangzhou and the heavily polluted Guangdong Province has suffered a slump, with an estimated 30 – 40% of provincial plastic recycling operators being shut down.

At the same time the China Plastics Processing Industry Association recycling committee has warned waste dealers that the strict enforcement of the new regulation will soon be extended across the entire country.

Source: World Packaging News (2012): The scrap hits the fan, downloaded from http://www.worldpackagingnews.com/2012/02/the-scrap-hits-the-fan/

Further initiatives have also been introduced in the pan-African forum on e-waste, 'Call for Action', which took place on 14-16 March 2012 at the UNEP headquarters in Nairobi[64]. The participants agreed on a set of priority actions for reducing the environmental and health impacts of growing levels of e-waste in Africa. Although there was no reference to banning the import of wastes, stricter enforcement of existing legislation was referred to. One of the priority actions called for the implementation and enforcement by African states of the Basel Convention, which bans the import of hazardous wastes into Africa. It was also stated that Africa would address the current recycling practices and would aim for improvements through an enforceable legislative framework.

64 Pan African Forum (2012): **Call for Action on E-waste in Africa - set of priority actions**, available from: http://www.basel.int/Implementation/TechnicalAssistance/EWaste/EwasteAfricaProject/Workshops/PanAfricanForumonEwasteNairobiMarch2012/tabid/2656/Default.aspx

The forum called for co-operation with international partners to intensify efforts to prevent the illegal traffic of e-waste, and the flow of used electrical and electronic equipment (EEE) lacking a reuse market, into the African continent by strengthening enforcement measures. Tightened control on near-end-of-life EEE was also encouraged.

6.2 Impacts on Stakeholders

6.2.1 Impacts on Waste Generators

Under Option 1 there would be no changes for waste generators. The on-going changes to the Basel Convention are unlikely to result in additional costs or benefits for households or industries. However, it is possible that tightening regulations in China could lead to increased costs for certain waste dealers, who might then choose to increase their own prices, thereby passing costs onto waste generators. This could also result in rising costs for households; however, costs to households are already rising in response to changes in requirements for waste treatment and disposal. Box 6.3 provides information on the costs of municipal waste services in three EU Member States.

Box 6.3: Costs of Municipal Waste Service in the UK, Hungary and Spain

In 2005 in the **UK**, household waste management cost local authorities over £1.3 billion a year (around €1.6 billion) and it is estimated that 180 million tonnes of waste are produced by commerce and industry each year[65]. The overall costs of waste management for UK industry are around £15 billion per year (€19 billion), approximately 4.5% of turnover. The majority of the cost is indirect and hidden. There is also lost time, raw materials lost through solid waste disposal, liquid effluents and atmospheric emissions.

In the county of Norfolk in the UK, the total cost of collection of refuse, materials for recycling and composting and the disposal of municipal waste was £26 million (€33 million) in 2004/05 compared to a cost of £21million (€27 million) in 2000/01. This is equivalent to £80 (€101) per household in 2004/05 compared to £57 (€34) per household in 2000/01.[66] Costs are similar in the country of Northumberland, where in 2008/09 the County authority's costs for disposing and recycling waste were £82.85 (€104.50) per head. This included services for collection, recycling, composting and energy recovery.

In **Hungary**, the costs of municipal waste collection and transport increased by 10-40% from 2010 to 2012. In the city of Kecskemet in 2012, the annual cost for the weekly collection and transport for every 60 litres (the average size of a bin) of household waste was around 17,500 HUF, equal to about €62 (an increase of 40% from 2010). In Italy on the other hand, there are great discrepancies between collection charges for example in Naples annual costs per household reach €453, in other cities such as Isernia it is €122.

In **Spain**, the costs of collection also vary depending on municipality, and there are municipalities that do not charge for collection. The level of charge also varies significantly and although the average is €78.9 per household per year, in a study across 62 cities, some regions such as Gerona have charges of up to c. €140 per household per year.

[65] Keep Britain Tidy (nd): **Key Issues: Waste,** downloaded from http://www.keepbritaintidy.org/KeyIssues/Waste/Default.aspx

[66] Envirowise (2003): **Resource Efficiency: Cut Costs in Plastics Processing**, Envirowise, Oxfordshire.

Box 6.3: Costs of Municipal Waste Service in the UK, Hungary and Spain
Sources: Joint Municipal Waste Management Strategy for Norfolk (2006), downloaded from http://www.norfolk.gov.uk/view/NCC049079, Northumberland County Council (nd) downloaded from http://www.northumberland.gov.uk/default.aspx?page=6628, Kecskemeti Varosgazdasagi Kft (2012) downloaded from http://vg-kft.hu/?r=22803, *Eco dale Citta (2010) downloaded from http://www.ecodallecitta.it/notizie.php?id=104661*, *OCU (2011)*: 4º estudio sobre la Gestión de Residuos y Limpieza Viaria, information available at: http://www.ocu.org/nt/nc/nota-prensa/limpieza-viaria-grandes-diferencias-entre-norte-y-sur539824

As Box 6.3 above indicates, the average household cost of waste collection and transportation is around €100 per year in 2004/2005. Costs within countries vary depending on the population size, the quantity of waste collected and the method of treatment and recycling or disposal. Costs may also be affected by the introduction of taxes, particularly on disposal to landfill.

Examples from the selected Member States show that cost increases of up to 40% are possible within two to four years. Table 6.1 provides an indication of potential future costs from more stringent regulation in non EU countries.

Table 6.1: Annual Household Waste Collection Charges

Countries	**2011/2012 Annual cost**	**2015/2016 Projected cost (increase 10-40%)**
Hungary	€62	€69 - €87
UK	€96	€105 - €134
Italy	€122 - €453	€134 - €634
Spain	€80	€88 - €112

**Source: Eurostat, Generation of waste downloaded from http://appsso.eurostat.ec.europa.eu/nui/setupModifyTableLayout.do*

In this context, the impacts of further cost increases due to tightening regulations in China are unlikely to be significant.

6.2.2 Impacts for Waste Dealers

Even though Option 1 would not result in the introduction of a European waste certification scheme, the restrictive measures being adopted in waste receiving countries could potentially impact waste dealers exporting waste outside the EU.

The main costs that waste dealers incur in relation to shipments include:

- cost of acquiring waste material;
- inland transportation costs (road or inland water);
- port charges;
- container costs;
- fuel charges for the shipment;
- overhead and personnel costs;

- goods and credit insurance;
- hedging costs; and
- certification costs.

Under Option 1, restrictions in receiving countries could result in waste dealers exporting waste facing increased costs to meet tightening restrictions in China or, alternatively, the costs of re-routing waste shipments to treatment facilities in other countries with lower prices. Where dealers continue to export to China even at higher costs, they have the option of either absorbing the price difference or passing it on to their customers. Additionally, the macroeconomic environment might also impact upon the costs faced by waste dealers. Box 6.4 illustrates recent changes in prices of shipping containers for plastic waste.

Box 6.4: Cost Changes for Plastic Export

Problems facing dealers looking to ship material to the Far East have persisted, with the cost of shipping containers more than doubling from up to £400 (€503) earlier in 2012 to as much as £900 (€1 133) later in the year, with further increases expected. Recyclers of plastic bottles and dealers of plastic films have confirmed that this has had a negative effect on prices, with lower quality film and bottle grades particularly affected.

Meanwhile, limited demand for PET bottles in the Far East, which started with the traditional lull in industrial activity around the Chinese New Year continues, as the manufacturing industry's demand for new material continues to lag and the country's recycling infrastructure grows. Dealers have experienced a reduction in Chinese demand for plastics as the cost of transport has increased; consequently European end markets for Asian products have weakened over the last 6 months.

China is continuing to develop its own recycling infrastructure which is further reducing its material requirements. Other recyclers have also noted that the quality of mixed bottles being traded has started to decline, with bad weather and a build-up of material being cited as contributing factors. Dealers in the plastic film market are noticing similar trends, with the value of plastic film sent overseas falling by as much as £20 (€25) per tonne across all grades.

Source: Waste Producer Exchange (2012): Export cost increase hit plastic prices, downloaded from http://www.wasteproducerexchange.com/article.php?id=83

Waste dealers range in size from SMEs to large companies and they often transport a variety of waste materials, including plastics and metal. These companies can take physical ownership of the materials whilst in transit. Exporting dealers can be contracted directly by the buyer (to source materials) or by the seller (to sell materials) and can also be referred through a shipment broker. Box 6.5 provides available information on the European waste exporting industry.

Box 6.5: Information on the European Waste Exporting Industry

Data on the European waste dealer industry is not available in an aggregate form. Information regarding the size of the industry was taken from the Public Waste Agency of Flanders (OVAM), which publishes on its website overviews of transfrontier waste shipments complying with the Waste Shipment Regulation.

Files for which a decision was taken in 2011 included 47 different notifiers involved in metal waste export. Of these:

- 21 were production companies, the actual generators of the metal waste;
- 22 were companies which specialise in metal waste, either dealers or treatment companies which are involved in internal company activities as well as exporting activities; and
- 4 companies were general waste collectors.

We consider these figures as more or less representative for the whole Belgian market, as the same actors are active in Flanders, Wallonia and Brussels.

The latest available data from the Basel Convention (2006) shows the following quantities (related to hazardous waste):

- amount of waste exported under application of the Basel Convention from **Belgium** for R4, metal recycling: **230 338** tonnes;
- amount of waste exported under application of the Basel Convention from the **European Union** for R4, metal recycling: 1 097 122 metric tonnes. This figure excludes data which are missing from France, Portugal, Lithuania and Bulgaria. Therefore, we have corrected the figure as follows: 1.097.122 x 27 / 23 = **1 300 000** metric tonnes.

From the above figure we deduce that the Belgian figures represents about 18% of the waste exported under application of the Basel Convention for R4, metal recycling (230 338 / 1 300 000 = 18%). Although an uncertain approximation, the Belgian figures for different types of notifiers can be extrapolated to the EU-27 as follows:

- 260 notifiers involved in the EU-27 (47 / 18 x 100 = 260). These would include:
  - 116 waste generators, (21 /18 x 100 = 116)
  - 122 metal waste companies, (22 / 18 x 100 = 122) and
  - 22 general waste collectors (4 / 18 x 100 = 22).

Sources: Basel convention reported data : http://archive.basel.int/natreporting/datasrces/2006.xls
OVAM overview on transfrontier shipments : http://www.ovam.be –afval en materialen – transport afval – in en uitvoer – actuele lijst van invoer en uitvoerstromen

Option 1 itself is not expected to result in significant cost increases for waste dealers the majority of cost impacts are a result of general economic conditions and demand for certain products and these factors will not be affected by the option itself.

6.2.3 Impacts for Waste Treatment Facilities

Option 1 is not likely to result in any significant impacts for waste treatment facilities in non-OECD countries. The increase in locally produced waste and changing national legislation might impose further obligations on the treatment sites; however, the extent of these changes is currently difficult to estimate.

It is presumed that waste treatment sites in mainland China would continue to receive imported wastes from European locations, but in declining volumes. This could potentially result in an increased volume of waste arriving to treatment sites in other Asian countries and Africa.

With regard to the waste recycling industry in Europe, Option 1 is expected to result into a business-as-usual scenario, with possible impacts arising from on-going development of national or international legislation such as the Basel Convention. The situation of the sector will therefore remain as at present, as outlined in Box 6.6.

Box 6.6: Information on the European Waste Recycling Industry

Data on the European Waste Recycling Industry tend to be incomplete and inconsistent. Often information is given on the recycling of particular commodities or specific metals, for example[67]. However, sources tend not to provide aggregated data on recycling. This complicates matters when attempting to provide a clear overview of the industry.

The recycling chain is composed of various steps: collection, dismantling/pre-treatment and recycling/refining. Within this chain, the earlier steps tend to be more labour intensive. The final step is capital and innovation intensive and is essential in ensuring access to raw materials in a resource efficient manner. Stakeholders have suggested that retaining the final step of the recycling chain within Europe is crucial as otherwise the previous steps, especially pre-treatment which is labour intensive, would also disappear[68].

An EU Presidency paper (2009) indicates that within the recycling sector there are approximately 60 000 companies in operation. Of these, it is estimated that over 95% are SMEs. Employment relating to recycling has increased from 422 per million inhabitants in 2000 to 611 per million inhabitants in 2007. This represents a 7% increase per year[69]. According to Eurostat, the population of the EU-27 in 2007 was 495 291 925. If there were 611 people per million inhabitants employed with the recycling industry in the same year, this would indicate a total of 302 623 employed within the EU industry. However, these figures are considered conservative, as they do not include employment relating to processing materials such as pulp or metals.

More recent information was provided by CEPI and RISI with regards the paper recycling industry. In 2011 there were 412 paper recycling mills in the EU, directly employing 90 000 people and indirectly impacting the jobs of around 550 000 people. Paper recycling mills in Europe in 2011 registered a turnover of €30 billion, which is equivalent to €80 million turnover per mill.

Within the recycling sector revenues are rising. In the space of four years (2004-2008) the turnover of seven core groups of recyclables has reached at least €60 billion, an increase of almost 100%[70]. It is suggested that growth rates have been witnessed throughout the waste industry as a result of the implementation of EU and national waste policies[71].

67 The Lisbon based International Study Groups have websites for Copper (www.icsg.org/), Lead *and Zinc (*www.ilzsg.org/*), and Nickel (*www.insg.org/*) and often provide information on recycling.*

68 Consultation with Eurometaux

69 EEA (2011): **Earnings, jobs and innovation: the role of recycling in a green economy,** European Environment Agency, Copenhagen.

70 EEA (2011): Earnings, jobs and innovation: the role of recycling in a green economy, European Environment Agency, Copenhagen.

71 Fact Sheet 8: Number And Distribution Of Relevant Companies And Operators In The EU

Box 6.6: Information on the European Waste Recycling Industry
Sources: *Presidency Paper to the Environment Council (February 2009):* ***The fall in demand for recycled materials****, Council of the European Union, Brussels.* *CEPI- Confederation of European Paper Industries* *RISI- http://www.risiinfo.com* *Fact Sheet 8: Number And Distribution Of Relevant Companies And Operators In The EU* *EEA (2011):* ***Earnings, jobs and innovation: the role of recycling in a green economy,*** *European Environment Agency, Copenhagen.* *Eurometaux*

6.3 Assessment of Impacts

6.3.1 Functioning of the Internal Market and Competition

No significant impacts are expected to arise under Option 1 in relation to the functioning of the internal market and competition. General economic conditions will continue to influence the position of stakeholders, with no additional impact arising from the lack of a waste certification system in the European Union.

6.3.2 Impact on Third Countries and International Relations

Under Option 1, no waste certification system would be introduced to ensure the environmentally sound management of waste exported from Europe. Due to more stringent legislation being introduced in EU waste recipient countries, there could be a shift in the quantity and types of waste being shipped to certain countries. With reducing quantities of waste being shipped to China, other Asian and possibly West-African countries might see an increase in waste imports from the EU. These countries might not be capable of handling the increased quantity of shipments, which could result in an increased number of dismantling and recycling sites which do not operate ESM. While these sites would provide employment opportunities for locals, the resulting environmental and health impacts could raise concerns about lack of control over waste exports on the part of the European Union.

In addition, it is expected that the Basel Convention could introduce binding requirements for its members regarding the ESM of waste in time. The European Union, as a member of the Basel Convention would be impacted by such measures. In the absence of a certification scheme, this could ultimately require the modification of relevant legislation, such as the Waste Shipment Directive and the Waste Framework Directive.

6.3.3 Employment and Labour Markets

As indicated above, the restrictions imposed by China could impact labour market conditions in other receiving countries. Job creation in waste management facilities may take place in other Asian and West-African countries. However, as yet there is no available information to identify the extent of labour market impacts, as import restrictions introduced by China are fairly recent.

6.3.4 Environmental and Social Impacts

There would be no direct improvements to environmental impacts arising under Option 1 in receiving countries. The on-going international measures, coupled with the initiatives in some of the receiving countries to control the quantity of imported waste and its management, could have a positive impact on the local environment in the longer term.

Social impacts due to an increase in waste imports in certain parts of Asia and West-Africa, as a result of growing limitations imposed by China, could potentially contribute to an increase in child labour, hazardous working conditions and the deteriorating health conditions of employees if no measures are put in place to ensure that ESM is adopted.

Provided that the quantity of exported waste from Europe does not decrease, and shipments are re-routed to other Asian and West-African countries, the new recipient countries would need to ensure that workers at the treatment sites are adequately trained and the emissions from the sites are continually monitored.

6.4 Conclusion on Option 1

Overall, there is considerable uncertainty regarding the potential of Option 1 to deliver improvements on the environmentally sound management of waste exported from Europe to third countries. It would rely on international agreement being reached under the Basel Convention to develop, implement and enforce ESM. Whilst the EU would have a role in this process, it would have no direct means of ensuring that EU waste exported to third countries would be properly managed, until all Basel Convention members reached agreement.

While restrictions on imports to China might reduce the environmental and social impacts arising from poor waste management in that country, there could be knock-on detrimental impacts on other recipient countries. Countries with low income, and low prospects of future growth, may choose to receive the diverted waste despite their lack of adequate infrastructure for appropriate treatment. This could lead to adverse environmental and social impacts in those countries

7. OPTION 2: VOLUNTARY CERTIFICATION SCHEME

7.1 Overview

Option 2 would introduce a voluntary certification scheme for the ESM of waste exported to third countries from the EU. Under this option, a certification scheme would be made available for waste dealers exporting waste, and potentially for direct certification of waste treatment facilities receiving exported waste, which could then choose whether to adopt the system or not.

Recent years have seen substantial growth in voluntary certification schemes for various types of goods and services. Voluntary certificates may use baseline standards (which convey good practice), while other schemes use more stringent requirements representing above-baseline standards (which convey best practice or niche market). In the case of waste certification, a similar method is possible where above baseline standards would put more stringent requirements on waste dealers and treatment facilities, thereby creating a two-tier certification system. Requirements under the two-tier system would need to be a result of regulatory and industry consensus.

A voluntary waste certification scheme proposed under Option 2 would include all the elements of the scheme as described in Chapter 5 of this report. The key stakeholders are:

- an administrative body that can be independent from or part of the European Commission;
- an accreditation body, (nominated in conjunction with industry); and
- certification bodies, (accredited by the accreditation body).

While some existing certification schemes employ third-party attestation, others are based on self-declaration. Those schemes which rely on an independent verifier or third-party attestation are generally perceived as more robust and accountable[72].

In the case of voluntary certification, third-party attestation can provide assurance to supply chain partners and other stakeholders regarding the validity and reliability of the certification. The EU Best Practice Guidelines for Voluntary Certification Schemes[73] deem third-party certification as most appropriate when activities are complex, regulated in detailed specifications and checked periodically. Self-declaration is more appropriate for relatively straightforward (single-issue) claims.

Adopting voluntary certification can yield the following benefits for companies:

- it can increase successful participation in procurement;

[72] Greenwise (2012): **Environmental Management Systems**, downloaded from http://www.greenwisebusiness.co.uk/resources/environmental-management-systems-1.aspx

[73] European Commission (2010): **EU Best Practice Guidelines for Voluntary Certification Schemes for Agricultural Products and Foodstuffs,** downloaded from http://ec.europa.eu/agriculture/quality/policy/quality-package-2010/certification-guidelines_en.pdf

- it can attract new contracts with buyers by expanding sale markets; and
- it raises competitiveness by increasing social responsibility in the supply chain.

Box 7.1 below provides examples of two voluntary schemes which are currently in place in Europe.

Box 7.1: Examples of Voluntary Certification Schemes: Biofuels Certification and Plastics Recycling Scheme

Biofuels Certification

With its rapidly growing market share, the socio-economic sustainability of bio-fuels has become a pressing issue. This applies to the entire supply chain, from land use and agricultural practices to competition with food, energy efficiency and GHG emissions.

In June 2010 the Commission officially encouraged industry, governments and NGOs to set up voluntary certification schemes for all types of biofuels, including those imported into the EU. However, in order to be recognised by the Commission, these schemes must satisfy certain elements. The rules underpinning the certification schemes are part of a set of guidelines explaining how the Renewable Energy Directive should be implemented. After a detailed assessment made by the Commission and multiple improvements, various schemes from around the world were recognised in July 2011.

The requirements set by the EU for biofuel certification are the most stringent worldwide. They involve independent auditors checking the whole production chain, from the farmer and the mill, via the dealer, to the fuel supplier who delivers petrol or diesel to the filling station. The Communication sets standards requiring this auditing to be reliable and fraud-resistant.

Plastics Recycling Scheme

A new voluntary certification and audit scheme - 'EuCertPlast', covering the recycling of post-consumer plastics, was launched in August 2012.

This scheme was developed by stakeholders within the plastics industry, including converters, recyclers and collectors, and is expected to increase recycling rates and transparency within the industry.

The certification aims to standardise transparency, waste traceability, and environmentally friendly best practices within the plastics recycling industry and is expected to increase plastic recycling rates.

Companies may now volunteer themselves to be examined by a growing pool of auditors who will soon be present in each country in the EU. If a company meets the standards, which include monitoring of the entire recycling process from beginning to end, verifying that the correct permits are issued and ensuring that the company is following the proper procedures, it will be awarded a European Certificate. It is scheduled that in 2013 EuCertPlast will be adopted by the German Blue Angel programme, the first European certification scheme to be introduced.

Sources:
European Commission (2010): Commission sets up system for certifying sustainable biofuels, downloaded from: http://europa.eu/rapid/pressReleasesAction.do?reference=IP/10/711.
Hacker, K. (2012): New plastic recycling standard to be implemented across Europe, Resource Magazine, downloaded from: http://www.resource.uk.com/article/News/New_plastic_recycling_standard_be_implemented_across_Europe.
EUCERTPLAST downloaded from - http://www.eucertplast.eu/en/.

Under a voluntary scheme, certified waste dealers would be responsible for exporting waste only to receiving facilities where waste is treated under similar standards that are used in the EU. Waste receiving facilities would be certifiable based on to their level of

technology and expertise. Certified waste dealers would only be allowed to transport waste to facilities that fulfil the requirements to be certified. If waste treatment facilities were allowed to seek certification directly, they would be able to market themselves to EU dealers as compliant, and thus gain a market advantage.

7.2 Impacts on Stakeholders

7.2.1 Impacts for Waste Generators

Under Option 2, waste generators are not expected to encounter significant impacts. Businesses wishing to improve their corporate image would be able to choose a certified waste dealer to demonstrate their environmental credentials. Certification provides a basis for dealers to demonstrate to their waste generators that their waste will be treated in an environmentally-sound manner. This is important for waste generators' CSR and potentially their EMAS/ISO 14001 certification.

Some cost increases may arise where a waste generator chooses a certified over an uncertified waste dealer, as the waste exporting dealer may choose to pass on (a proportion of) the costs of certification onto the waste generator. At this stage of the analysis however, it is difficult to estimate what the scale of that increase might be. In addition, this cost transfer may differ depending on the policy of the exporting dealer and the waste generator will be free to decide whether or not to accept the increased cost.

7.2.2 Impacts for Dealers

A voluntary certification scheme, by definition, allows waste dealers exporting waste to decide whether to adopt the scheme and adhere to its requirements. Studies on the advantages of voluntary standards and schemes have concluded that these schemes can enable companies to better access markets and at the same time can enhance market requirements and can serve as a reputation-enhancing tool[74,75].

Seeking certification under a voluntary scheme will introduce a number of additional administrative tasks for the exporting dealer. Based on the current experience of waste exporting companies, the management of certification requires 50% of the working time of one employee.

Under the proposed certification scheme, the administrative tasks of the individual waste exporting companies would include:

- completing the application procedure – submitting documents;
- maintaining an up-to-date contact list for the receiving facilities in third countries;

[74] ZATAK (2010): **Proceedings of the Roundtable on Voluntary Standards and Schemes for Specific Quality Products**, prepared for FAO.

[75] Muradian and Pelupessy (2005): **Governing the Coffee Chain: The Role of Voluntary Regulatory Systems**, *World Development*, Vol. 33, No. 12, pp. 2029–2044, 2005

- maintaining up-to-date records on the technological and environmental practices in place in receiving facilities (as described in Section 5.2.3);
- maintaining an inventory of the waste covered by the waste certification scheme;
- reporting the shipment of waste via an on-line system; and
- undergoing quality control audits.

Under a self-certification option within the voluntary scheme, waste exporting companies would face costs in assessing whether the receiving waste treatment plants met the scheme criteria or, alternatively, contracting third-parties to undertake the assessment on their behalf. Depending on the number of waste treatment facilities, the assessment procedure could be time consuming and expensive. It is likely that some SMEs, especially those with a large number of treatment facility contracts, would turn to third-party organisations in order to reduce the costs that might arise in connection with visiting the sites. Contracting third-parties to undertake site assessment visits can also provide confidence to supply chain partners.

If waste treatment facilities were able to seek certification directly, this could significantly reduce costs. This is because each waste treatment facility would only need to be assessed once, rather than by each of its customers. Waste treatment facilities could then market themselves directly to dealers as already certified, which could make participating in the scheme much more attractive (and cheaper) for dealers, particularly SMEs.

The benefits of a certification scheme can be of both an internal and external nature. Some commentators consider that the most important benefits are of an internal nature e.g. improvement in awareness of the employees regarding some of the key concerns related to the processes, which can include social as well as environmental issues. External benefits include improved public and customer relations, improvement in services, demonstration of regulatory compliance and increased competitiveness[76]. In the case of a voluntary waste certification scheme however, these benefits might be diluted as a number of companies already hold different certifications.

Costs

ISO 9001 is one of the most widely used management tools with over one million organisations certified worldwide. Table 7.1 provides cost estimates for companies implementing ISO 9001. Information contained in the table was taken from a company selling complete certification packages including guides, software and technical support. The table also provides information on consultant hours spent for implementing the certification scheme.

[76] Heras I et al (nd): **Effects of ISO 9000 Certification on Companies Profitability: an Empirical Study**, downloaded from http://www.sc.ehu.es/oewhesai/02-02%20AYR.pdf

Table 7.1: Estimated Costs of Implementing ISO 9001					
Employees	**Quality system in place**	**Costs in US$ for All-in-One Package and Consultation**		**Cost in terms of employee hours spent**	
1-25	No quality system in place	All-in-One	$997	All-in-One	96*
		Consultant	$4,800*	Consultant	48*
	Good quality system in place	All-in-One	$997	All-in-One	38*
		Consultant	$1,920*	Consultant	19*
501-1000	No quality system in place	All-in-One	$997	All-in-One	1152*
		Consultant	$57,000*	Consultant	576*
	Good quality system in place	All-in-One	$997	All-in-One	461*
		Consultant	$22,800*	Consultant	230*
* Estimates.					
Indicates the lowest and highest costs					
Note: The cost of the Registration Audit must be added to the total cost estimate.					
Source: The 9000 Store (2012): ISO 9001 Registration: How much does it cost, downloaded from: http://the9000store.com/iso-9000-cost.aspx					

Another example of costs of voluntary schemes is provided by the EMAS scheme. The implementation of EMAS can be divided into external and internal costs. The external costs include: costs for the external verifier; registration fees; and any additional external support from consultants for the initial review, auditing, training and on-going implementation. Registration fees can vary according to Member State, sector and size of organisation. They range from €0 – €1 500. The internal costs include the implementation cost and maintenance costs. These also vary depending on size and sector[77].

A study by RPA Ltd. and Milieu investigated the average cost of implementing and maintaining EMAS. This study provides data, as shown in Table 7.2, on the average costs of setting up an environmental management system as estimated by the European Commission in the "EMAS Toolkit". These include external consulting fees and associated communication and registration costs.

Table 7.2: Estimated Costs of Implementing EMAS	
Size of Company	**Cost**
Very small companies (< 10 employees)	€ 10 000
Small companies (< 50 employees)	€ 20 000
Medium companies (50 - 250 employees)	€ 35 000
Large companies (> 250 employees)	€ 50 000
Source: RPA Ltd. and Milieu (2009): Study on the Costs and Benefits of EMAS to Registered Organisations, downloaded from: http://ec.europa.eu/environment/emas/pdf/news/costs_and_benefits_of_emas.pdf	

[77] RPA Ltd. and Milieu (2009): **Study on the Costs and Benefits of EMAS to Registered Organisations**, downloaded from:
http://ec.europa.eu/environment/emas/pdf/news/costs_and_benefits_of_emas.pdf

However, other studies on EMAS indicated that the costs could be higher[78,79]. Clausen *et al* (2002)[80] collected evidence from previous studies on the costs of EMAS registration in different countries. Table 7.3 shows these findings.

Table 7.3: The cost of EMAS Registration

Member State	Company size			
	Small (<100 employees)	**Medium (<500 employees)**	**Large (>500 employees)**	**Average**
Austria	€109 000	€225 000	€153 000	-
Denmark	-	-	-	€62 000
Germany	€37 000	€84 000	€85 000	€59 000
Hungary	€3 200 – 6 200	€5 800 – 11 000	€11 000	-

Source: Clausen, et al. (2002): ***The State of EMAS in the EU – Eco-Management as a Tool for Sustainable Development – Literature Study*** *(for EMAS II Conference, 26 - 27 June 2002, Brussels, Belgium), downloaded from:*
http://ec.europa.eu/environment/emas/pdf/general/literature_study_020506_en.pdf

Based on the complete sample of responses collected in the RPA study[81], the average fixed, internal and external costs of a typical EMAS organisation are presented in Table 7.4. These costs have been calculated for the first year of implementation and annually thereafter.

Table 7.4: Estimated Average Costs – Complete Sample

	First year (€)	**Annual (€)**
External	6 688	2 536
Internal	22 814	14 410
Fixed	18 629	8 997
Total	**48 131**	**25 943**

Source: RPA Ltd. and Milieu (2009): Study on the Costs and Benefits of EMAS to Registered Organisations, downloaded from:
http://ec.europa.eu/environment/emas/pdf/news/costs_and_benefits_of_emas.pdf

It can be seen from the various tables above that the costs of implementation and maintanance vary considerably. The results indicate that substantial costs are likely to

78 Hamschmidt and Dyllick (2001): **ISO 14001: profitable? Yes! But is it eco-effective?,** Greener Management International, No. 34, 2001.

79 Cesqa Sincert (2002): **Indagine sulla certificazione ambientale secondo la norma UNI EN ISO 14001; risultati indagine Triveneto,** 2002.

80 Clausen, et al. (2002): **The State of EMAS in the EU – Eco-Management as a Tool for Sustainable Development – Literature Study** (for EMAS II Conference, 26 - 27 June 2002, Brussels, Belgium), downloaded from: http://ec.europa.eu/environment/emas/pdf/general/literature_study_020506_en.pdf.

81 RPA Ltd. and Milieu (2009): **Study on the Costs and Benefits of EMAS to Registered Organisations**, downloaded from:
http://ec.europa.eu/environment/emas/pdf/news/costs_and_benefits_of_emas.pdf

be incurred in the first year of registration, in understanding EMAS requirements, establishing the necessary management and administrative systems, often requiring expert advice from outside the organisation.

However, the costs to dealers of seeking certification under a new scheme could be lower for companies carrying an ISO, EMAS or WEELABEX certification than for those companies not carrying any type of certification, as they may have readily available information on the life-cycle impacts of exports. However, it is likely that additional costs will arise as companies may need to contact waste treatment facilities and receive further information to comply with the scheme requirements.

Other stakeholders have suggested that setting up the quality control system necessary for operating according to the ISO standards costs approximately €10 000, while running the scheme comes with an additional annual cost of €16 000 with audits costing a further €1 000 per year. It can be presumed that similar costs would arise from the introduction and operation of a waste certification scheme.

7.2.3 Impacts for Waste Treatment Facilities

Under Option 2, those waste treatment facilities that decide to continue to trade with dealers participating in the waste certification scheme could incur costs related to technological development and employee training to meet the requirements for ESM set out by the scheme.

If waste treatment facilities are able to seek certification directly, they would need to meet the following requirements:

- register with the scheme, naming the dealer companies they are connected to that participate in the scheme;
- submit a self-assessment against the requirements of the scheme;
- in case of third-party verification, undergo an on-site inspection audit by the certification body;
- confirm approval or appeal against the result of the on-site audit; and
- maintain their status by undergoing annual reviews/audits.

It is difficult to estimate the level of investment that would be required by the scheme, as it would depend on the size and type of the facility as well as its general conditions. However, a maximum value for the costs of upgrading a facility can be estimated from the costs of building a new solid waste treatment plant, which in India in 2001 were reported to be over €400 000[82]. In addition to these initial costs, the replacement of worn out equipment and machinery, which generally entails a large expenditure once every 5-6 years, could account for as much as 30-40% of the original capital expenditure[83].

[82] The Times of India (2011): **New Solid Waste Management Plant Soon**, downloaded from http://articles.timesofindia.indiatimes.com/2011-04-20/india/29450471_1_solid-waste-management-plant-landfill-site

[83] Nema A (nd):Risk **Factors Associated with Solid Waste Treatment Technology Options in the Indian Context**, downloaded from

In addition to investment in infrastructure, the costs of ensuring adequate operation of the facility by employees can also be a significant part of ensuring the fulfilment of requirements. Wages in India for a manager at a solid waste treatment plant are around €8 000 per annum[84]. It is possible that the requirements set by the scheme could necessitate hiring additional staff, as well as providing relevant training.

7.2.4 Impacts on Public Authorities

Industry wide voluntary schemes applicable across Member States can be set up by European Associations and other industry stakeholders, as well as in conjunction with the European Commission. There are also examples of voluntary schemes, such as the EU Ecolabel and EMAS, which are managed by the European Commission with the criteria for the schemes set out in EC Regulations. EUCertPlastic, on the other hand, is a European certificate for post-consumer plastic recyclers that was launched by the European Commission under its Eco-Innovation Programme; however it is being managed by European Associations.

Depending on the extent of involvement of the Commission, it could incur initial costs in setting up the scheme, together with annual costs in relation to the administrative tasks of the scheme, which could include:

- consultation with industry and other stakeholders;
- development and operation of the scheme website;
- selection process for the accreditation body; and
- review of related standards etc.

However, in most cases, the costs of setting up and operating the scheme are recovered from certification bodies and certified organisations in the form of fees collected by the administrative body and the accreditation bodies. Accreditation and certification bodies are generally nominated by industry and operate independently.

7.2.5 Impacts on the Supply Chain

The impact on the supply chain is unlikely to be significant.

Certification, which demonstrates achievement of certain requirements, can prove to supply chain partners as well as other stakeholders that the certified organisation effectively manages environmental and social impacts of the processing and recycling operation.

As CSR and corporate image becomes more important for many organisations there may be increased demand from these organisations to become certified. In this case it is possible that new certification schemes may arise. However, as has been the case in other industries, the co-existence of multiple certificates alongside non-certified

http://www.seas.columbia.edu/earth/wtert/sofos/Asit_Risk%20Factors%20Associated%20With%20MSW%20Treatment%20Technology%20Options%20in%20the%20Indian%20Context.pdf

[84] Information from Careerjet India , downloaded at http://www.careerjet.co.in

products or services could reduce consumer confidence and alter their interpretation of the presence or absence of a certification. This can in turn reduce the value that an organisation would gain from certification and may influence some organisations not to certify.

7.3 Assessment of Impacts

7.3.1 Functioning of the Internal Market and Competition

As a voluntary scheme, the impacts of Option 2 will depend on the level of uptake.

The voluntary certification scheme is unlikely to have a significant impact on the functioning of the internal market. However, it could impact the competitiveness of individual waste exporting companies, as responsible waste generators switch their custom from non-certified to certified dealers. The additional costs faced by certified dealers may mean that non-certified dealers are able to undercut them in the market. This could result in a segmented market, with waste generators concerned about their CSR status moving to certified dealers and those which are solely cost-driven using (cheaper) non-certified dealers. However, it is unlikely that the supply of waste exporting services as a whole would be impacted.

7.3.2 Impact on Third Countries and International Relations

Certification can provide an incentive to improve waste treatment conditions. However, it can also introduce additional costs for some stakeholders in the developing world, which may be seen as trade barriers.

As waste, especially waste which incorporates precious metals, can be of considerable economic value to the developing world, a measure such as a certification scheme is likely to fall within the scope of the General Agreement on Tariffs and Trade (GATT). However, due to the voluntary character of the certification, Option 2 is unlikely to contravene the principles of GATT.

7.3.3 Employment and Labour Markets

Option 2 is expected to result in limited impacts in terms of new job creation in receiving facilities and at waste exporting companies. The additional administrative and management tasks arising from the implementation of the scheme could also result in some new job creation.

However, the extent of such impacts would largely depend on the take-up rate of the certification scheme among waste exporting companies in Europe.

7.3.4 Environmental and Social Impacts

The environmental and social benefits arising from the scheme will depend on the level of uptake by dealers in the EU. If uptake is low, environmental impacts under Option 2 are expected to be marginal.

With a number of voluntary quality control schemes already in place, it is possible that companies currently holding an ISO or supply chain certificate could be reluctant to add another voluntary certification scheme. Indeed, some stakeholders have suggested that the tendency is for companies to seek certification to similar schemes as their partners, thereby simplifying the procedure of buying, selling and treating waste (as the same quality control scheme is used all the way down the supply chain). These factors could limit uptake of the waste certification scheme. In addition, a recent report suggested that the existence of multiple voluntary schemes can create uncertainty and hinder credibility and support for the individual schemes[85]. Alternatively, though, the fact that a company already holds one form of certificate may make compliance with the scheme cheaper and easier.

Even though the proposed waste certification scheme would contain provisions for ESM which are not included in other certification programmes, its voluntary nature could limit the achievement of the overarching objective, which is improved ESM of exported waste in third countries. In order to increase the uptake of the scheme amongst waste exporting companies in Europe additional incentives may need to be introduced. An example of possible incentives is described in Table 7.5 below.

Table 7.5: Incentives for Companies to Join a Voluntary Certification Scheme

Type of Incentive	Incentive	Impact for waste exports
Commercial	Following the market leaders/ Competitiveness	Once major waste exporting companies join the scheme others might be pressured into following suit so as not to lose their competitive position
	Increased efficiency	Increased rates of material recovery made possible through a controlled process of waste treatment
Financial	Tax cuts	Not relevant
	Reduced fees	Could reduce credit insurance fees against non-paying customers
	Reduced verification costs	Verification for the waste certification scheme and for ISO 9000 could be combined, reducing overall costs (however costs would still increase).
Social	Environmental awareness	Increase awareness of ESM along the supply chain

[85] Merger et al (2011): **Options for REDD+ Voluntary Certification to Ensure Net GHG Benefits,** Poverty Alleviation, Sustainable Management of Forests and Biodiversity Conservation, Forests 2011, 2, 550-577.

The results of a consultation undertaken as part of the 2009 RPA and Milieu study[86] on EMAS costs and benefits show that registered companies identify a wide range of financial benefits as a result of the certification scheme. These include reduced energy use, efficient resources, access to grants, legal cost savings, reduced insurance premiums as well as reduced taxes.

7.4 Summary of Option 2

In the context of waste exports and the environmentally sound management of waste, the key benefit of a voluntary certification scheme is that it can facilitate awareness among stakeholders.

It has become apparent through the consultation process that some waste exporting companies are already certified under a number of different schemes. While the proposed certification scheme includes provisions for the ESM of exported waste, an element currently lacking in other schemes, the multiplicity of certificates in the market could result in a lack of transparency, inefficiency and uncertainty among market actors. Consequently the certification scheme could experience limited support.

A voluntary scheme can include either provisions for self-certification or a requirement for third-party verification. Third-party verification carried out by an accredited certification body adds consistency and a greater level of credibility to the scheme. For dealers with the ability to assess treatment plants themselves, the costs of third-party verification could be higher than self-certification. However, dealers that do not have the resources or expertise to assess the compliance of waste treatment plants themselves would need to make use of third-parties to participate in the scheme.

A voluntary scheme would impose costs and administrative burdens on participating waste exporting companies, waste treatment facilities and to a lesser extent (depending on its role in the scheme) upon the European Commission. In terms of achieving the overarching objective of improved management of exported waste, its success rate would be largely depend on the level of uptake in the market. A slow but continuous increase in market uptake could prove to be beneficial, as it would allow the certification system to correct and improve its mechanism over time. However, over time it is possible that other certification schemes could introduce similar standards, which could lead to further fragmentation in the market.

Companies seeking certification under the scheme could gain market advantages via improved public relations and the ability to demonstrate corporate social responsibility, particularly if third-party verification becomes an element of the scheme. The option would allow companies to prove to supply chain partners, as well as final customers, that they effectively manage the environmental and social impacts of waste treatment in the receiving countries.

[86] RPA Ltd. and Milieu (2009): **Study on the Costs and Benefits of EMAS to Registered Organisations**, downloaded from:
http://ec.europa.eu/environment/emas/pdf/news/costs_and_benefits_of_emas.pdf

8. OPTION 3: "LIGHT" MANDATORY SCHEME (SELF-CERTIFICATION)

8.1 Overview

Option 3 comprises a mandatory scheme which allows companies to self-certify themselves against the set requirements (although participants without the resources to assess waste treatment facilities themselves could use third parties to aid self-certification). As a mandatory scheme, the option could only apply to organisations based in the EU. Only waste dealers based in the EU would therefore be able to participate in the scheme.

In order for waste dealers to receive certification, they must certify that all the receiving facilities for waste they export fulfil the requirements of the ESM standards set by the scheme. They must provide information on the location, technology used, environmental management systems in place as well as employee training, health and safety and emergency plans (requirements are further detailed in Section 5.2.4). Under the self-certification scheme, the assessment of the waste treatment facilities, including periodic review, would be undertaken by the waste dealers themselves (though they could use consultants to assist in this process).

In order to include an internal control mechanism within the certification scheme, waste dealers would self-certify themselves for a limited period which, following the initial phase of compliance, could be renewed periodically. Renewal of self-certification would be granted provided that additional controls such as the tracking of cargo or custom control confirm the reliability of the certificate. In other words, the self-certification system would be open only for companies that comply with other regulatory elements related to the export and management of waste.

An example of existing mandatory certification is the energy labelling of household appliances. The concept of energy labelling was introduced in the 1990s under Framework Directive 92/75/EEC as a tool to increase the energy efficiency of household appliances and to reduce domestic electricity consumption[87]. The current labelling scheme now provides more information than before and includes issues such as water consumption and noise levels. Box 8.1 below describes the current energy labelling scheme and compares it with the mandatory system of CE marking.

[87] Come on Labels project (2011): **Appliance Testing - Summary paper on appliance testing procedures and good practices**, downloaded from: http://www.come-on-labels.eu/about-the-project/all-project-documents-eu.

Box 8.1: Examples of Mandatory Certification Schemes.

Energy Labelling of Household Refrigerating Appliances	**CE marking**
On 30 November 2010, the European Commission adopted Commission Delegated Regulation (EU) No 1060/2010 supplementing Directive 2010/30/EU with regard to energy labelling of household refrigerating appliances. The label provides information to assist consumers in evaluating refrigerating appliances under several criteria, including energy efficiency, energy consumption, storage capacity and noise emissions. The Regulation entered into force on 20 December 2010 and has been applicable since 30 November 2011. The label is required to include the following information: • supplier's name or trade mark; • supplier's model identifier; • energy Efficiency Class based on the Energy Efficiency Index (EEI); • annual energy consumption (AE C) in kWh per year; • sum of the storage volumes of all compartments that do not merit a star rating; • sum of the storage volumes of all frozen-food storage compartments that merit a star rating; and • airborne acoustical noise emissions expressed in dB(A) re1 pW, Other similar mandatory labelling schemes cover**:** • labelling of household dishwashers through Regulation (EU) No 1059/2010; • labelling of televisions through Regulation (EU) No 1062/2010; and • labelling of household washing machines through Regulation (EU) No 1061/2010	CE or 'Conformité Européenne' marking has been in place since the mid-1990s. It applies to products regulated by various EU legislation relating to products or services. A CE mark indicates that a product complies with the relevant EU legislation. It is a legal requirement to CE mark products (or services) which fall within the scope of one or more of the CE marking Directives, before it can be legally placed on the market (or put into service) in the EU. The mark indicates that the product conforms to all relevant requirements or provisions which may be imposed on it by means of European Directives. The European Commission's "Blue Guide" lists Directives where CE Marking is applicable. CE marking is generally a 'self-declaration' process. It is a declaration by the manufacturer that the product conforms to all relevant requirements or provisions which may be imposed on it by means of European Directives. However, some products, such as invasive medical devices or fire alarms, may require third party attestation. The same principles apply to imported products and it is the responsibility of the importer / person placing the product on the market to ensure that the product is correctly CE-marked.

Source:
Bureau Veritas (2010): ***EU Establishes New Energy Labelling for Household Refrigerating Appliances****, downloaded from: http://www.bureauveritas.com.*
European Commission (2012): ***European standards, Ecodesign and Energy Labelling****, downloaded from: http://ec.europa.eu/enterprise/policies/european-standards/harmonised-standards/ecodesign/index_en.htm.*
EUtech Instruments (1997): CE Certificates, available at: http://www.eutechinst.com/ce_certificate.htm.
CE Marking Association website, available at: http://www.cemarkingassociation.co.uk/.

The potential implications of a mandatory certification scheme in relation to relevant international agreements and treaties need careful consideration. This is because a mandatory certification scheme could be considered a barrier to free trade. These impacts are discussed in Box 8.3 in section 8.3.2

8.2 Impacts on Stakeholders

8.2.1 Impacts for Waste Generators

Under Option 3, waste generators are not expected to encounter significant impacts. Some cost increases are possible. Depending on the policies of the waste exporting companies, some might decide to pass on costs arising from the certification scheme to the waste generators. At this stage of the analysis however, it is difficult to estimate what the scale of that increase might be.

8.2.2 Impacts for Waste Dealers

Any mandatory certification scheme could have significant impacts on waste dealers. They would not be able to remain in business without seeking certification. Waste dealers would incur costs relating to the implementation and maintenance of the scheme. This would involve not only specification of ESM, but also requirements regarding inspection of waste management facilities to ensure that the waste they export to third country facilities is being managed in an environmentally sound way. These requirements would apply equally to self-certification and third-party verification schemes.

As with Option 2, the costs may be lower for those companies already holding an ISO, EMAS or WEELABEX certification than for those companies without any type of certification, as they may have readily available information on the life-cycle impacts of exports. However, it is likely that additional costs will arise, as companies may need to contact waste treatment facilities and receive further information to comply with the notification requirements.

Under Option 3, waste dealers would be responsible for assessing the ESM of waste at the receiving facilities. Therefore, they would be required to demonstrate their competence to carry out the assessment of the waste treatment sites or they would have the possibility to contract an accredited certification body. Competence requirements to undertake the site assessment would be included in the criteria of the scheme. The assessment of the facilities would require a high-level technical knowledge of the waste treatment operations for all waste types exported by the individual companies. Knowledge of best available technologies, as well as health and safety risks and regulations, would also be essential elements of the assessment.

In order to assure that waste exporting companies follow similar procedural guidelines, minimum requirements will need to be included in the scheme. These minimum requirements would set standards for the auditing procedure, in particular regarding:

- competence of quality systems;
- knowledge and awareness of legal standards and statutory minimum levels of pollutions;
- sampling and testing methodology;
- test standards and procedures; and
- record keeping.

In both Options 3 and 4, waste dealers would be responsible for on-site assessment (potentially including testing and sampling) at the treatment facilities. Depending on the size of the company and the extent of their operation, this might necessitate the employment of additional staff members or the use of external consultants. This could potentially lead to strategic advantages for larger companies that may already have offices and employees at different locations that are able to undertake on-site assessment.

Box 8.2 below illustrates the perceived benefits of a similar self-certification scheme operating in the construction sector in the UK. Identified benefits of the scheme include shorter time for the audit procedure, as it excludes the involvement of a third party, as well as reduced charges.

Box 8.2: Competent Person Self-Certification Schemes in the UK

Competent person self -certifications schemes were introduced in the UK in 2002 to allow registered installers (i.e. businesses, mostly small firms or sole traders), who are competent in their field, to self-certify certain types of building work as compliant with the requirements of the Building Regulations.

These schemes offer benefits to the building industry and consumers:

- scheme members save time by not having to notify in advance and use a building control body to check/inspect their work; and
- consumers benefit from lower prices as building control charges are not payable.

The schemes help to tackle the problem of cowboy builders by raising standards in the industry and enabling consumers to identify competent installers. They also allow building control bodies to concentrate their resources on areas of higher risk.

Membership of a competent person scheme is voluntary. Installers carrying out certain types of work subject to the Building Regulations may choose to join a relevant scheme if they consider membership to be beneficial. Alternatively, they may choose to continue to use a building control body to check/inspect their work.

Source: Department of Communities and Local Government UK (nd), Planning, building and the environment, Competent Person Self-Certification Schemes downloaded from http://www.communities.gov.uk/planningandbuilding/buildingregulations/competentpersonsschemes/

Under a self-certification scheme, costs are expected to arise in connection with the assessment of the individual treatment sites and the periodic review of their operation, such as:

- wages and salaries of personnel undertaking the assessment;
- travel and accommodation costs in the treatment site area; and
- training and other administrative costs.

According to information from the Waste Facilities Audit Association, which operates audit programmes for a number of waste treatment plants in Europe, the cost of an audit per site is around £2 000 (€1 600) excluding taxes[88]. These costs, however, would increase if the waste exporting companies needed to assess a number of facilities in a variety of locations. Small and medium sized companies could struggle to meet the costs of self-certification, using either their own staff or consultants.

Assuming salary costs for one employee, with additional training and expenses for visits to different facilities in three countries with accommodation costs for six nights stay in each country, cost estimates are summarised in Table 8.1.

Table 8.1: Cost Estimation for Site Inspection Under Option 3

Cost Categories	Cost Estimations
Wages and salaries	€30 000 - €45 000 per annum*
Training	€100 - €1 000 per training per person**
Travel	€1 800 - €2 100
Accommodation	€420 - €1 200

**source: http://www.indeed.co.uk/Waste-Management-jobs*
***source: http://www.bsigroup.co.uk/en/training/iso-9001-quality-management-training/*

The cost estimates in the above table are approximations; they represent figures for wages and salaries as identified for waste management personnel in Western Europe. Training costs were calculated based upon information on prices of one and two-day ISO training courses. Travel and accommodation costs were calculated upon five air fares and hotel prices for two nights in China, India and Nigeria.

In cases where the additional administrative costs of a mandatory certification scheme with self-certification outweigh the savings from sending the waste materials to non-OECD countries for recycling, the alternative would be to recycle the materials within the EU. This would be in line with the strategic objectives of the Commission in terms of waste management and increased recycling. Consultation undertaken for this study has indicated different opinions as to the impacts of both types of mandatory schemes (Options 3 and 4), with some consultees favouring mandatory certification and another consultee highlighting the need for companies to receive incentives to support this approach.

8.2.3 Impacts for Waste Treatment Facilities

Under a mandatory self-certification scheme, individual treatment sites would need to agree to their operations being inspected by third parties (as part of the monitoring and evaluation activities undertaken by the authorities), and that information regarding the processes for waste treatment are passed on to third-parties.

[88] Waste Facilities Audit Association (nd): **About WFAA**, downloaded from http://www.wfaa.eu

The elements that dealers would need to assess in order to identify the level of ESM applied at the treatment sites would be the same as for Options 2 and 4 (these were given in Section 5.2.5). Section 5.2.4 gives a step-by-step description on the necessary procedures waste treatment plants need to carry out in order to allow EU waste dealer exports.

Depending on the current level of technological advancement and the minimum requirements for the operations that are to be established, treatment sites will face varying costs under Option 3. A key impact for waste treatment sites might arise from whether or not they can maintain the standards stipulated by the scheme.

The impacts would be greater than for Option 2, as certification would be mandatory for all dealers, and thus all treatment sites accepting waste from the EU would need to be assessed and to make any necessary improvements in order to continue accepting EU waste. It would also not be possible, under a mandatory scheme, for treatment sites to seek certification directly and therefore to gain a market advantage as a destination for EU waste.

The costs will, of course, depend on the stringency of the standards but are likely to change according to country and type of waste being exported. Table 8.2 assesses the scale of impacts based on country and type of waste.

Table 8.2: Impacts from Mandatory Certification on Waste Treatment Facilities in Different Countries

Recipient Country	Waste	Impact on Waste Recycling Plants
China	Paper, metal, plastic	The impacts could be significant despite the regulatory controls on imports due to the passing down of waste to local sites with low standards and imports from other countries such as Hong Kong.
Hong Kong	Plastic	Impacts on country plants are uncertain as waste exported to Hong Kong appears to be traded further to China. On the other hand, it may have an impact on waste brokers or importers
India	Metal	Impacts may be significant despite the current regulations on ESM due to the large number of small units in the informal sector.
Turkey	Metal	The impacts are unlikely to be significant as Turkey is an OECD country (and thus under the provisions of OECD Decision C(2011) 107 and C(2004)100 on the ESM of waste)
Egypt	Metal	Although there are controls over imports (certificate showing that waste is free of hazardous materials) and accreditation is recognised, the impacts on plants are uncertain.

The impact assessment to the Regulation on ship recycling, which included mandatory certification, estimated costs for recycling facilities in the range of €20 000 - €40 000 plus internal personnel costs of 1-2 man years (€2 160 - €4 320), but these costs were

considered negligible compared to dismantling prices (CEC, 2012)[89]. It is expected that auditing costs will also be negligible compared to recycling prices and revenues from recycling especially for larger facilities. Moreover, these costs are likely to be passed on to waste dealers. The Regulation is therefore not expected to have a noticeable impact on recycling facilities' revenues. This conclusion may not apply to waste treatment, where prices may be lower than for ship dismantling. For smaller facilities in particular, the impacts could be more significant.

The flow of exported materials is unlikely to be impacted under a mandatory certification scheme. The intention of a certification scheme is to ensure the environmentally sound management of waste; those facilities that do not meet the specified criteria will not be able to receive waste for recycling from Europe. This would contribute to a reduction of underequipped facilities that negatively impact human health and the environment. However those facilities that meet the requirements are expected to increase their intake of exported materials, as they would receive waste which would otherwise have been shipped to those plants which do not meet the schemes requirements. This would essentially mean that the quantity of the material flows remains unchanged but the final destination of the shipments is concentrated in and around areas of high standard treatment facilities.

Recent reports on openings of new treatment plants indicate that the increasing capacity of these waste treatment plants would require use of their full potential in order to provide a short-term return of investment. Box 8.3 below provides examples of recent investments into new, state-of-the-art recycling plants in China.

Box 8.3: Examples of New Investments into Recycling Plants in China

Teijin Ltd of Japan is to establish Zhejiang Jiaren New Materials Co., Ltd - a joint venture with the Jinggong Holding Group of Shaoxing in Zhejiang Province, one of China's largest production bases for material fibre products. Through the joint venture, Teijin will chemically recycle polyester as well as manufacture and sell the resulting fibres, with the aim of establishing a closed-loop recycling system in China.

The new plant will chemically recycle polyester fibre scraps and used polyester products into DMT (which is used in the production of polyesters) with quality comparable to that derived directly from petroleum; the DMT will be used for the production of polyester resin, as well as value-added polyester fibre. The facility will have a DMT production capacity of 20 000 tonnes per year in the initial phase; as demand grows, annual capacity will be expanded to 70 000 tonnes. Annual production capacity of recycled polyester fibre will be 19 000 tonnes in the initial phase.

Fuji Xerox (a partnership between Japanese Fuji Photo and American Xerox) announced that its integrated recycling system located in Suzhou, China has managed a 99.8% recycling rate in fiscal year 2010, qualifying it as a so-called "zero waste" facility. Zero waste, as defined by Fuji Xerox, means that more than 99.5% of all products collected have been sorted, disassembled, and either recycled or reused.

[89] CEC (2012): **Impact Assessment, Accompanying the document. Proposal for a Regulation of the European Parliament and of the Council on ship recycling**, available at: http://ec.europa.eu/environment/waste/ships/pdf/Impact%20Assessment.pdf

Box 8.3: Examples of New Investments into Recycling Plants in China
The Suzhou facility collects over 70 categories of used materials and consumables from all over China, including copiers, scanners, and ink cartridges. It also collects materials such as plastic, iron, aluminium, glass, and copper. In just over three years of operation (the facility opened its doors in January of 2008, and evaluation was performed at the end of March 2011), Fuji Xerox Eco Manufacturing reclaimed approximately 1500 tonnes of resources.
One of the largest metal recyclers in China, the China Metal Recycling Ltd has also announced plans to open new treatment facilities in Tianjin, Zhejiang province and Jiangsu province. These new facilities are expected to double the company's annual production capacity to 3.1 million metric tons.
Sources: Teijin's polyester recycling JV in China *downloaded from* http://www.recyclinginternational.com/recycling-news/6454/plastic-and-rubber/china/teijin-s-polyester-recycling-jv-china Fuji Xerox has jumped on the bandwagon, *downloaded from* http://cleantechnica.com/2011/08/18/hope-for-chinese-recycling-facilities/ China Metal Recycling Ltd *downloaded* http://www.chinametalrecycle.com/en/product_southern.html

8.2.4 Impacts on Public Authorities

Under Option 3 the European Commission would be responsible for introducing the legislation upon which the mandatory scheme is based. The legislation needs to be aligned with the relevant environmental, waste and international trade provisions such as the WTO, Basel Convention and the OECD guidance.

Once a supporting a legal basis has been agreed and accepted, depending on the type of legislation (Regulation, Directive or Decision), Member States authorities would need either to transpose or to ensure that they comply with the requirements. Under Option 3 the implementation of a Directive (see Table 5.3) would allow the individual Member States to adapt their currently varying waste trade regulations to the scheme.

An accreditation body would need to be appointed for the management and operation of the certification scheme, either within the European Commission or external to it. The selection of the accreditation body and the periodic review of its operation is an additional task that would be overseen by the European Commission.

In order to prevent the risk of a rise in illegal trade, which might result from the cost increases associated with the certification scheme, it might be necessary for custom control authorities to undertake an increased number of inspections of waste shipments.

8.2.5 Impacts on the Supply Chain

Introduction of a mandatory self-certification scheme would involve the entire supply chain, from the point the dealer takes ownership of the waste. Initially, overseeing all elements of the supply chain may be a complex procedure. The mandatory nature of the scheme would mean that all waste exporting companies operating in Europe would be subject to the certification scheme. While this would entail costs for dealers, they

would be in a position to leverage technological and environmental improvements through actions targeted at waste treatment sites and waste generators.

The main impacts under Option 3 would fall on dealers to comply with the scheme. Costs incurred by the dealers might be passed on to the buyers of the recycled materials. Other trading companies might also limit their operation to specific waste types and treatment facilities.

8.3 Assessment of Impacts

8.3.1 Functioning of the Internal Market and Competition

Option 3 is expected to have an impact on the market for waste trade in the European Union. While the mandatory nature of the scheme prevents non-compliance and supports increased environmental awareness in relation to the exported waste materials, it might result in a heavy financial and administrative burden for companies, especially SMEs, and could result in a loss of business or the downsizing of operations. It might thus result in concentration of the waste market.

Mandatory certification could, however, provide a more level playing field across the sector, as all waste exporting companies would need to demonstrate that their business operations comply with required standards.

A risk associated with a mandatory scheme is the possible rise of illegal trade driven by the higher costs. According to information from the European Commission, across the 27 Member States 1 545 million tonnes of sea cargo is checked every year[90]. The results of custom checks could provide a quick and transparent overview of the effectiveness of the certification scheme. The scheme could facilitate fair competition among waste dealers as those failing to comply with the regulatory elements of the certification scheme would risk withdrawal of certification and thus loss of business.

8.3.2 Impact on Third Countries and International Relations

A number of international organisations, such as the Basel Convention and the OECD have already undertaken initiatives in relation to the ESM of exported waste. A mandatory certification scheme in the European Union could support these international provisions as it would contribute to increased environmental awareness in the EU regarding the treatment of exported waste, as well as in the recipient countries.

However, while a mandatory scheme could lead to improved management of waste in recipient countries, the costs of compliance might mean that some treatment facilities were no longer able to accept EU waste, which could limit the quantity of valuable materials arriving in the recipient countries.

[90] European Commission (2012): **Taxation and Customs Union, EU Customs strategy**, downloaded from http://ec.europa.eu/taxation_customs/customs/policy_issues/customs_strategy/index_en.htm

Option 3 could also give rise to concerns regarding free trade. A mandatory scheme may potentially conflict with WTO principles if it confers a trade advantage. Box 8.3 below summarises some of the main articles affecting the development of mandatory standards for recycling treatment facilities.

Box 8.3: **General Agreement on Tariffs and Trade (GATT) and Waste Exporting**

GATT 1994 is an international treaty which is legally binding on all WTO members. Although primarily concerned with trade liberalisation through the removal of discriminatory trade barriers, the preamble explicitly acknowledges the objective of sustainable development. This is reflected through the addition of Article XX (g)

The GATT is applicable to objects that have an economic value or materials that are potential subjects of a business transaction. As waste, especially waste which incorporates precious metals, can be of great economic value to the developing world, a measure such as a certification scheme is likely to fall within the scope of the GATT. According to Article XI of the GATT, the only permitted restrictions on trade are duties, taxes and other charges; prohibitions through quotas or licenses are clearly not permitted. Whilst there may only be a few WTO decisions on export bans, WTO panels have consistently held that import bans implemented though compulsory license systems violate Article XI.

Any measure that operates as a form of limitation on or in relation to imports or exports is prohibited by Article XI:1. "Discretionary" and "non-automatic" licensing requirements are categorised as prohibited quantitative restrictions. As a result, a system under which the licensing authority can universally grant licences to applicants who satisfy the pre-requisites, as in a certification scheme, may still violate Article XI:1 if those pre-requisites give the licensing authority unfettered discretion to deny a licence. Therefore, even though the license to import/export waste under a certification scheme may be universally accessible, it may still breach Article XI:1.

A certification scheme could also potentially violate Article XIII of the GATT. This provision requires Members to administer quantitative restrictions that are justified under Article XX of GATT, in a non-discriminatory manner. In this respect, the certification scheme would need to comply with the concept of Most Favoured Nation (MFN). The concept of MFN imposes an obligation on States to treat all like products equally regardless of their origin or whether they are domestic or imported. It seeks to ensure equality of opportunity to import from or to export to all WTO members.

Article XX (g) permits trade measures relating to the conservation of exhaustible natural resources when such trade measures work together with restrictions on domestic production or consumption, which operate so as to conserve an exhaustible natural resource.

Although certain measures may breach the GATT rules, they may be permitted if they fall within the scope of one of the exceptions listed under Article XX. More specifically, it would be the responsibility of the EU to show that the certification scheme was justified as a measure:

- *Necessary to protect human, animal or plant life or health* (paragraph b of Article XX); and/or
- *Relating to the conservation of exhaustible natural resources if such measures are made effective in conjunction with restrictions on domestic production or consumption* (paragraph g of Article XX).

It would be the responsibility of the EU to demonstrate that the introduction of the certification scheme is justified as a measure *Necessary to protect human, animal or plant life or health* (paragraph b of Article XX); and/or *Relating to the conservation of exhaustible natural resources if such measures are made effective in conjunction with restrictions on domestic production or consumption* (paragraph g of Article XX).

In order for the certification scheme not to contravene international obligations, certificates issued under the scheme must not be based on vague and unspecified criteria. Furthermore, it must also be ensured that there are no lengthy delays in issuing certificates, even if the delays are a result of internal administrative problems or sudden high volumes of applications. A certification scheme may violate international trade principles if it confers any trade advantage; affects like products and fails to accord that advantage immediately and unconditionally to those products. In other words, the measure would need to be applied consistently across all importing countries. Moreover, it is suggested the EU engage in a dialogue with all importing counties prior to the measure being imposed. This will need to include discussion about the requirements for ESM and the level of penalties for dealers which are non-compliant.

8.3.3 Employment and Labour Markets

The impact on labour markets in Europe would be marginal under Option 3. The mandatory scheme could result in an increase in employment for certification auditors and essential administrative staff at waste exporting companies. However, there might also be a loss of employment for small and medium sized enterprises which fail to meet the requirements for self-certification and thus cease operations.

At the waste treatment facilities, the certification scheme is not expected to result in significant employment changes. However, the scheme could potentially result in an increased awareness and higher levels of competence amongst the employees at the facilities.

8.3.4 Environmental and Social Impacts

The introduction of a mandatory certification scheme on the treatment of exported waste could contribute to a reduction of air, water and soil pollution via the control measures applied at the waste treatment sites.

Under Option 3, all waste dealers operating in the European Union would be obliged to self-certify that the treatment plants receiving their waste are operating in compliance with the environmental requirements of the certification scheme.

Option 3 is therefore expected to increase the quality of waste treatment operations and could result in a reduction in child labour, as certified waste treatment plants would be obliged to assess the qualifications and experience of their employees.

8.4 Summary of Option 3

Option 3 comprises a procedure that ensures compliance with ESM for all waste dealers exporting waste to non-OECD countries. While the mandatory aspect of Option 3 would facilitate trade and the implementation of a standard level of ESM for all waste exported to non-OECD countries, certification could bring additional financial and administrative burdens.

Under this Option, as for Options 2 and 4, waste dealers complying with the proposed waste certification scheme would need to undertake an assessment of the technological status and expertise of the staff at waste treatment facilities, including a periodic review.

The mandatory nature of the scheme would imply that all waste exporting companies operating in Europe would be subject to the certification scheme. The requirement to assess the operations of waste disposal sites could pose a heavy financial burden on SMEs, which may struggle to cover the costs of the assessment for each individual waste treatment plant. This could lead to a strategic advantage for larger companies that might already have offices and personnel at the key waste treatment locations.

Depending on the current level of technological progress and the minimum requirements for the operations that are to be established, treatment sites will face varying costs under Option 3. A key impact for waste treatment sites might arise from whether or not they can maintain the standards stipulated by the scheme.

Due to the mandatory nature of the scheme, the implementing authority – the European Commission - would need to ensure that the scheme has well-defined and specific criteria relating to the protection of human health and the environment. Moreover, the scheme would need to be applied consistently across all importing countries.

9. OPTION 4: MANDATORY SCHEME WITH THIRD-PARTY VERIFICATION

9.1 Overview

Under Option 4, the certification scheme would be mandatory and would require independent third-party verification of compliance. Third party verification is more likely to ensure consistency and a high level of confidence that the certification is based on valid and truthful information. Under a mandatory certification scheme, the main stakeholders affected would be:

- waste dealers: dealers would be obliged to send their waste only to treatment facilities that met the requirements of the scheme and would have to comply with other information requirements;
- waste treatment facilities: would have to meet all conditions and criteria under the certification scheme in order to receive imports from Europe; and
- public authorities: would have to carry out inspections to assess whether dealers are complying with the new requirements.

Within Option 4, Certification Bodies (CB) would be contracted by dealers applying for certification, to verify whether they are fulfilling their requirements. As described in Section 5.1.5, the certification bodies would be responsible for awarding certificates and reviewing the implementation of the scheme at the individual organisations. This would include visiting the treatment facilities to which the waste was exported by EU dealers. CBs would be European (and non-European) organisations accredited by EU accreditation bodies. This will ensure that potential governance issues are addressed while respecting national sovereignty concerns.

It is envisaged that there would be positive impacts on the working conditions of employees in waste treatment facilities. These, along with related environmental impacts are discussed below.

As with Option 3 the implications of a mandatory scheme in relation to relevant international agreements and treaties need careful consideration. This is because a mandatory certification could be considered a barrier to free trade. These impacts were assessed in Box 8.3 in Section 8.3.2 above. There would be no difference in the trade implication of a third party verification scheme compared to a self-certification scheme.

9.2 Impacts on Stakeholders

9.2.1 Impacts for Waste Generators

Under Option 4, waste generators are not expected to experience significant impacts. However, as waste dealers are required to gain certification (as in Option 3) it is possible that some of costs they incur will be transferred to the waste generators. The

proportion of the costs which are transferred would depend on policy decisions made by each individual waste exporting company. At this stage of the analysis however, it is difficult to estimate what the scale of that increase might be.

9.2.2 Impacts for Waste Dealers

Under a mandatory scheme with third party verification, dealers would be obliged to maintain an updated list of the waste treatment facilities they carry shipments to. Specific elements of this list are detailed under section 5.2.3. The waste dealers would be allowed to modify their list of contacts at any time, provided that new facilities meet the requirements for certification.

In order for waste dealers to achieve certification, they must prove that all the facilities receiving waste from them fulfil the requirements of the ESM standards described in the scheme. There will be administrative cost implications of the new requirements, but these may vary according to whether the company already has relevant measures in place. As with Options 2 and 3, the costs may be smaller for those companies already holding an ISO, EMAS or WEELABEX certification than for those companies that do not hold any type of certificate, as they may have readily available information on the life-cycle impacts of exports. However, it is likely that additional costs will arise, as companies may need to contact waste treatment facilities and receive further information to comply with the notification requirements.

The key additional impact of Option 4 is the cost of third-party verification. Costs for assessment and annual audits can vary from company to company depending on the size, number of employees, number of waste receiving facilities etc. Table 9.1 below highlights possible costs for third-party verification based upon ISO 9000 for different sized companies. Within this waste certification scheme, verification costs are expected to be higher as both ends of the waste transport route have to be assessed for compliance.

Table 9.1: Cost Projections for Third-Party Verification

	Without Pre-assessment	**With Pre-assessment**
Cost offers for a 2 person company with office dealing with on-line publications	€470 - €1 100	€710 - €1 440
Cost offers for a 51 person company dealing with the manufacturing and sales of merchandise	€840 - €2 845	€1 090 - €2 905

Source: Standard Team (nd) downloaded from http://www.standard-team.com/cikkek/tanusito-ceg.php

Option 4 could potentially benefit dealers. The fact that a dealer's compliance with a certification scheme is verified by a third party could be taken into account in setting insurance premiums or providing financial guarantees, setting financing conditions, and could even affect the value of company shares. Stakeholders are likely to have

greater confidence in a certificate backed by third-party verification than one that is self-certified.

In cases where the additional costs of a mandatory certification scheme with third-party verification outweigh the savings from sending the waste materials to non-OECD countries for recycling, the alternative would be to recycle the materials within the EU. This would be in line with the strategic objectives of the Commission in terms of waste management and increased recycling. Consultation undertaken for this study has indicated different opinions as to the impacts of both types of mandatory schemes (Options 3 and 4), with some consultees favouring mandatory certification and another consultee highlighting the need for companies to receive incentives to buy into this idea.

9.2.3 Impacts for Waste Treatment Facilities

Under both Options 3 and 4, mandatory certification will have similar cost implications for waste treatment facilities in non-OECD countries but could act as an incentive for treatment plants to upgrade their facilities. These costs are discussed in section 8.2.3.

Option 4 would include third-party verification, which means that the operation of waste treatment facilities would be assessed by accredited certification bodies. Consequently, waste treatment sites would need to agree to initial assessment and periodic review of their operations by third parties. The site audits undertaken by independent auditors could yield benefits for the treatment facilities, as they would potentially be able to attest their level of ESM to all trading partners. However, there could be confidentiality concerns if a third party verifier is reviewing a number of different waste facilities that are in competition with each other.

Additionally, having third party verification of a mandatory certification scheme could help indirectly with current enforcement issues in some of the non-OECD countries. For instance, the China Certification and Inspection (Group) Co Ltd (CCIC) indicated that only about 10% of waste originating from the EU is subject to pre-shipment inspection and certification by CCIC. Mandatory certification could address this issue and thus help to avoid legal loopholes and illegal operations.

9.2.4 Impacts on Public Authorities

Under Option 4 (similarly to Option 3), the administrative body would have full responsibility for maintaining the plant register and also for keeping a tracking system. The costs associated with this are difficult to estimate with accuracy. The set-up costs may be significant in the first few years but running costs are not expected to be significant.

The costs to the Commission will also depend on whether the standards are applied through Regulation, a Directive, or a Decision. Under Option 4 it could be expected that the standards are applied through a Regulation in order to ensure consistency with the existing regulatory framework and to avoid any delays in transposition. This would be in line with recommendations made for ship recycling facilities under the Hong

Kong convention[91]. The costs to Member States for transposing and implementing a Directive are likely to be higher than for implementing a Regulation. In the case of a Directive, Member States have costs associated with transposition whereas in the case of a Regulation, its elements are binding and do not require transposition.

In order to maintain the effective functioning of mandatory certification schemes, it is important to have a strong and consistent enforcement effort to effectively implement and verify the requirements. This applies to both Option 3 and Option 4; however, the costs could be higher in the case of mandatory third-party verification.

The report on analysis of the implementation/enforcement of Annex VII and Articles 18 and 49-50 of the WSR (BiPRO, 2011[92]) highlighted that most competent authorities already request copies of the plant authorisation, with some of the competent authorities collecting information on the treatment method but generally there is a diversity of procedures to collect information on treatment standards (from trusting companies to e-mails and expert knowledge of the competent authority). A mandatory certification scheme with third-party verification would address this diversity in the level of information collected, as most competent authorities will have access to the same type of information, facilitating their work. In this respect, there may be savings in market surveillance in the medium to longer term.

The implementation of the mandatory certification scheme might require further changes to the text of the WSR, impacting on specific articles and annexes of the regulation. A detailed description of the possible changes is given in Annex II of this report.

9.2.5 Impacts on the Supply Chain

Similarly to Option 3 the introduction of a mandatory scheme with third-party verification would require closer cooperation between the waste dealer and the waste treatment facility.

The main costs would fall on dealers, to comply with the scheme. Costs incurred by the dealers might be passed on to the buyers of the recycled materials. Other trading companies might also limit their operation to specific waste types and treatment facilities.

The greatest impacts under Option 4 would be the result of the third-party verification aspect of the scheme, which would provide confidence and ensure the reliability of operations.

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91 The Commission has on 23 March 2012 adopted a proposal for a regulation on ship recycling, and for a Council decision regarding ratification of the Hong Kong Convention. The Council and the European Parliament are currently discussing the Commission proposal. More information on: http://ec.europa.eu/environment/waste/ships/index.htm

92 BiPRO (2011): **Report on Analysis of the Implementation/enforcement of Annex VII and Article 18 and 49-50 of the Waste Shipment Regulation in all Member States,** including a Summary Report of National Provisions, a study for DG Env, 16 November 2011, available at: http://ec.europa.eu/environment/waste/shipments/pdf/report_d-2-1-1.pdf

9.3 Assessment of Impacts

9.3.1 Functioning of the Internal Market and Competition

As with Option 3, Option 4 is expected to have an impact on the market for waste trade in the European Union. While the mandatory nature of the scheme prevents non-compliance and supports increased environmental awareness in relation to the exported waste materials, it might result in a heavy financial and administrative burden for companies, especially SMEs, and could result in a loss of business or the downsizing of operations. It might thus result in concentration of the waste market.

Mandatory certification (under both Option 3 and Option 4) could provide a more level playing field across the sector, as all waste exporting companies would need to demonstrate that their business operations comply with required standards. The main impact of Option 4 as opposed to Option 3, is greater certainty that the requirements of certification are being met.

A risk associated with a mandatory scheme is the possible rise of illegal trade driven by the higher costs. According to information from the European Commission, across the 27 Member States 1 545 million tonnes of sea cargo is checked every year[93]. The results of custom checks could provide a quick and transparent overview of the effectiveness of the certification scheme. The scheme could facilitate fair competition among waste dealers as those failing to comply with the regulatory elements of the certification scheme would risk withdrawal of certification and thus loss of business.

9.3.2 Impact on Third Countries and International Relations

As for Option 3, any restrictions on the import of wastes to third countries on the basis of technical standards could be in breach of international treaties under the WTO as compulsory license systems to operate facilities can violate the principles of free trade.

More information on the impact of a mandatory scheme on free trade as well as trade GATT and WTO provisions can be found in Box 8.3 in section 8.3.2.

9.3.3 Employment and Labour Markets

Option 4 is not expected to result in significant impacts on the employment and labour markets in the European Union. The option could have a potentially positive impact on employment in some receiving facilities in non-EU countries which are able to meet the scheme requirements and thus continue to receive waste shipments from the EU, but this could be offset by reduced employment at those facilities which are not able to meet the standards.

As the implementation of Option 4 would require investment at the waste treatment facilities (as for Option 3), it is expected that some waste control facilities that do not

[93] European Commission (2012): **Taxation and Customs Union, EU Customs strategy**, downloaded from http://ec.europa.eu/taxation_customs/customs/policy_issues/customs_strategy/index_en.htm

intend to comply with the requirements would need to downsize their operation or cease accepting materials from the European Union altogether, thus potentially reducing the number of personnel at this site. This could result in the re-routing of some of the shipments to sites that comply with the certification requirements.

9.3.4 Environmental and Social Impacts

As discussed in Chapter 2, there is a wide range of potentially serious impacts associated with the export of wastes from the EU-27 to non-OECD countries. These impacts include damage to the environment and human health from the treatment of different waste streams such as plastics, paper, metals, etc. using technologies which are below EU standards.

The introduction of a mandatory certification with third-party verification is likely to result in greater certainty that the requirements of certification are being met. This could result in better environmental performance, including increased resource efficiency, and better employment conditions for workers at waste treatment sites in non-EU countries. This could include health benefits from better control of emissions and reduced injury cases, especially for some waste streams such as electric and electronic waste. Third-party verification of the sites provides a robust independent review of the operations which could result in more efficient handling of waste at the individual sites.

The immediate impact may be an increase in unemployment however, as some of the recycling facilities not able to meet the conditions of the scheme may need to close down should they not find an alternative market. This could be minimised by phased implementation. On the other hand, mandatory certification may reduce child labour which is a known phenomenon in some non-OECD countries' small dismantling units.

In addition positive impacts could be expected on employment levels in certification bodies.

9.4 Summary of Option 4

As for Option 3, the main economic impacts from Option 4 are expected to be incurred by waste dealers and treatment facilities with poor environmental performance. Waste dealers will incur additional administrative costs from having to provide more information on waste shipments and treatments; these costs are likely to arise mainly at the beginning of the process. There may be potential for the use of third-party verifiers to reduce costs compared to Option 3. This is because all dealers would need to use third-party verifiers, increasing the market for verifiers and thus enhancing competition between them.

Option 4 is likely to have positive environmental and social impacts in comparison with the baseline scenario. Unemployment impacts from the closure of recycling plants is possible but could be minimised by a phased implementation. On the other hand, there could be job creation on the certification industry and, more importantly, the

improvement in working conditions and the reduction of child labour are expected to be significant in comparison with current practices.

The main benefit of Option 4 is that it brings reliable and robust results to the evaluation of waste exporting operations and the treatment of exported waste. This is a result of the independent evaluation of third-party assessors who verify that the requirements of the standards have been met. As for Option 3, the main concern regarding this Option relates to international trade issues. A mandatory certification scheme may violate the international trade principles if it confers any trade advantage, affects like products and fails to accord that advantage immediately and unconditionally to those products. In other words, the measure needs to be applied consistently across all importing countries.

It is expected that the EU will engage in a dialogue with all importing counties prior to a mandatory standard being applied in order to establish the right level of standardisation. On the other hand, having a mandatory certification scheme will minimise the risk associated with trade between the countries, in other words, it will ensure a more level playing field among the different players of the non-OECD countries. It is important, however, that a system to track the waste is established in order to avoid loopholes. The costs of this are unknown but could be expected to reduce once the system is up and running.

10. SUMMARY AND COMPARISON OF OPTIONS

10.1 Comparison of Impacts on Stakeholders

10.1.1 Overview

Impacts on stakeholders have been compared on the basis of the available and measureable costs and benefits as presented under the descriptions of the different options. Cost in relation to the implementation and the functioning of the certification scheme have been calculated, based on examples of similar schemes in operation.

Costs and benefits have been compared for waste generators, waste dealers, waste treatment facilities as well as public authorities. Costs for other potential stakeholders involved in the scheme, such as the accreditation body, the certification bodies and the administrative authority overseeing the management of the scheme, are highly dependent on the nature of the scheme and would need to be subjected to further detailed analysis.

10.1.2 Impacts on Waste Generators

The proposed waste certification scheme (Options 2 – 4) would not weaken the liability of waste generators, meaning that the primary requirement on them would be to meet waste collection and recycling targets. However, as the export of waste is generally not the decision of either the individual consumers or manufacturers - unless the manufacturing company is itself the dealer of waste - the certification scheme would not impose further obligations for the generators of waste.

Waste generators are not expected to face significant increases in costs under the different schemes. Some cost increases are predicted under the baseline (Option 1) due to the rising costs of waste collection and recycling in Europe, while under the certification schemes cost impacts might arise from waste dealers increasing their prices to cover the costs of certification.

The scale of these cost increases is likely to vary from company to company. The overall impact under Option 2 would be largely dependent upon the level of uptake of the voluntary scheme. As not all dealer are likely to participate in the scheme, waste generators would have the option of paying higher fees to a certified waste dealer or lower fees to a non-certified dealer.

Under the mandatory certification options (3 and 4), all dealers would face cost increases. The extent to which these would be passed on to waste generators is difficult to estimate as it will depend on the individual decisions of waste dealers. As all companies will incur certification costs, there could be less competitive pressure to avoid passing on the costs than under Option 2. Benefits for the generators of waste include increased assurance that their waste will be treated in line with ESM. This may help to enhance corporate social responsibility (CSR) throughout the supply chain. Enhanced CSR can have direct business benefits, such as improving environmental performance, supporting compliance with regulatory requirements and reducing the risk

of sudden damage to the reputation of companies. The impacts are summarised in Table 10.1

Table 10.1: Comparison of Impacts on Waste Generators				
	Option 1	**Option 2**	**Option 3**	**Option 4**
Costs	Cost increases are expected to be in excess of 10-40% for waste collection and recycling.	Some additional cost increases are possible if waste exporting companies decide to pass on their certification costs to waste generators.	As in Option 2. Costs could be higher as all waste exporting companies will require certification	As in Option 2. Costs could be higher as all waste exporting companies will require certification
Other Impacts	N/a	N/a	N/a	N/a

10.1.3 Impact on Waste Dealers

Waste dealers are the primary focus of the proposed waste certification scheme, although it may also be possible for waste treatment facilities to seek direct certification under the voluntary scheme (Option 2). Justification for this lies in the fact that it is the waste dealers who decide on the final destination of the shipment. Furthermore, while waste treatment is the responsibility of the treatment facilities, those sites are outside the jurisdiction area of the European Union, therefore a mandatory scheme would not be directly enforceable on them.

Table 10.2 below summarises the main costs and other impacts waste dealers could face under the various options.

Table 10.2: Comparison of Impacts on Waste Dealers				
	Option 1	**Option 2**	**Option 3**	**Option 4**
Costs	Cost increases deriving from the market and economic fluctuations.	Cost to participate in a voluntary scheme can reach €10 000 per company, with additional annual cost of €16 000 with audits taking up another € 1 000 per year. Costs will only be incurred by participants in the voluntary scheme	As in Option 2, but costs will be incurred by all waste dealers	As in Option 3, with potentially slightly higher costs for third-party verification.
Other Impacts	N/a	Improved environmental and health conditions at receiving facilities. Improved CSR and public image of waste dealers. Benefits will only accrue to participants in the scheme	As in Option 2, but benefits will accrue to all waste dealers	As in Option 3, plus additional certainty that the benefits will be achieved, and greater transparency provided by third-party verification

Under Option 1, waste dealers would not experience any cost increases apart from the price fluctuations for goods and services driven by the fluctuations of the market and the macroeconomic environment (which would apply to all options).

Under Option 2 waste dealers would have the option to choose whether to adopt the scheme or not. If companies considered the adoption of the scheme to be too costly they would simply choose not implement it.

Under Option 3, the adoption of the scheme is mandatory although waste dealers have some flexibility in how they undertake the assessments necessary for self-certification. In the case of Option 4 third party verification is the only option. As Table 10.2 shows, there are only minor differences in terms of costs for waste dealers between self-certification and third-party verification. This is largely explained by the fact that in the case of self-certification, companies would be free to choose the most economical way to undertake assessment of treatment plants. This might include visiting treatment plants when a company representative would be visiting the region anyway, or including elements of the certification scheme into their regular employee training programme. This could result in lower costs than third party verification. Companies without such a possibility, however, would need to employ consultants to assess treatment plants, and the costs could be very similar to those for third-party verification.

A mandatory scheme, under Options 3 and 4, could facilitate competition as the scheme would require certification of all dealers, creating a level playing field.

The most comprehensive benefits for waste dealers would be offered by Option 4, which introduces a mandatory scheme with the benefits of third-party verification. This would ensure a level playing field between companies, as it would not disadvantage companies which did not have sufficient resources to assess the compliance of treatment plants themselves. In addition, the external review of operations contributes to the reliability of data and certifiers can potentially offer fixed prices for verification for three to five years in advance as well as price reductions for multiple facility visits. Third-party verification can also help to facilitate and maintain regulatory compliance and avert regulatory failure.

10.1.4 Waste Treatment Facilities

The introduction of the proposed waste certification scheme could put financial and administrative burdens on waste treatment facilities in non-OECD countries. In order to ensure that waste treatment facilities continue to receive waste transported from Europe, they will have to comply with the environmental, technological and audit requirements of the scheme.

In addition to meeting the requirements of a certification scheme, waste treatment facilities will also have to maintain compliance with their own national legislative provisions. Consequently the relevant provisions of the scheme should not be inconsistent with, or facilitate the circumvention of, national regulation. Table 10.3 below highlights the key costs and impacts for waste treatment facilities under the different options.

Table 10.3: Comparison of Impacts on Waste Treatment Facilities				
	Option 1	**Option 2**	**Option 3**	**Option 4**
Costs	N/a	Costs include investments in training and infrastructure, including the monitoring of emissions. Costs would only be incurred by treatment facilities used by dealers deciding to participate in the scheme. Facilities would have the option not to incur costs, but this would restrict them to accepting waste only from uncertified dealers	As in Option 2, but costs would be incurred by all facilities accepting waste from EU dealers	As in Option 3.
Other Impacts	N/a	Improved environmental and health conditions at receiving facilities under the certification scheme as compared with Option 1, for facilities used by dealers who seek certification. The potential for waste treatment facilities to seek certification directly could create business opportunities for facilities wishing to participate	Improved environmental and health conditions would be accrued by all waste treatment facilities used by EU dealers, plus improved awareness regarding sustainable waste management practices amongst the public and other stakeholders in the receiving countries.	As in Option 3 plus additional certainty that the benefits will be achieved, and greater transparency provided by third-party verification

Under Option 2, it is likely that only a limited number of waste treatment facilities would be covered by the scheme, as not all dealers would chose to seek certification. Only treatment facilities used by dealers seeking certification would be affected. One concern is that, because certification is voluntary, it would be taken up only by dealers using sites with already advanced infrastructure, and exclude facilities handling large quantities of waste in a non-ESM manner. This would limit the degree of improvement in facilities resulting from the scheme. Options 3 and 4 would result in a higher degree of uptake, as all facilities receiving waste from the EU would be required to meet the conditions of the scheme and undergo checking. Consequently, the number of sites operating ESM would increase, contributing to a significantly lower level of environmental and health damage.

10.1.5 Public Authorities

The role of public authorities is largely dependent on the detailed type of certification scheme in operation. There is a key role and responsibility for the European

Commission in relation to the setting up of the scheme, which includes consultation, dissemination of information and development of criteria for certification.

For Option 4, one of the most important roles of the administrative body is developing rules that govern who can serve as a verifier (in conjunction with accreditation bodies), how regulated entities select verifiers, and how verifications are performed. With well-designed rules and strong governmental oversight, third-party verification has the potential to significantly improve the implementation of the scheme[94]. Table 10.4 below summarises the key costs and other impacts for the European Commission under the individual options.

Table 10.4: Comparison of Impacts on the European Commission

	Option 1	Option 2	Option 3	Option 4
Costs	N/a	Wages and salaries for an initial period of two years (in excess of €40 000* per person per year). Administrative costs for stakeholder consultation including meetings, workshops in excess of €10 000 per year.	As in Option 2, with potentially a longer timeframe as the mandatory nature of the scheme could require more extensive consultation. Additional costs could be incurred as, without accreditation and certification bodies the public body would be required to oversee the functioning of the scheme.	As in Option 3, with additional costs for selecting accreditation bodies but reduced future costs for overseeing the functioning of the scheme
Other Impacts	N/a	Slow uptake and potential for confusion amongst stakeholders.	Greater transparency of waste export operations, increased availability of data.	As in Option 3, plus additional certainty that the benefits will be achieved, and greater transparency provided by third-party verification.

**salaries based on 2012 advertisements for certification manager positions*

Under Options 2-4, costs would arise for the initial launch of the scheme. The expected financial and administrative burden could increase for a mandatory scheme, as it may potentially involve a more extensive consultation period. Under Option 3, costs may potentially be lower as there would be no need to select an accreditation body; however, without any additional external bodies, the EC could face a more prolonged involvement in overseeing the operation and levels of compliance. For Option 4, initial costs would also include an extensive stakeholder consultation, forums to disseminate information, plus the selection of an accreditation body (or bodies). However, over time the responsibilities and tasks related to the functioning of the scheme would reduce as the accreditation and certification bodies would bear the majority of the burdens.

[94] McAllister L.K. (2012): **Regulation by Third-Party Verification**, Boston College Law Review, downloaded from http://lawdigitalcommons.bc.edu/cgi/viewcontent.cgi?article=3182&context=bclr

10.1.6 Impact on Accreditation and Certification Bodies

Accreditation and certification bodies would be required for Option 4. Accreditation bodies are responsible for accrediting certification bodies and overseeing the operation of the scheme. The accreditation body is selected by the governing public organisation. Certification bodies are private companies that issue the certificate and conduct the regular reviews.

While there are costs of operation for both the accreditation and certification bodies, these costs are generally recovered through the fees paid by companies seeking certification.

10.2 Evaluation

Option 1, the baseline/continue on-going initiatives, relies on agreement being reached in international fora, such as under the Basel convention, to ensure that waste treatment facilities in third countries that accept EU waste apply ESM.

By contrast, all other options should facilitate the improvement of environmental and social conditions in third country waste treatment plants, although the extent of their impacts varies.

Table 10.5 below compares and summarises the impacts of the different options in relation to the objective of enabling waste dealers to demonstrate and verify that waste exported from the EU will be treated in an environmentally sound manner and complies with Article 49 of the EU Waste Shipment Regulation.

Table 10.5: Comparison of Impacts on Stakeholders

	Option 1	**Option 2**	**Option 3**	**Option 4**
Waste generators		Certification schemes would provide a basis for dealers to demonstrate to their customers (waste generators) that their waste will be treated in an environmentally-sound manner. This is important for waste generators' CSR and potentially their EMAS/ISO 14001 certification.		
Waste dealers	N/a	Low uptake of the scheme due to its voluntary nature (and potentially the number of existing certification schemes already in place).	The self-certification aspect of the scheme could result in a non-level playing field for SMEs.	Similar to Option 3; however a level playing field is achieved as third-party verification is mandatory.

Table 10.5: Comparison of Impacts on Stakeholders				
	Option 1	**Option 2**	**Option 3**	**Option 4**
Waste treatment facilities	N/a	Limited environmental and social impacts, depending on the uptake rate.	Greater impacts in management of environmental and health impacts of waste treatment, as all facilities accepting EU waste would be affected.	As in Option 3 with third-party verification providing greater assurance that improvement will take place.
Public authorities	N/a	Responsibilities in connection with the launching of the scheme.	Transparency and robustness of result could be challenged because of self-certification.	Transparency of operation and reliability of data assured by third-party verification.

Options 2-4 will all result in increased costs and administrative burdens for individual waste dealing companies, but will ensure more effective management of waste treatment. Option 4 will provide the most verifiable and robust results while assuring consistency.

It is understood that many waste trading companies already have a certification scheme in place and, as such, may be reluctant to take up a new one. SMEs, with limited personnel and financial resources to meet the management requirements of the scheme may be particularly unlikely to participate in a voluntary scheme. Large companies, however, are expected to be more responsive. Depending on the level of uptake of the scheme, it is possible that ISO may introduce a new standard which incorporates similar requirements to the scheme proposed here. In that case, those companies which already comply with a relevant ISO standard (as described in Box 4.3) may choose to adopt the new ISO standard rather than the proposed certification scheme.

Under Option 3, SMEs in particular might find it difficult to provide the resources for a certification scheme that required them to assess all the waste receiving facilities that they use. It would be likely that they would need to employ consultants to do this. This could put them at a disadvantage compared to larger companies, which have the resources and expertise to assess treatment facilities themselves. Third-party verification under Option 4 introduces a level playing field for all companies, although larger companies could bear increased costs, and provides a more robust basis for the implementation of the certification scheme.

11. CONCLUSIONS AND RECOMMENDATION

11.1 Conclusion

The goal of this study is to evaluate measures, particularly certification schemes and standards, which allow waste operators/dealers to demonstrate that waste exported from Europe to non-OECD countries is treated in an environmentally sound manner.

With regard to the relevant regulatory provisions, the export of non-hazardous waste for recovery to non-OECD countries is either more strictly regulated (through prohibition, full notification and national provisions) or it is equivalently regulated to exports between Member States. In the latter case, only an identification form and a contract are requested. In relation to the treatment of waste, however, there are no internationally binding measures.

Based on current regulatory provisions, as well as the Ship Recycling proposal, the Integrated Pollution Prevention and Control (IPPC) Directive and the Best Available Techniques Reference Document (BREF) on Waste Treatments Industries, a potential certification scheme for waste dealers has been outlined. The proposed scheme (described in section 5) sets out requirements for the individual stakeholders. The inception report of this project introduced three basic options; these were the baseline option (continue on-going initiatives), a voluntary scheme and a mandatory scheme. Within the analysis we have studied both self-certification and third-party verification options for the voluntary scheme, as is explained in the relevant sections. As the differences between the sub-options in relation to the end-result were insignificant, the voluntary scheme sub-options have been incorporated within the Option.

In the case of a mandatory scheme, however, separate options were developed for self-certification and third-party verification. As the mandatory scheme would result in an immediate 100% uptake among the market players, it is important to compare how the sub-options would impact the stakeholders. It was concluded that the self-certification scheme could lead to a market advantage for larger companies, as they are more likely to be able to meet the assessment requirements of the scheme in-house, whereas smaller companies would be more likely to need to use consultants. In both cases, the sub-options of the mandatory scheme would need to clearly state the overarching goal of the scheme, which is the protection of human health and the environment as to avoid any discrepancies with international trade regulations. Additionally, in all cases extensive consultation with relevant stakeholders and the dissemination of information regarding the expected results are a vital part of launching the scheme.

Table 11.1 below summarises the advantages and drawbacks of a mandatory and voluntary certification scheme.

Table 11.1: A Comparison of Voluntary vs. Mandatory Schemes		
Type of Scheme	**Advantages**	**Drawbacks**
Voluntary Scheme	*• Voluntary schemes can allow for gradual adoption by the sector thereby letting the system develop and improve its mechanisms overtime.* *• Could provide additional commercial benefits for companies adopting the schemes especially in demonstrating corporate social responsibility.* *• Voluntary schemes can cover specific areas of waste management (e.g. export to non-OECD countries) that are not addressed by other quality control schemes.*	*• Varying levels of compliance can result in fragmentation within a sector and lead to inconsistent results.* *• Can increase uncertainty amongst stakeholders.* *• Attracting companies to join the scheme could require incentives.* *• Those companies currently using illegal transportation or environmentally damaging waste treatment in third countries are unlikely to participate in the scheme.* *• Market leaders would have to be convinced to join the scheme via, for example, extensive dissemination of information to consumers as a way of gaining competitive advantage.*
Mandatory Scheme	*• Mandatory schemes would result in a rapid 100% coverage of all waste dealers, thus quickly reducing the number of companies using uncertified waste treatment plants and below-standard treatment practices.* *• Mandatory schemes enable customers and supply chain partners to make informed decisions.* *• Mandatory schemes can help to assure compliance and provide legal certainty for dealers with regard to article 49 of the WSR.* *• Mandatory schemes can support customs and control authorities to enforce compliance with article 49 of WSR.* *• Mandatory schemes can support the implementation of European waste legislation*	*• Mandatory Schemes can result in increased administrative and operational costs for companies.* *• SMEs might be particularly vulnerable to cost increases.* *• Waste treatment facilities might have difficulty dealing with the need to rap8idly upgrade their operations to meet the requirements.* *• Auditors would have to be trained and reviews would have to be conducted in a very short timeframe, possibly resulting in a higher margin of error.*

As Table 11.1 shows, there are significant advantages and drawbacks under both types of schemes. However, taking into consideration the complex nature of the scheme and

the continuously evolving international regulatory environment, conclusions can be drawn regarding how successful the individual schemes might be in the longer-term.

It has been noted that despite there being no certification scheme introduced on the part of the European Union under Option 1, other international initiatives such as the Basel Convention might result in changes to the regulatory environment as well as to the practices of waste management. A voluntary certification scheme would allow an initiative to be taken by waste exporting companies who opt to implement the certification scheme. This approach however, would only be successful with a high uptake rate, where results of the scheme could be identified. Furthermore the costs of a voluntary certification scheme could result in the fragmentation of the market. In order to achieve a significant impact that provides measurable results and facilitates the transparency of operations, a mandatory scheme is found to be most appropriate. The main benefit of a mandatory scheme is an actual and measurable impact on waste treatment practices for exported waste.

11.2 Recommendation

The assessment of the various options concluded that the most appropriate option to pursue would be Option 4, which represents a mandatory certification scheme featuring third-party verification.

The proposed mandatory certification scheme would ensure that waste exported from the European Union would only be treated in waste treatment facilities which meet the requirements for ESM. It would guarantee that treatment facilities are monitored continuously and meet the expected ESM standards. Through the implementation of a mandatory scheme, harmonisation would be ensured across the sector by assuring that all operations comply with the required rules and regulations.

Table 11.2: A Comparison of Mandatory Schemes

Type of Scheme	Self-Certification	Third-Party Verification
Advantages	• 100% uptake by the market. • Benefits companies in marketing and CSR terms. • Faster procedure as it may not require the involvement of a third-party.	• 100% uptake of the market. • Builds confidence and trust in stakeholders about the reliability of results. • Transparency of audit procedure. • Provides greater transparency of operations. • Allows for the benchmarking of operations as facilities and practices become comparable
Drawbacks	• Costs arise in connection with self-certification. • Costs would increase with the number of exporting partners.	• Procedures and formalities can be time consuming. • Costs arise in connection with third-party involvement.

Where a self-certification scheme involves more than a simple declaration from the waste dealers attesting that the waste exported is being treated in an environmentally sound way, and actually requires companies to assess local practices at treatment sites, it can lead to a non-level playing field. This is because some companies will have the resources and expertise to carry out assessment in house at relatively low cost, whilst others will be required to hire consultants to do this. By contrast, mandatory third-party verification would require all participants to adopt the same approach to assessment.

Costs related to the certification scheme (for both Options 3 and 4) could increase as companies use more treatment facilities; this in turn could act as a constraint on the waste exporting industry. However the certification scheme could also have positive impacts for waste dealers, as European stakeholders would be more inclined to export their waste having been assured of the quality of the treatment.

Third-party verification is seen as a more reliable and trustworthy form of certification than self-certification schemes. Third-party verification involves an independent certifying body and is therefore more likely to deliver consistency and a high level of confidence with regards to the data reported.

Furthermore, companies undertaking the certification are often accredited for a number of certification schemes and regularly provide information on their development, thus making the auditing scheme more transparent. The involvement of certification bodies also ensures that the audit procedure is carried out in an impartial and objective manner and as such it is perceived as a more reliable and equitable.

The mandatory nature of the scheme would allow for immediate and measurable results of the certification process. The extensive consultation which would precede the introduction of the scheme could leave sufficient time for waste exporting companies to evaluate the costs which would arise under both types of attestation. Third-party verification could also allow for the creation of benchmarking operations as facilities and practices become comparable.

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ANNEX I:
FURTHER DETAILS ON WASTE EXPORTS
(BASED ON THE PROGRESS REPORT)

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LIST OF ABBREVIATIONS

AQSIQ	Administration for Quality Supervision, Inspection and Quarantine, China
BAT	Best Available Techniques
BIR	Bureau of International Recycling
BREF	Best Available Techniques Reference Document
B2B	Business to Business
B2C	Business to Consumer
CB	Certification Body
CCIC	China Certification & Inspection Group
CEC	North American Commission for Environmental Cooperation
CEN	European Committee for Standardisation
CENELEC	European Committee for Electrotechnical Standardization
CEPI	Confederation of European Paper Industries
COP	Conference of the Parties
CPCB	Central Pollution Control Board, India
CPE	Core Performance Elements
EBRA	European Battery Recycling Association
EC	European Commission
EEA	European Environment Agency
EFTA	European Free Trade Agreement
EICC	Electronic Industry Citizenship Coalition
ELV	End-of-Life Vehicles (or, sometimes, Vessels)
EMAS	Eco-Management and Audit Scheme
EPA	Environmental Protection Agency, United States
EPD	Environmental Protection Department, Hong Kong
ESM	Environmentally Sound Management
ETSI	European Telecommunications Standards Institute
EU	European Union
Eurometaux	European Association of Metals
EWC	European Waste Catalogue
FIDH	International Federation for Human Rights
FoC	Flag of Convenience
GHG	Greenhouse Gases
HKSAR	Hong Kong Special Administrative Region
HWTF	Hazardous Waste Task Force
ILO	International Labour Organisation
IMO	International Maritime Organisation
IMPEL	Implementation and Enforcement of Environmental Law
IPCC	Intergovernmental Panel on Climate Change
IPPC	Integrated Pollution Prevention and Control
ISO	International Standardisation Organisation
MARPOL	International Convention for the Prevention of Pollution from Ships
MBT	Mechanical and Biological Treatment
MoEF	Ministry of Environment and Forest, India
NGO	Non-Governmental Organisation

NPC	National People's Congress, China
NSB	National Standard Bodies
OCTA	Organised Crime Threat Assessment
OECD	Organisation for Economic Co-operation and Development
OEWG	Open-ended Working Groups
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyl Compounds
PDBEs	Polybrominated Diphenyl Ethers
POP	Persistent Organic Pollutants
SEPA	State Environmental Protection Administration, China
SUSPROC	Sustainable Production and Consumption
TFS	Transfrontier Shipment of Waste
TMW	Transboundary Movement of Waste
UK	United Kingdom
UNEP	United Nation's Environmental Programme
VOCs	Volatile Organic Compounds
WDO	Waste Disposal Ordinance, Hong Kong
WEEE	Waste Electrical and Electronic Equipment
WFD	Waste Framework Directive
WSR	Waste Shipment Regulation
YPSA	Young Power in Social Action, Bangladesh

1. EXPORTING WASTE FROM THE EUROPEAN UNION

1.1 Background

1.1.1 Origin of Waste

According to OECD, waste is defined as "*materials that are not prime products (that is, products produced for the market) for which the generator has no further use in terms of his/her own purposes of production, transformation or consumption, and of which he/she wants to dispose. Wastes may be generated during the extraction of raw materials, the processing of raw materials into intermediate and final products, the consumption of final products, and other human activities. Residuals recycled or reused at the place of generation are excluded*."

Meanwhile the EU provides a more general phrasing to identify and classify materials and products as waste. Under the Waste Framework Directive it defines waste as "*any substance or object which the holder discards or intends or is required to discard"*.

Waste is often a result of development as it increases alongside growth in productivity and purchasing power. According to the European Environment Agency, on average Europe produces an estimated 250 million tonnes of municipal waste and more than 850 million of industrial waste annually.

According to the statistics of Eurostat in the EU-27 in 2008, over 2.6 billion tonnes of waste were generated in total where this includes mineral waste. Mineral wastes (construction, demolition, asbestos wastes and naturally occurring minerals) represent 62% of all waste generated followed by household, combustion and metallic waste.

Table A1.1 below lists the most prominent waste streams - including hazardous as well as non-hazardous waste - in Europe as identified by Eurostat.

Table A1.1: Most Relevant Waste Streams for EU-27 in 2008

Type of waste	Amount of Waste (million tonnes)
Total waste	2,611
Mineral waste (except combustion wastes, contaminated soils and polluted dredging spoils)	1,631
Household and similar wastes, mixed and undifferentiated materials	240
Combustion waste	156
Metallic waste	99
Animal and vegetal waste (except animal waste of food preparation and products, animal faeces, urine and manure)	86
Wood waste	68
Paper and cardboard waste	58
Dredging spoils	49

Table A1.1: Most Relevant Waste Streams for EU-27 in 2008	
Type of waste	**Amount of Waste (million tonnes)**
Sorting residues	45
Glass waste	16
Plastic waste	15
Source: Eurostat	

1.1.2 Waste Treatment in Member States

Based on information provided by Eurostat in its COMEXT database regarding the types and quantity of waste generated in Member States, conclusions can be drawn regarding the priority waste streams.

Widespread, more or less industry independent consumer wastes such as glass, metal, paper and plastic can be found in the highest quantity in Member States with the largest population including France, Germany, Italy, Spain and the UK.

The UK produces the largest amount of mixed waste and household waste, which may be a result of a less focused approach to separate collection of waste. Germany, on the other hand, has the largest quantity of sorting residue, while Finland generates the largest amount of wood wastes. Considering the country's wood-industry this might be expected, nonetheless the quantity of wood waste is considerably higher than in other large Member States with significant wood industry, such as France, Germany or Austria.

Despite similarities in their industries, there is a significant difference regarding the amount of combustion wastes generated in Germany (28.5 million tonnes in 2008) and France (4.2 million tonnes in 2008), which can be explained by the different focus on nuclear and fossil fuel for electricity production, as well as the high level of waste incineration in Germany.

Not all waste statistics can be explained by industry analysis; occasionally inconsistencies in reporting strategies and data collection methods contribute to higher than expected figures e.g. the high level of textile and rubber waste in Portugal, the high level of animal and vegetal waste in Romania.

Waste generated in Member States is either disposed of in the EU by landfill, incineration or is sent for export either for disposal or recovery. In the European Union, it is the Waste Framework Directive[1] (WFD) that sets out the responsibilities of Member States with regard to the treatment of waste. Box A1.1 (next page) highlights the provisions of the WFD on reuse and recycling.

[1] European Commission (2008): **Directive 2008/98/EC** of the European Parliament and of the Council of 19 November 2008 on Waste, downloaded from:
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:312:0003:0030:en:PDF

Box A1.1: WFD on Reuse and Recycling
Article 11: 2. In order to comply with the objectives of this Directive, and move towards a European recycling society with a high level of resource efficiency, Member States shall take the necessary measures designed to achieve the following targets: (a) by 2020, the preparing for re-use and the recycling of waste materials such as at least paper, metal, plastic and glass from households and possibly from other origins as far as these waste streams are similar to waste from households, shall be increased to a minimum of overall 50 % by weight; (b) by 2020, the preparing for re-use, recycling and other material recovery, including backfilling operations using waste to substitute other materials, of non-hazardous construction and demolition waste excluding naturally occurring material defined in category 17 05 04 in the list of waste shall be increased to a minimum of 70 % by weight.
Source: European Commission (2008) Waste Framework Directive, downloaded from http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:312:0003:0030:EN:PDF

Waste Treatment in this context is identified as "*recovery or disposal operations, including preparation prior to recovery or disposal"*. Recovery refers to all waste reuse, recycling, composting, and waste-to-energy processes, the latter meaning primarily waste incineration with high calorific value. Disposal includes waste incineration without (sufficient) energy recovery and landfill.

In relation to the most appropriate treatment of waste, Member States shall take into consideration measures that encourage the best overall environmental outcome. Liability for the treatment and disposal of waste lies primarily with the original waste producer. In the case of waste being transported out of the territory of the EU, Member States may specify different conditions of responsibility.

However, objecting to the transportation of waste can only be based upon the recycling targets set for Member States by the European Environment Agency if it is in breach of the following condition: *"the waste concerned will not be treated in accordance with waste management plans drawn up pursuant to article 7 of Directive 2006/12/EC (on waste) with the purpose of ensuring the implementation of legally binding recovery or recycling obligations established in Community legislation"*. The scope of this study will therefore focus on assuring that recycling or recovery in third countries takes place in conditions broadly equivalent to the European acquis.

Figure A1.1 (next page) summarises the disposal and recovery activities of Member States. With regards to the figures on waste treatment options at the level of the individual Member States, there are some inconsistencies as a result of poor data quality. Due to the regulative measures introduced on both the EU and national levels, particular trends can be identified with regard to the preferred waste treatment methods. The Landfill Directive (Council Directive 31/1999/EC) obliges Member States to reduce the amount of municipal solid waste in landfill by 65% compared to 1995 levels by 2016. As the Directive does not give binding specifications on what to do with the waste this has led to increased waste incineration in some Member States that have the potential to set up a capital intensive network of waste incinerators.

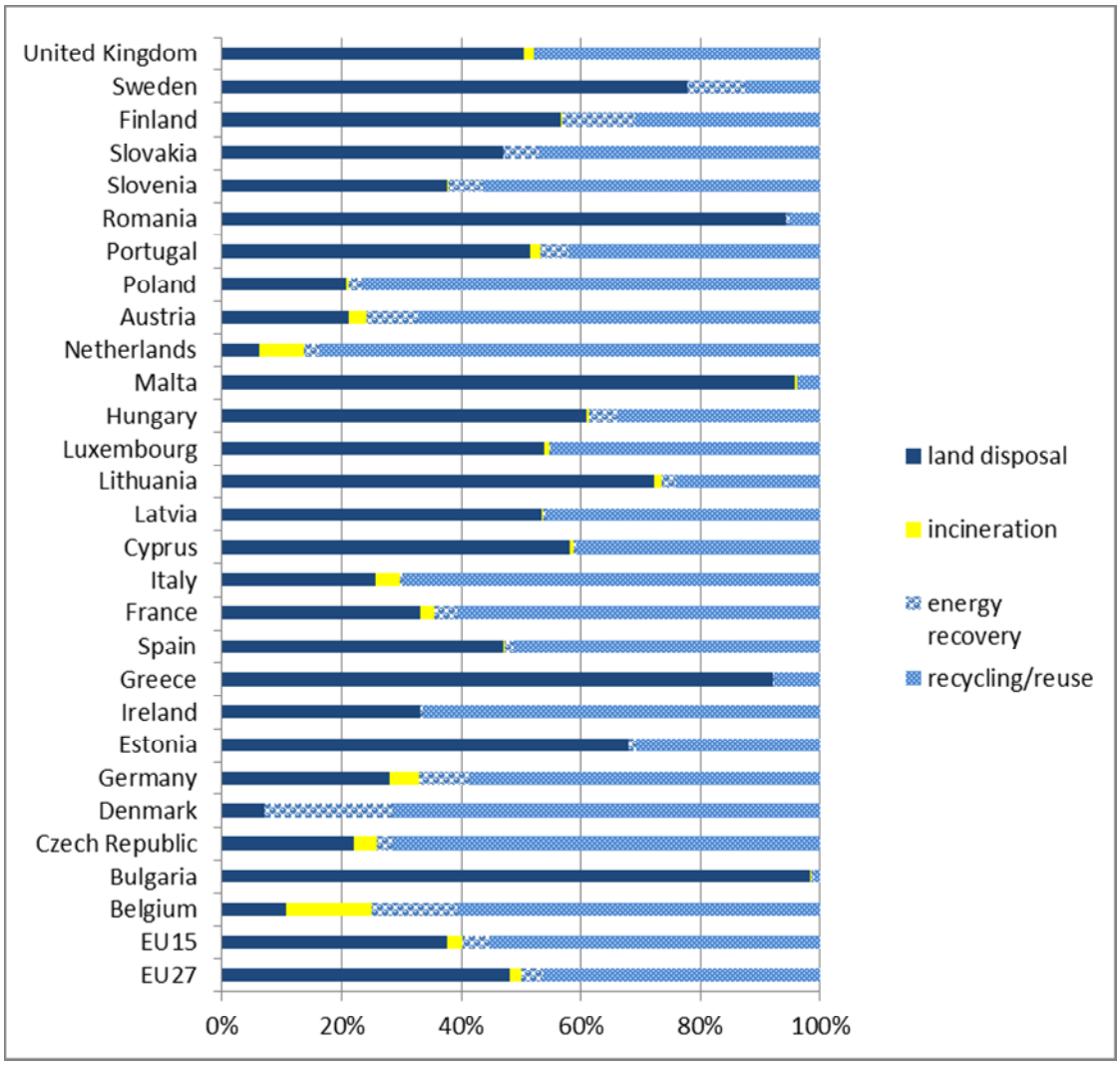

Figure A1.1: Treatment of Waste in EU Member States in 2008
Source: Eurostat, Treatment of waste by NUTS 1 regions (tonnes) [env_wastrt]

Incineration with and without energy recovery have both increased slightly in the EU-27, even though it is not a viable option for waste treatment at an acceptable costs in all Member States. Incineration requires capital intensive investments and it is heavily taxed in certain parts of Europe. Individual Member States have adopted different approaches. While Sweden has scrapped its incineration tax scheme as a response to the financial crises, some Member States such as Belgium (Flanders) and Denmark maintain it, while at the same time, Germany, for example, does not impose taxes on landfill disposal or incineration. In general there is more incineration in Western Europe (EU-15) than in Eastern Europe.

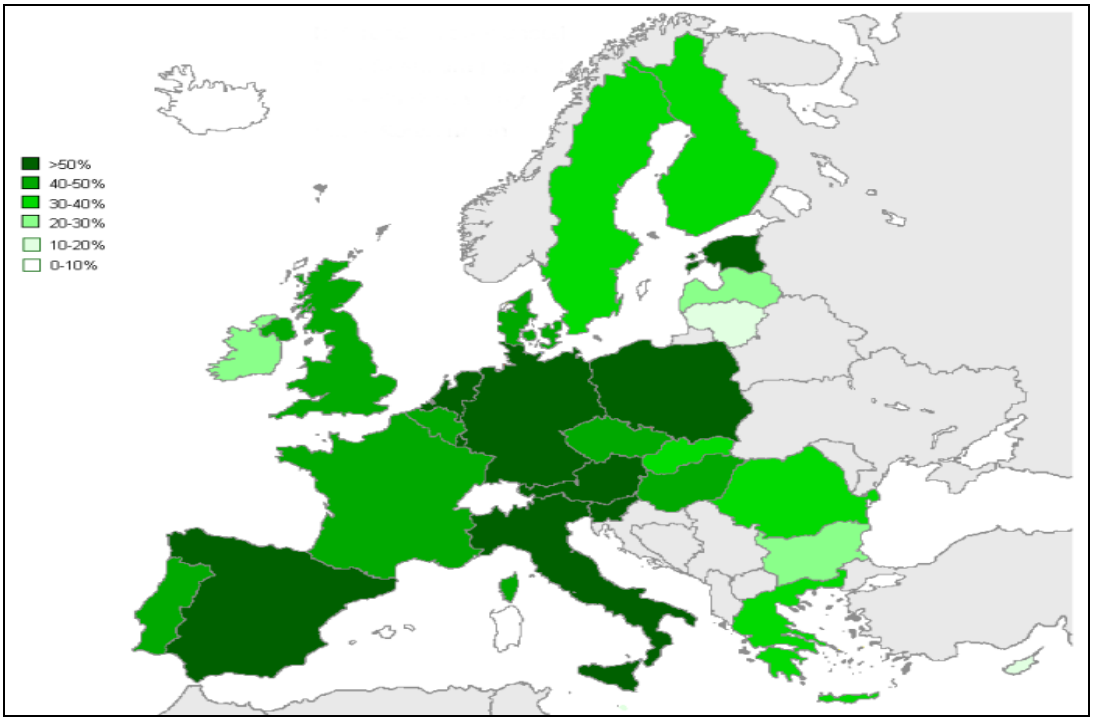

Figure A1.2: Overview of the Rate of Recycling in Member States in 2008
Source: Arcadis own compilation

Figure A1.2 above shows the rate of recycling in Member States. Europe recycles approximately 50% of its waste. Waste incineration, predominantly with energy recovery, occurs mainly in the EU-15 Member States, and especially in the more northern countries while in southern and eastern European countries, as well as in the UK and Ireland, landfill disposal is still significant.

1.1.3 Materials Trading

Metal wastes are the most commonly traded according to the figures of Eurostat. On an annual basis, over 250 million tonnes of scrap metal are being shipped outside of the European Union.

Other materials that are exported in significant amounts include wood, textiles as well as animal and vegetable waste. Paper and cardboard are also being exported according to COMEXT figures. Annually around 18 million tonnes of paper are being shipped for recycling from Europe; however there are also over 33 million tonnes per year exported from countries outside the EU arriving to Europe which suggest recycled paper is resold again to Member State enterprises. This process highlights a recycling loop as the production of virgin paper which takes place in Europe, requires more energy than the recycling process.

Table A1.2 (next page) gives an overview of the import and export figures for the most frequently traded types of waste. For the top eight waste streams and the four additional waste streams, the related base products and source materials were selected

(products from where the waste stream has originated). The COMEXT database, disseminated by EUROSTAT, reports the quantities of these products that are exported and imported as indicated in Table A1.2. The figures in Table A1.2 have been further subdivided in order to identify the trade of products amongst EU-27 Member States (EU-intra) and with non EU-27 Member States (EU-extra). This allows the identification of the dependency of the European economy to imports of certain goods, which is relevant if we consider waste recycling as an important possible resource for these products.

For those product categories included in the PRODCOM database, the EU production (in tonnes) of the related base products were retrieved by relating the PRODCOM code of the base product to the specific waste streams. The quantities of the related products generated are given in Table A1.2.

Table A1.2: Quantity Generated, Exported and Imported of the Related Base Products (2008)

Products Linked to Following Wastes	Partner	Internal EU-27 Production of Related Products[1] (tonnes)	Trade of Related Products (tonnes)[2]	
			Exported	Imported
Animal and vegetable wastes (except animal was of food preparation and products; and animal faeces, urine and manure)	EU-extra	Not available	54,059,564	94,226,169
	EU-intra		183,667,794	184,949,762
Combustion wastes	EU-extra	Not available	988,617	454,734
	EU-intra		4,088,869	3,878,121
Dredging spoils	EU-extra	Not available		
	EU-intra			
Household and similar wastes and mixed and undifferentiated materials	EU-extra	Not available	157,356	145,176
	EU-intra		91,709	91,709
Metallic wastes	EU-extra	414,475,457	69,440,689	253,876,662
	EU-intra		253,745,888	248,284,049
Paper and cardboard wastes	EU-extra	Not available	33,399,295	18,614,866
	EU-intra		78,615,778	78,432,325
Sorting residues	EU-extra	Not available		
	EU-intra			
Wood wastes	EU-extra	Not available	20,388,952	34,659,522
	EU-intra		67,344,716	61,996,873
Glass wastes	EU-extra	Not available	3,361,451	3,588,783
	EU-intra		11,076,140	11,363,893
Plastic wastes	EU-extra	75,212,548	18,321,247	11,349,761
	EU-intra		59,954,292	60,613,839
Rubber wastes	EU-extra	4,631,268	3,142,290	5,248,205
	EU-intra		8,362,094	8,069,598
Textile wastes	EU-extra	10,775,358	5,295,026	14,047,080
	EU-intra		11,319,864	15,210,187

[1] PRODCOM data.
[2] COMEXT data (disseminated by EUROSTAT).

As indicated in Table A1.2 a greater quantity of products relating to combustion wastes, household wastes, paper and cardboard wastes and plastics wastes is exported to non-EU countries than is imported. Table A1.2 also indicates that in the case of animal and vegetable, metallic, wood, glass, rubber and textile wastes a greater quantity of related products are imported from countries outside of the EU than is exported. Therefore, for these products, it can be considered that the EU economy is dependent on resources from abroad. This is more the case where exchange of products with non-EU countries is larger than exchange within the Union itself (EU-intra[2]). In total, for the twelve most important materials the European Union is exporting over 200 million tonnes of waste to third countries, while imports from third countries total over 430 million tonnes.

1.2 Legislative Background to Waste Trading

1.2.1 European Union

An alternative to the local treatment of waste is the export of waste. The relevant EU legislation is summarised in Box A1.2.

Box A1.2: Policy Measures Relating to the Export of Waste[3]

The most relevant EU legislations overseeing and regulating waste shipments are:

- Regulation (EC) No 1013/2006 of the European Parliament and of the Council of 14 June 2006 on shipments of waste, as frequently amended, with special focus on Article 49 on protection of the environment;
- Commission Regulation (EC) No 1418/2007 of 29 November 2007, as amended, concerning the export for recovery of certain waste listed in Annex III or IIIA to Regulation (EC) No 1013/2006; regulating the shipment to certain non-OECD countries;
- Directive 2000/59/EC of the European Parliament and of the Council of 27 November 2000 on port reception facilities for ship-generated waste and cargo residues;
- Council Directive 2006/117/EURATOM of 20 November 2006 on the supervision and control of shipments of radioactive waste and spent fuel;
- Regulation (EC) No 1774/2002 of the European Parliament and of the Council of 3 October 2002 laying down health rules concerning animal by-products not intended for human consumption;
- Directive 2006/12/EC of the European Parliament and of the Council of 5 April 2006 on waste (Waste Framework Directive); with measures to protect the environment and human health by preventing or reducing the adverse impacts of the generation and management of waste and by reducing overall impacts of resource use and improving the efficiency of such use (art 1), and requesting waste management to be carried out without endangering human health, without harming the environment and, in particular without risk to water, air, soil, plants or animals, without causing a nuisance through noise or odours; and without adversely affecting the countryside or places of special interest (art 13), and
- Commission Decision on the European List of Waste (COM 2000/532/EC)

[2] One would expect that the data for export EU-intra are identical to the data for import EU-intra. This is not always the case due to differences in reporting between the Member States. For textiles and wood these differences are significant.

[3] European Commission (2012): **Waste Shipments Community Legislation**, downloaded from http://ec.europa.eu/environment/waste/shipments/legis.htm

Exports of waste from the European Union are subject to the provisions of the Waste Shipment Regulation (WSR) of the European Commission. In the legislative text the WSR refers to all relevant legislative measures and points to the interlinking elements. With regard to the Basel Convention, the WSR points out:

> *"Council Decision 93/98/EEC (6) concerned the conclusion, on behalf of the Community, of the Basel Convention of 22 March 1989 on the control of transboundary movements of hazardous wastes and their disposal (7), to which the Community has been a Party since 1994. By adopting Regulation (EEC) No 259/93, the Council has established rules to curtail and to control such movements designed, inter alia, to make the existing Community system for the supervision and control of waste movements comply with the requirements of the Basel Convention."*

Moreover, Article 49 of the WSR on the protection of the environment states that Article 4 of Directive 2006/12/EC (the waste treatment hierarchy) and other Community legislation on waste shall be respected.

In connection with the environmentally sound treatment of waste Article 49 states that it is the responsibility of the notifier or the competent authority of the given EU Member State to demonstrate that the human health and environmental protection standards at the waste treatment facility are in accordance with the provisions of the Community legislation. Further guidelines with regard to the context of ESM are contained in Annex eight of the WSR which refer to the guidelines of the Basel Convention, the OECD, the International Maritime Organisation (on ship recycling) and the International Labour Organisation (on health and safety in ship breaking).

Specifically, with regard to issues of implementation and enforcement of the WSR, authorities have clustered cooperation in a platform called IMPEL-TFS (Transfrontier Shipment of Waste). The platform represents a cluster of network activities to stimulate and facilitate effective and efficient international inspections and non-compliance responses of violations of the WSR in the European countries[4].

Besides the European regulative measure, international conventions also provide limitations on the transboundary shipment of waste; these are detailed in the following sections.

Intra-EU shipments

Non-hazardous waste for intra-European shipments destined for recycling is regulated by Article 18 of the Waste Shipment Regulation. Intra-EU shipments of non-hazardous waste should be accompanied by an identification form corresponding to annex VII of the Regulation. The main elements of this form are:

[4] Ruessink *et al* (nd): **Combating Illegal Waste Shipments through International Seaports - a Call for Concerted Public and Private Approaches**, downloaded from http://inece.org/conference/9/papers/RuessinkWolters_Netherlands_Final.pdf

- the identification of the person who arranges the shipment, and who is subsequently responsible for the information declared in the form. (This responsible person should be under the jurisdiction of the country of dispatch. It usually is the producer, waste collector or trader);
- the identification of the importer or consignee of the waste;
- the identification of the (chain of) carrier(s) who all have to date and sign the form;
- the actual quantity and the date of shipment;
- the identification of the waste generator, in case they are different from the person arranging the shipment;
- the identification of the recovery facility, which might thus be different from the consignee or importer;
- the R code for the applied recovery activity;
- the description of the waste and its Basel code, its OECD code (if relevant), its List of Wastes (LoW) code and if applicable its national waste codes;
- the countries of export, transit and import;
- the signed declaration of the person arranging the shipment;
- on reception the signature of the consignee; and
- after recovery the signature of the recovery facility representative confirming reception of the waste, and the received quantity;

The data listed in the identification form are confidential. Member States may request, through their national legislation, additional information, for the purpose of inspection, enforcement, planning and statistics.

Section (2) of Article 20 specifies that the identification forms "*shall be kept in the Community for at least three years from the date when the shipment starts, by the person who arranges for the shipment, the consignee and the facility which receives the waste*".

At the same time, Article 18 also requests the existence of a contract between the person who arranges the shipment and the consignee. The contract should be effective when the shipment starts and needs to include an obligation for the person who arranges the shipment or on the consignee in case the shipment of waste or its recovery cannot be completed as intended to:

- take the waste back or ensure its recovery in an alternative way; and
- provide, if necessary, for its storage in the meantime.

The person who arranges the shipment or the consignee shall provide a copy of the contract upon request by the competent authority concerned.

A specific aspect of this procedure, according to Article 18, is that **no** "a priori" judgement on the conditions of the shipment needs to be made by the competent authorities, this includes:

- judging whether the treatment operation can be considered as recovery;
- whether the recovery will happen according to environmentally sound management of waste;
- what will happen with the recycling residues;
- whether the consignee or the recovery plant exists and is capable to accept the waste; and
- whether the contract exists and contains all legal provisions.

While these enforcement actions are not prohibited and can be made during the shipment, in the case of an inspection in the field, they cannot serve as an instrument to allow or deny a shipment permit.

Extra-EU Shipments

Non-hazardous waste for extra-European shipments destined for recycling is regulated under Title IV chapter 2 of the Waste Shipment Regulation. It details that:

- export to non-OECD decision countries is prohibited if the country of destination prohibits its import (art 36.1 (f));
- export to non-OECD decision countries is prohibited if the competent authority of dispatch has reason to believe the waste will not be managed in an ESM way (art 36.1 (g));
- if not prohibited based on the two above mentioned provisions, non-hazardous waste for recovery may be exported to non-OECD countries according to Regulation 1418/2007/EC. Article 37 points out that countries of destination can choose between a prohibition, a full notification procedure or "no control". Regulation 1418/2007/EC however implemented this differently. Its Article 1bis, as amended in 2009 by Regulation 967/2009/EC, states that if a country requests no control regime, the provisions of Article 18 of the Waste Shipment Regulation have to be applied: the identification form and the contract as described above. Furthermore Regulation 1418/2007/EC also allows for specific control procedures under national legislation;
- if countries have not responded, the full notification procedure shall apply (WSR art 37 .2 sentence 2);
- export to OECD decision countries of non-hazardous waste for recovery can take place, using the same procedure as for export intra EU-Member States, with some minor adaptations;
- export to the Antarctic is always prohibited; and
- export for recycling to overseas territories is prohibited if the country of destination prohibits its import, or if the competent authority of dispatch has reason to believe the waste will not be managed in an ESM way.

Based on the relevant regulations, export of non-hazardous waste for recovery to non-OECD countries is either more strictly regulated (prohibited, full notification, national provisions) or it is equivalently regulated to export between Member States. In the latter case only an identification form and a contract are requested.

However, in the case of intra-EU shipments all actors (the person arranging the shipment, the consignee and the facility of recovery) need to maintain the relevant records and contracts for at least three years. In the case of extra-EU shipments this obligation only exists for the EU partner. It is also not clear whether a non-EU actor can be requested to make and sign the declarations on receiving the waste, as foreseen in boxes 13 and 14 of Annex VII of the Waste Shipment Regulation.

1.2.2 Basel Convention

One of the most significant international level policies is governed by the UN via the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal which was adopted in 1989.

The management of hazardous wastes has been on the international environmental agenda from the early 1980s, when it was included as one of three priority areas in the United Nations Environment Programme's (UNEP) first Montevideo Programme on Environmental Law in 1981. The Basel Convention was initiated in response to numerous international scandals regarding hazardous waste trafficking in the developing world that began to occur in the late 1980s[5].

The aim of the Convention is to protect human health and the environment from adverse effects caused by wastes, especially hazardous wastes, and the transboundary shipments of these wastes. The provisions of the Convention centre around the following principal aims:

- the reduction of hazardous waste generation and the promotion of environmentally sound management of hazardous wastes, wherever the place of disposal;
- the restriction of transboundary movement of hazardous wastes except where it is perceived to be in accordance with the principles of environmentally sound management; and
- a regulatory system applying to cases where transboundary movements are permissible[6].

The Convention also stipulates that the regulatory environment is based on prior consent, meaning that, prior to a transboundary shipment of waste, the authorities of the state of export must notify the authorities of the prospective States of import and transit, providing them with detailed information on the intended movement. The movement may only proceed if and when all States concerned have given their written consent. The Convention was amended later with a paragraph highlighting the fact that transboundary shipments of hazardous wastes to developing countries, many of which are incapable of handling such waste, do not constitute environmentally sound management as required by the Convention.

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5 Basel Action Network (2011): **About the Basel Convention**, downloaded from http://www.ban.org/about-the-basel-convention/

6 Basel Convention (2011): **Overview**, downloaded from http://www.basel.int

The scope of the Basel Convention includes two categories of wastes, hazardous and other types of waste. Hazardous wastes are defined in two of the technical annexes (Annex I and Annex III) of the Convention. According to these waste is considered hazardous if it belongs to any category contained in Annex I, unless it does not possess any of the characteristics listed in Annex III (Article 1, paragraph 1(a)).

Waste categories according to the composition of waste are further defined in Annex VIII. Waste which is not covered by the Annexes is also considered hazardous if it is defined or considered to be hazardous by the national legislation of one or more of the parties involved in a movement of the waste in question (Article 1, paragraph 1(b)). "Other wastes" are listed in Annex II of the Convention. This category includes household wastes and incinerator ash – which are not defined as hazardous wastes, but are also included in the scope of the Convention (Article 1, paragraph 2).

Furthermore, radioactive wastes and wastes covered by the International Convention for the Prevention of Pollution from Ships (MARPOL) are excluded from the scope of the Basel Convention (Article 1, paragraph 3 and 4)[7].

The Basel Convention has been signed by 182 parties but has yet to be ratified by the United States, Afghanistan and Haiti. The guiding principles of the Convention are that transboundary movements of hazardous wastes should be:

- reduced to a minimum;
- managed in an environmentally sound manner;
- treated and disposed of as close as possible to their source of generation; and
- minimised at the source.

The Convention works through a series of meetings of the Conference of the Parties (COP) as well as through regular sessions of Open-ended Working Groups (OEWG).

COP is the governing body of the Convention and is composed of governments of all countries that have accepted, ratified or acceded to it. The implementation of the Convention is advanced through the decisions it takes at its periodic meetings. COP promotes the harmonization of appropriate policies, strategies and measures for minimizing harm to human health and the environment by hazardous and other wastes. It functions through three subsidiary bodies: the Expanded Bureau; the Open-ended Working Group; and the Committee for Administering the Mechanism for Promoting Implementation and Compliance[8].

Open-ended Working Groups were established by the sixth meeting of the Conference of the Parties with the main goal of keeping a review on the work and progress of the Convention. Furthermore, OEWGs have an advisory role towards the COPs and assist in the planning of the COP meetings.

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7 Rummel-Bulska, Kummer (nd): **The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal**, downloaded from http://www.inece.org/1stvol1/rummel-bulska.htm

8 Basel Convention (2011): **Conference of the Parties**, downloaded from http://www.basel.int

The role of the Expanded Bureau is to provide administrative and general operational directions to the secretariat between the meetings of the Conference of the Parties, as well as performing administrative tasks at the request of the OEWG. Finally, the Implementation and Compliance Committee works to support Parties to secure the implementation of, and compliance, with the obligations of the Convention.

Bilateral, Multilateral and Regional Agreements

Under the Basel Convention for the EU and its Member States with regard to the export of waste, the following agreements are of interest:

- Bilateral arrangement between the Federal Republic of Germany and the Republic of Zimbabwe; and
- Bilateral Agreement between the Netherlands and the Netherlands Antilles concerning Transboundary Movements of Hazardous Wastes.

1.2.3 OECD

The Organisation for Economic Co-operation and Development (OECD) has also emplaced requirements for its Member Countries - via its Decision C(2001)107 on the Control of Transboundary Movements of Wastes Destined for Recovery Operations. The transboundary movements of wastes are supervised and controlled under a specific intra-OECD Control System, which is based on two types of procedures:

a) Green Control Procedure: for wastes that present low risk for human health and the environment and, therefore, are not subject to any controls other than those normally applied in commercial transactions; and
b) Amber Control Procedure: for wastes presenting sufficient risk to justify their control.

Wastes subject to these control procedures are listed in Appendices 3 and 4 to Decision C(2001)107/FINAL, these are the so-called Green and Amber lists of wastes. The controls of waste shipments are carried out by national competent authorities and Customs Offices through the use of notification and movement documents.

This Control System aims at facilitating trade of recyclables in an environmentally sound and economically efficient manner by using a simplified procedure, as well as a risk-based approach, to assess the necessary level of control for these materials. Wastes exported outside the OECD area, whether for recovery or final disposal, do not benefit from this simplified control procedure[9].

[9] OECD (nd): **The OECD Control System for Waste Recovery**, downloaded from: http://www.oecd.org/document/52/0,3746,en_2649_34395_2674996_1_1_1_1,00.html

Box A1.3 below summarises the relevant OECD legislations.

Box A1.3: Relevant OECD Documentation on Waste Shipments

- Decision of the Council concerning the Control of Transboundary Movements of Wastes Destined for Recovery Operations 14 June 2001 - C(2001)107/FINAL and amendments;
- Guidance manual for the implementation of Council decision c(2001)107/final, as amended, on the control of transboundary movements of wastes destined for recovery operations;
- Recommendation of the Council on the Environmentally Sound Management of Waste (9 June 2004 - C(2004)100 amended on 6 October 2007 - C(2007)97);
- Decision-Recommendation of the Council on the Reduction of Transfrontier Movements of Wastes 31 January 1991 - C(90)178/FINAL; and
- Decision-Recommendation of the Council on Exports of Hazardous Wastes from the OECD area 5 June 1986 - C(86)64/FINAL

The OECD operates via a series of measures which can include decisions that are binding for their members, recommendations that are mandatory or requests e.g. to provide information. The documentations can also contain instructions which are mostly addressed to internal divisions within the organisation.

The European Union is a member of both the OECD and the Basel Convention; its legislative instruments aim for – as pointed out in section 2.3.1 – full compliance. The relevant legislative elements of the OECD are formulated in a similar manner as they take notice of the legislative developments of the Basel Convention. An example of this is OECD's Decision-Recommendation of the Council on the Reduction of Transfrontier Movements of Wastes (31 January 1991 - C(90)178/FINAL), which refers to and recognises the Basel Convention.

1.3 Main Routes of Export

1.3.1 Background

Wastes from a variety of sources are being sent for disposal to third countries. These transboundary shipments can travel legally or illegally. In the case of legally exported waste, the type and treatment of notified waste reported to the European Commission is an aggregated figure, therefore it is not possible to evaluate whether the shipments actually result in treatment that is better, at the same level or less favourable for the environment than if it had been treated in the country of origin. As for illegally shipped waste, there are no accurate statistics, consequently information and figures are approximations.

Article 13 of the Waste Shipment Regulation describes the circumstances for objecting to a shipment of waste for recovery. These include inconsistencies with particular provisions of the Waste Framework Directive, such as protection of human health and the environment (Article 13), the prohibition of abandonment, dumping or uncontrolled management of waste (Article 36.1), the provisions of waste management plans (Article 28) or the provisions in waste management permits

(Article 23). However, it is often difficult to identify how a shipment of waste is going to be treated, what technological capacity would be present in the receiving country and what environmental and social impacts there might be.[10]

In the receiving countries, depending on the technological capacity and economic conditions, exported waste can be further traded. Box A1.4 presents two examples of how waste can continue to be traded and why it can be difficult to trace the route of one particular shipment.

Box A1.4: Uncertainty in Waste and Scrap Trading in China and India

In **China**, waste is often collected by internationally operating dealers, and handed over to local Chinese companies.

In the notification forms under application of the Waste Shipment Regulation, Chinese companies are frequently registered as consignees or as recovery facilities but appear, in some cases, to be local dealers or companies which combine treatment operations with trading operations.

There is anecdotal evidence to suggest that local dealers dispatch the imported waste for treatment to the operators with the lowest costs and, often, 'home industry' under poor social and environmental conditions is the final step. Due to the network of trading companies, the passing down of waste and the frequent shifts in ownership of the waste, even while being shipped, the exporting companies are unaware of the final destination of the exported waste

In **India**, a 'free trade zone' or 'export processing zone' is set up. This refers to an area where normal trade barriers such as tariffs and quotas are eliminated and administrative requirements are lowered in the hope of attracting new business and foreign investments. Free trade zones can be defined as labour-intensive manufacturing centres that involve the import of raw materials or components and the export of factory products. In India, Special Economic Zones, or SEZ, are established as export processing zones.

They have two major drawbacks: the environmental regulations are decentralised to State Pollution Control Boards that use provisions or set up control systems which are sub-optimal, compared to EU-standards. Furthermore the output of the treatment activities in an export processing zone is by law destined to export. Consequently, materials treated in these zones can be further exported without environmentally sound treatment.

Source: ARCADIS in-house files

Depending on the type of waste, the treatment technologies can require varying levels of technical competence and infrastructure. However, there is a general route that waste shipments can follow which is detailed in Figure 1.3 (next page).

As the figure illustrates, hazardous materials cannot be shipped to non-OECD countries, while regulations relating to the export of non-hazardous materials can vary on a country-by-country basis.

[10] Department of the Environment, Heritage and Local Government, Ireland (2009): **International Review of Waste Management Policy,** Annex 65 to Main Report - Exports and Imports of Waste. Arcadis Belgium and partners for Eunonia, September 2009

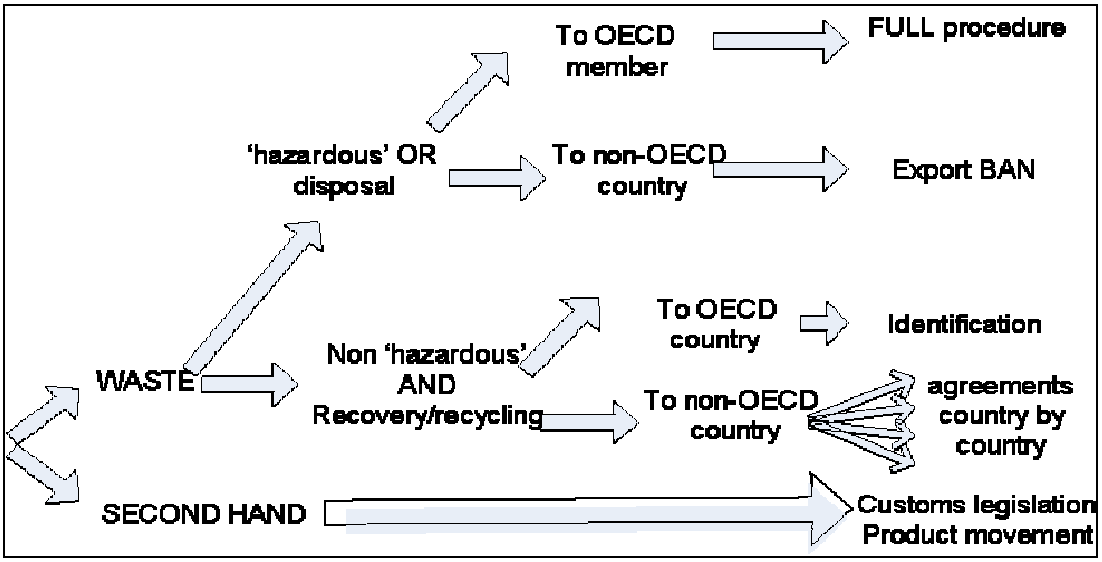

Figure A1.3: Procedures for Waste and Second-hand Goods Exports
Source: ARCADIS 2009, Mike van Acoleyen, lecture for Antwerp harbour community

However, if an exported product is considered second-hand good and not waste, none of the above waste provisions are applicable and export can be arranged in a much less regulated way. In order to circumvent regulations, shipments can be labelled as second-hand goods. In particular, used cars, used electrical and electronic equipment are exported to Africa as second-hand goods. The port of Antwerp, specialised in African trade, plays an important role for end-of-life/second-hand vehicles, together with the ports of Rotterdam, Hamburg and Le Havre. Exact criteria for the distinction between waste and second-hand goods are difficult to establish and to apply while concerns remain in connection with the expected lifespan and safety of the exported second-hand goods.

1.3.2 OECD Countries

With regard to shipment of hazardous waste between OECD countries, a prior consent procedure (based on the exchange of information for each individual shipment) is required for hazardous waste included in the amber list of annex IV of the Waste Shipment Regulation and for waste that is destined for disposal and is shipped to OECD countries.

Non-hazardous waste for recycling or recovery is shipped freely between OECD-countries when the provisions of Article 18 of the Waste Shipment Regulation are fulfilled, mainly an identification of the shipment and its involved actors. In relation to the transport of hazardous waste, the provisions of the Basel Convention apply. The following tables indicate the quantity of all waste shipments bound for export and import between the parties of the Convention.

Table A1.3: Export, Transboundary Movement of Waste, Basel Convention data 2008										
	Among All Parties		Among non-OECD		Among OECD		Non-OECD to OECD		OECD to non-OECD	
Aim	**Amount**	**%**	**Amount**	**%**	**Amount**	**%**	**Amount**	**%**	**Amount**	**%**
Disposal	2 577 687	25.6	0	0	2 533 872	25.9	43 815	33	0	0
Recovery	7 484 299	74.4	36 634	100	7 242 512	74	87 196	67	117 957	100
Not Specified	942	0	0	0	942	0	0	0	0	0
Total	10 062 928	100	36 634	100	9 777 326	100	13 011	100	117 957	100
Source: Basel Convention, 2008										

Table A1.3 above illustrates that the majority - over 9.7 million tonnes - of waste trade took place between OECD member countries in 2008. Almost two third of the waste shipped was meant for recovery. Waste exported by EU-Member States to other OECD nations is mainly destined to neighbouring countries. For example 89% of waste exported under Regulation from Flanders in 2006 is sent to the Netherlands, Germany and France.[11]

Regarding the figures of transport between OECD and non-OECD countries, the data shows that 67% of waste exported from non-OECD countries was meant for recovery while 33% was shipped for disposal. The quantity of waste shipped from non-OECD countries for disposal to OECD countries is still small however as it only makes up 1.6% of all waste transported for disposal.

As for waste exported from OECD to non-OECD countries, the table shows that the total registered quantity was meant for recovery.

Table A1.4: Import, Transboundary Movement of Waste, Basel Convention data 2008										
	Among All Parties		Among non-OECD		Among OECD		Non-OECD to OECD		OECD to non-OECD	
Aim	**Amount**	**%**	**Amount**	**%**	**Amount**	**%**	**Amount**	**%**	**Amount**	**%**
Disposal	2 841 972	25	2	0	2 655 043	25	186 927	62	0	0
Recovery	8 771 689	75	766 323	100	7 806 699	75	116 939	38	81 729	100
Not Specified	0	0	0	0	0	0	0	0	0	0
Total	11 613 661	100	766 325	100	10 461 742	100	303 866	100	81 729	100
Source: Basel Convention, 2008										

Table A1.4 above shows the imported quantity of waste and concludes that in 2008 over 90% of import trade took place between OECD countries, two third of which was meant for recovery.

[11] Public Waste Agency of Flanders (2011): **Industrial, Figures and Trends for Production, Processing, Exports and Imports**, 2007 and 2011, downloaded from: http://www.ovam.be/jahia/Jahia/cache/offonce/pid/176?actionReq=actionPubDetail&fileItem=2178

Overall there is more consistency in the export and import data reported between OECD countries, than that between non-OECD countries or where both OECD and non-OECD countries are involved. There are large discrepancies between the export and import data of transfrontier movement of waste between non-OECD countries. The amount reported from import data is more than 20 times the amount that which is reported from export data.

Data and statistics show that the ambition of the European Union, to be self-sufficient in handling its landfill and other waste disposal activities, has almost been achieved. Only a limited amount of waste is disposed of in other OECD countries. However, the ratio of waste shipped for disposal and waste shipped for recovery has remained constant (2004-2008 in Basel report). Hence, the aim described in the EU Waste Framework Directive, that individual Member States should individually move towards self-sufficiency in waste disposal is no closer to being realized[12].

1.3.3 Non-OECD Countries

As stated above, under the Basel convention, all export of hazardous waste to non-OECD countries is prohibited. Shipment of non-hazardous waste for recycling or recovery to non-OECD countries is either prohibited, allowed under the full procedure, including the identification of shipment, or allowed under a country-specific procedure. The procedure applied for the waste shipments depends on the country of destination and the relevant provisions of Regulation No 2007/1418/EC, regarding the export of the particular type of waste.

As highlighted by Table A1.3 above, shipments of waste from OECD countries for recovery in non-OECD countries make up almost 118 million tonnes per year. E-waste trade containing valuable metals is particularly significant with non-OECD countries. While these electronic products are of high value due to the presence of valuable substances (such as copper, iron, silicon, nickel and gold), they can also contain toxic heavy metals and hazardous chemicals which, if handled inadequately, can harm human health and the environment.

However, it is expected that establishing and maintaining adequate conditions for the treatment of waste will continue to be a challenge as the economies and populations of developing nations grow. Waste management systems therefore must be capable of handling the increasing quantity of waste generated locally as well as those being transported from other countries. In order to manage the growing quantity of waste exported into the country, the Chinese government has initiated some restrictive measures, which are detailed in Box A1.5 (next page).

[12] European Environment Agency (2009): **Waste Without Borders in the EU?** Transboundary Shipments of Waste. Report No 1/2009, downloaded from www.eea.europa.eu/publications/waste-without-borders-in-the-eu-transboundary-shipments-of-waste

Box A1.5: Restriction on Waste Imports in China

The Measures on Management of Import of Solid Waste entered into force on 1 Aug 2011 in China. According to data from the Chinese Ministry of Environmental Protection (MEP), the actual import volume of solid waste used as raw materials such as waste paper, waste plastics, waste hardware, waste iron & steel, waste aluminium scrap and waste copper scrap was over 40 million tonnes in 2010.

By placing tougher control on the import of solid waste, the Chinese government plans to combine the utilization of foreign solid waste as raw materials with the nationwide scheme of energy saving and emission reduction. According to the Measures, both overseas suppliers and importers of solid waste shall register themselves with the General Administration of Quality Supervision, Inspection and Quarantine. The Measures stipulate nine bans:

- dumping, stockpile and disposal of overseas solid waste shall be banned within the territory of the People's Republic of China;
- movement of hazardous waste in transit through the territory of the People's Republic of China shall be banned;
- import of hazardous waste shall be banned;
- the import of solid waste for recycling heat energy shall be banned;
- the import of solid waste failing to be used as raw materials or employed in an environment-friendly way shall be banned;
- the import of solid waste, with big domestic generation or stockpile volume, not under full utilization shall be banned;
- the import of solid waste without applicable compulsory requirements, such as national environmental protection, control standards or relevant technical norms shall be banned;
- entrepot trade of solid waste shall be banned; and
- acceptance of carriage of solid waste into the territory of the People's Republic of China in the form of "to order" shall be banned.

The Measures also stipulate that any enterprise engaged in processing and utilization of imported solid waste should carry out routine environmental monitoring on the discharge of pollutants. Environmental protection departments shall strengthen on-the-site inspection and monitoring to prevent any secondary pollution during processing and utilization process.

Source: Chemical Inspection and Regulation Service The Measures on Management of Import of Solid Waste in China Entered into Force on 1 Aug 2011downloaded from http://www.cirs-reach.com/news/The_Measures_on_Management_of_Import_of_Solid_Waste_in_China_Entered_into_Force_on_1_Aug_2011.html

While there is a limited amount of readily available capital for improving the technological conditions of waste treatment in the developing world, the amount of waste produced in the EU does not appear to be reducing. Modelling results based on the assumption that no great future changes to policies or implementation mechanisms will take place predict that overall waste generation in the European Union will peak at around 2016, and then plateau until 2030, but there will not be any decline[13].

[13] Institute for European Environmental Policy (2010): **Final report – supporting the thematic strategy on waste prevention and recycling**, October 2010, downloaded from http://ec.europa.eu/environment/waste/pdf/Final%20Report%20final%2025%20Oct.pdf

Composition of Waste

Waste composition is also expected to change radically in coming decades. One aspect of the problem is that growing population will consume more food and produce more organic waste, leading to higher methane content and GHG emissions.

In fact, it is expected that by 2050 the demand for agricultural goods will rise by 70% and the demand for meat will double. It has been estimated that urban food waste is going to increase by 44% globally between 2005 and 2025.

During the same period, and because of its expected economic development, Asia is predicted to experience the largest increase in food waste production, from 278 million to 416 million tonnes. If present waste management trends are maintained, landfilled food waste is predicted to increase world CH4 emissions from 34 million to 48 million tonnes and the landfill share of global anthropogenic emissions from 8% to 10%.

Another pattern is the increasing amount of complex products including personalized medicine, electronics and consumer products. Electronic waste is already one of the largest components of exported waste materials. The second is the stream of nanomaterials including nano-bio and e-technologies which are expected to create a whole spectrum of new artificial materials. As these products will become available in larger quantities and their prices will drop the willingness to throw them away will increase[14].

1.3.4 Illegal Shipments

Metal and e-waste is routinely exported to developing countries, often in violation of international law. Illegal shipments are most likely to occur without administrative follow-up under application of Directive 1013/2006/EC on shipments of waste or in breach of the conditions described in the notification file. Frequently shipments are administratively legal but the files accompanying the cargo may lack complete information on the possible waste treatment conditions in the country of destination.

Box A1.6 (next page) highlights a recent example of customs operations against illegal shipments of waste.

[14] Antonis Mavropoulos (nd): **Waste Management 2030+**, published online at Waste management World, downloaded from http://www.waste-management-world.com/index/display/article-display/8267238380/articles/waste-management-world/volume-11/issue-2/features/waste-management_2030.html

Box A1.6: Operations Targeting Illegal Waste Shipments
Between March and May 2009, Customs administrations from 64 countries launched Operation Demeter targeting the illicit cross-border shipment of hazardous and other waste en route from Europe to countries in the Asia/Pacific region and Africa. It netted more than 30,000 tons and 1,500 pieces of illegal hazardous waste in 57 seizures, ranging from household waste and scrap metal to discarded electronic goods and used vehicle parts. The majority of seizures took place in European countries such as the Netherlands, Belgium, and Italy before the waste could be shipped. Iron scrap destined for Asia topped the list in terms of quantities seized. Africa remained the 'destination of choice' for household waste such as used refrigerators containing CFCs and old television screens, with over 1100 of the approximately 1500 pieces seized destined for countries on the continent.
Source: World Customs Organisation (2009) Operation Demeter yields tons of illegal shipments of hazardous waste, downloaded from http://www.wcoomd.org/press/default.aspx?lid=1&id=187

While trade in waste is profitable, the market for waste metal is particularly large and valuable. The trade volume of ferrous waste and scrap in 2008 was estimated at 71 million tonnes with a value of approximately US$ 48 billion. The vast majority of this (80% of the volume and 88% of the value) originates from OECD countries. In addition, OECD countries are the main importers of scrap (75% of the volume and 80% of the value)[15]. Metal scraps also make up a large fraction of the waste dumped in developing countries, such as South Asia.

The quality of scrap metal traded is highly variable ranging from low grade metal ash (often containing highly toxic metals in high concentrations) to relatively high grade pieces of waste metal. Although, scrap metal itself is not considered hazardous, imported scrap metal often lacks information about possible impurities. It can be contaminated with hazardous substances such as heavy metals, toxic substances or even explosives. Export of scrap metal for recycling is legal, so long as it is treated in suitable facilities and the scrap metal is not contaminated. However, under unsatisfactory conditions and operations it can be highly polluting and harmful. Box A1.7 illustrates a recent investigation into the legality of a shipment of scrap metal.

[15] Indonesian-Swiss Country-Led Initiative (Cli) To Improve The Effectiveness Of The Basel Convention Second Meeting (2010): **Transboundary Movements of Hazardous Wastes Impacts on Human Health and the Environment - Impacts on Human health and the Environment**, Wildhaus, Switzerland

Box A1.7: Illegal scrap metal shipments - UK-Indonesia
A recent example of the illegal trade of scrap metal from the EU to non-OECD countries was uncovered recently. On the 8th of June 2012, almost 90 containers (each weighing more than 30 tonnes) were returned to Suffolk, UK from Jakarta, Indonesia. They had been shipped to Indonesia some months earlier labelled as 'recyclable' materials and with a value of approximately €398,000. However, on arrival, a check deemed the shipment to be hazardous waste and it was shipped back to the UK. An investigation is under way to determine whether the waste metal, claimed by its exporters to have been legitimately-exportable scrap metal, was mixed with hazardous contaminants allegedly found by the Indonesian authorities.
Source: The Independent (2012): Britain's waste: Now it's coming back to haunt us, available at: http://www.ban.org/2012/06/08/britains-waste-now-its-coming-back-to-haunt-us/

An inspection undertaken by Greenpeace[16] in 2005 found that out of 18 European seaports as much as 47% of waste destined for export, including e-waste was illegal. In the UK alone, at least 23,000 metric tonnes of undeclared or 'grey' market electronic waste was illegally shipped in 2003 to the Far East, India, Africa and China. In the US, it is estimated that 50-80 % of the waste collected for recycling is being exported in this way. This practice is legal because the US has not ratified the Basel Convention.

In its 2011 Organised Crime Threat Assessment (OCTA), Europol has highlighted how intertwined legitimate businesses have become with illicit waste trafficking including those in the financial services, import/export and metal recycling sectors, and with specialists engaged in document forgery to acquire permits. Hazardous waste is reportedly being trafficked from Southern to South East Europe and the Western Balkans, as well as other Member States. Italy has also become a transit point for e-waste (second-hand electrical and electronic equipment) en route to Africa and Asia.

The Europol report suggests that the systematic mapping and profiling of criminal networks on a regional basis could support EU law enforcement by enabling them to target and disrupt the activities of the largest and most threatening groups. At the same time the concentration of criminal logistics in hubs in and on the border of the EU and a proliferation of trafficking routes suggest that an operational focus - such as targeting the illegal shipping of scrap metal - would be the most effective way of tackling transnational organised crime.

[16] Greenpeace (2009): **Where does E-waste end up?** Downloaded from http://www.greenpeace.org/international/en/campaigns/toxics/electronics/the-e-waste-problem/where-does-e-waste-end-up/

1.4 Types of Waste Exported

1.4.1 Metal Waste

In relation to non-hazardous exports to third countries, metal is the most significant waste stream, followed by paper and plastic. Table A1.5 below lists the most significant waste streams to third countries.

Table A1.5: Most Important Exported Waste Streams from EU-intra to EU-extra	
Type of waste	**Quantity of export (tonnes)**
Metal	15 150 946
Paper and cardboard	11 598 790
Plastic	1 436 320
Combustion	988 617
Textile	984 357
Rubber	270 118
Household and similar waste	157 356
Source: COMEXT, Eurostat	

Based on the statistics of COMEXT and the codes (CN) for metal waste a country specific analysis was undertaken to calculate the amount of metal waste exported from the EU-27 to third countries. The analysis shows that exports of metal waste to third countries have increased by five times since 1999. The most prominent recipient country of metal waste from Europe is Turkey.

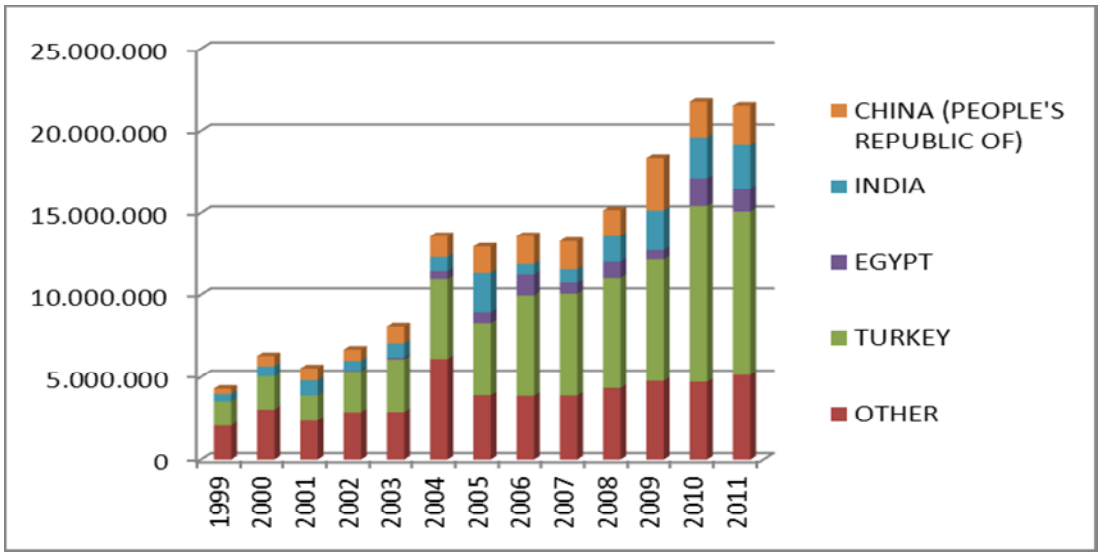

Figure A1.4: Quantity of Exported Metal Waste to the Four Largest Recipient Countries (in tonnes)
Source: COMEXT, Eurostat

In relation to non-OECD countries, China and India are the largest recipients of metal waste originating from the European Union.

Apart from WEEE, other common waste shipment items include end-of-life vehicles (ELVs) and batteries. Due to the relatively high value of metals and components, cars have become an attractive trade product. Vehicles bound for export which have been certified as being in working order or repairable, can be classified as second hand and hence not as waste. In this event, the Waste Shipment Regulation does not apply and the vehicles may be exported, provided that the export is in compliance with Customs Regulations in the country of destination. However, without the required documentations these shipments can be classified as illegal[17].

The ELV recycling chain has been facing challenges such as illegal operators dismantling vehicles without suitable environmental protection measures and waste shipments with erroneous waste transport codes. An additional concern is the so-called *paper exports,* which means that transactions are happening only on paper without the actual export of a vehicle. This can give illegal dismantlers the possibility to perform any illegitimate action since the vehicle theoretically no longer exists in the country of export[18].

The shipment of batteries is another cause of concern. Various harmful substances are present in batteries and accumulators. The European Union sets requirements, via its Directive 2006/66/EC, regarding the use, collection and disposal of batteries containing lead, mercury and cadmium. Export of batteries outside the territory of the European Union is allowed, provided that the exporter can demonstrate recycling in the recipient country will be done to standards equivalent to those in the EU and the shipment is in line with the requirements of the WSR. In December 2000, the United Nations passed a recommendation relating to the safe transport of all Lithium Ion (Li-Ion) cells and batteries. Subject to product testing, the legislation allows for some smaller Li-Ion batteries to be transported as normal cargo. However, larger Li-Ion batteries are to be regarded as Class 9 - Hazardous Goods.

According to EBRA, the European Battery Recycling Association[19], leakages of Li-Ion batteries still occur due to improper preparation for shipment. The Association reports that, in 2010, around 1300 tonnes of used batteries were imported from outside the EU for recycling by EBRA members[20].

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17 IMPEL-TFS (2008): **On end of life vehicle/ vehicles for export**, downloaded from http://impel.eu/wp-content/uploads/2010/04/2006-20-End-of-Life-Vehicles-Project-FINAL-REPORT.pdf

18 Association of European Vehicle and Driver Registration Authorities (2011): **De-registration and recycling of end-of-life vehicles**, downloaded from https://www.ereg-association.eu/actualities/index.php?action=show_article&news_id=160

19 European Battery Recycling Association (2010): **Transportation of used Lithium batteries**, workshop organised by RECHARCE, PRBA and EBRA, downloaded from http://www.ebra-recycling.org/sites/default/files/ITEM_1___2__JPWX___COMMENTS_DAY_1.pdf

20 European Battery Recycling Association (2011): **Press release**, 2010: a year of contrasts: further growth in the primary sector but temporary decrease in the Li-Ion recycling market, downloaded from http://www.ebra-recycling.org/sites/default/files/EBRA%20PR-%20BatteryStatistics_year2010_0.pdf .

1.4.2 Paper and Cardboard Waste

It is estimated that close to 70% of European paper is recycled; this figure is calculated based on paper consumption figures for the EU-27, Norway and Switzerland. Other uses, which imply recycling, not within the paper industry (such as animal bedding, plaster board, etc.) are not included in this percentage.

Paper and cardboard waste producers have various options available including sorting, recycling or disposal in landfill. As figure A1.5 below indicates, the total amount of paper and cardboard exported out of the EU increased by a factor of three from 1999 to 2009 with a decrease in 2010.

The key routes of waste export for paper and cardboard are:

- China (75%);
- Indonesia (9%);
- India (5%);
- South Korea (1.6%);
- Many other countries such as Malaysia, Thailand, Taiwan are all under 1%

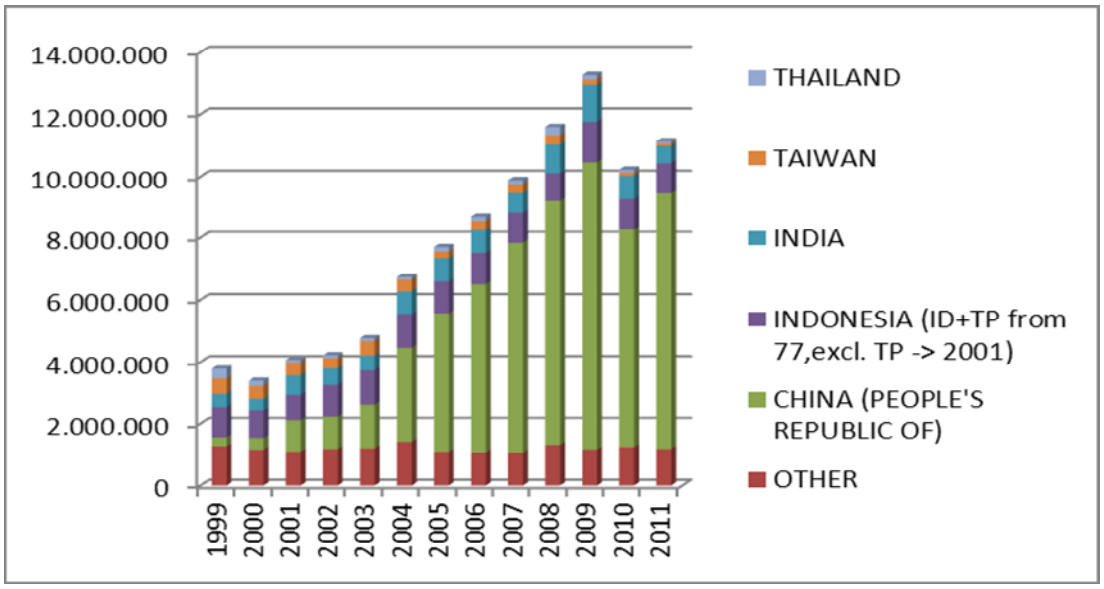

Figure A1.5: Quantity of Exported Paper Waste to the Five Largest Recipient Countries (in tonnes)
Source: COMEXT, Eurostat

The majority of exported waste is sent to China, which has been receiving increasing quantities of paper waste over the past 10 and especially the past 5 years[21]. Most of the paper exported to China is recycled. Imported paper is strategically important for China as it is used as packaging material for its own exported goods.

[21] Interview with CEPI, 2012

1.4.3 Plastic Waste

The most important receiving country for exported plastic waste from the European Union is China and Hong Kong, which serves as a stop-over for product destined for mainland China. In 2011, approximately 87 % of the total exported plastic waste was exported to China or to Hong Kong.

The total amount of plastic waste has increased 12-fold since 1999 with a significant jump in 2010. Figure A1.6 below indicates the quantity of plastic waste exported from the European Union.

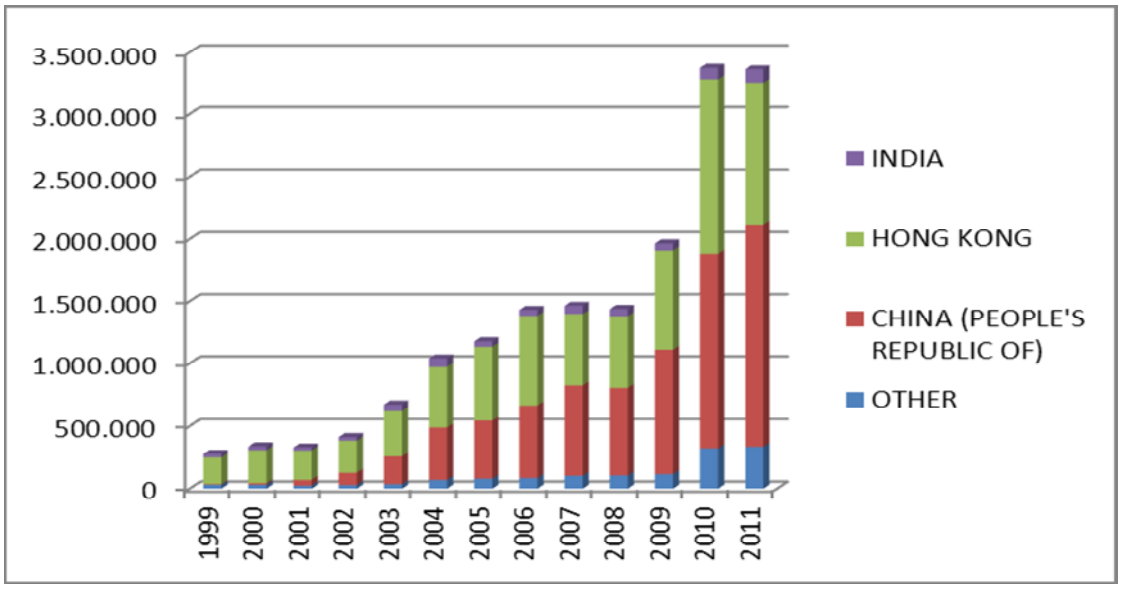

Figure A1.6: Quantity of Exported Plastic Waste to the Three Largest Recipient Countries (in tonnes)
Source: COMEXT, Eurostat

Apart from China, India is another key destination for plastic waste exports. According to the available notifications in the Netherlands[22] and Belgium[23], India is the most important destination country outside of the EU-27 for the export of plastic waste. The reason for this apparent contradiction with the above figures from Eurostat, is that under application of Regulation 2007/1418/EC India requests a full notification procedure for the waste while China is administratively less demanding.

[22] Nl Agency Ministry of Economic Affairs, Agriculture and Innovation (nd): Decisions, downloaded from http://www.agentschapnl.nl/programmas-regelingen/beschikkingen-online last accessed 29.05.2012

[23] Public Waste Agency of Flanders (2011): **Industrial, Figures and Trends for Production, Processing, Exports and Imports,** 2007 and 2011, downloaded from http://www.ovam.be/jahia/Jahia/cache/offonce/pid/176?actionReq=actionPubDetail&fileItem=2178

1.4.4 Hazardous waste

'Hazardous waste' refers to waste which displays one or more of the hazardous properties listed in Annex III of the Waste Framework Directive, identified with H-codes and UN classes. The export of hazardous waste for final disposal and recycling from EU and OECD members and Liechtenstein, to all other Parties to the Basel convention is prohibited (Basel Ban).

Since the export of non-hazardous waste for recovery among OECD countries does not need to be reported to the Basel Convention, it can safely be assumed that the reported quantities of waste exported for recovery among the OECD reporting Parties is 'hazardous' (see Figure A1.7 below).

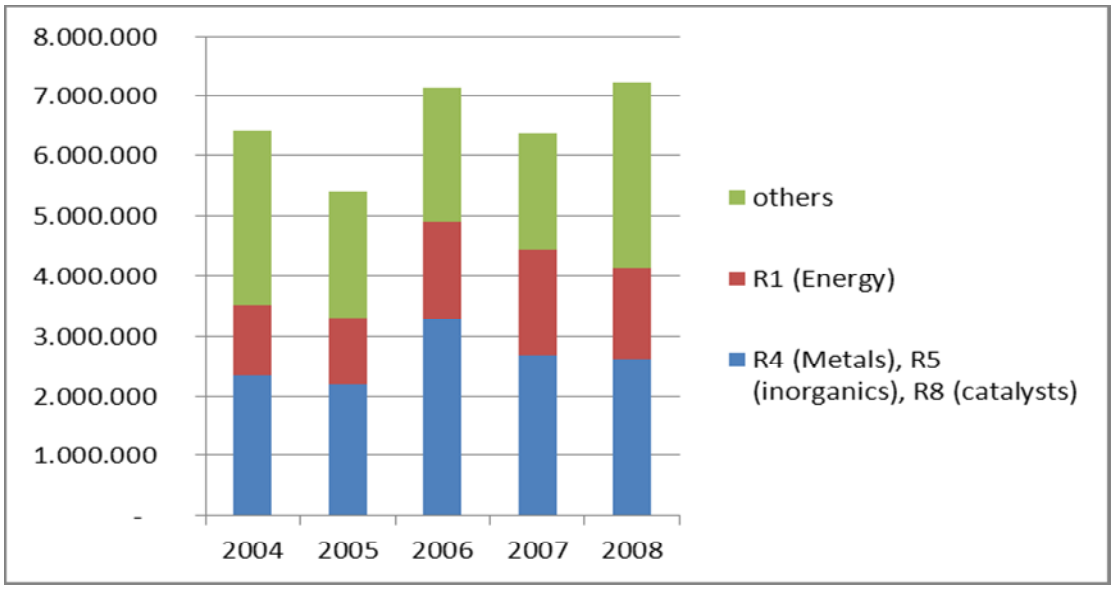

Figure A1.7: Export for Recovery of Hazardous Waste among OECD Reporting Parties (in tonnes)
Source: Basel Secretariat

The largest part of exported hazardous waste that is destined for recovery is composed of metals (R4), inorganic materials (R5) or components from catalysts (R8), which together made up 36% of all waste shipments in 2008.

An important source of hazardous waste comes from waste electrical and electronic equipment (WEEE). WEEE contains hazardous substances (e.g. heavy metals) and at the same time valuable materials such as precious metals (resources). The export of WEEE to non-OECD countries is prohibited, but WEEE is often exported as a second hand product. It is difficult to discern when a used electrical or electronic item is waste or just second-hand.

Therefore, hazardous waste appears to be shipped illegally. In general, non-OECD countries do not have a sufficient number of adequate treatment and disposal facilities for WEEE, and much of it is dismantled and incinerated in open fires to recover

metals. This practice is unsafe both for the environment and human health. In a report published by the European Environment Agency[24], it is assumed that a large part of the WEEE from Europe is exported to Africa, in particular to Ghana, Nigeria and Egypt. However, information regarding the quantities and final destination of the majority of used electrical and electronic equipment and WEEE is limited.

1.5 Primary Waste Streams Identified

As a conclusion of this chapter we have summarised the three most significant exported waste streams (metal, paper/cardboard and plastic waste) and the five most important export countries (presented in Table A1.6).

Table A1.6: Primary Waste Streams and Main Exporting Countries

Recipient Country	Primary Waste Stream	OECD member	Member Basel Convention
China	Paper, Metal, Plastic	No	Yes
Hong Kong	Plastic	No	Yes (China)
India	Metal	No	Yes
Turkey	Metal	Yes	Yes
Egypt	Metal	No	Yes

Currently, there are gaps in terms of the knowledge and data relating to the export of waste. However, it is known that Europe is exporting an increasing proportion of its waste for reprocessing in third countries. The total trade in notified waste exports from Member States increased four-fold between 1997 and 2005. This was associated with significant growth in non-hazardous waste shipped from the EU to third countries[25].

Asia is the main destination of EU waste. Between 1995 and 2007 trade in waste metals, paper and plastics between the EU and Asia expanded five-fold, 10-fold and 11-fold respectively. In 2006, around 3% of generated paper waste (2.1 million tonnes), 10% of metal waste (around 9 million tonnes) and 71% of plastic waste (10 million tonnes) were exported from the EU-25 to non-EU countries. This trend of increasing exports is anticipated to continue into the future.

Metal waste is most frequently shipped to Turkey, which is member of both the OECD and the Basel Convention; therefore the regulations limiting the shipment and treatment of waste apply. Metal is also shipped to Egypt, China as well as India in significant quantities. In the case of both paper and plastic the most significant recipient country is China, where 75% of paper and over 85% of plastic waste is shipped. Hong Kong is also a major receiver of plastic waste; however the port only serves as a stop-over as waste is being transported further into mainland China.

[24] European Environment Agency (2009): **EEA report No 1/2009** downloaded from: www.eea.europa.eu/publications/waste-without-borders-in-the-eu-transboundary-shipments-of-waste

[25] Institute for European Environmental Policy *et al.* (2010): **Final Report – Supporting The Thematic Strategy on Waste Prevention and Recycling**, available online at: http://ec.europa.eu/environment/waste/pdf/Final%20Report%20final%2025%20Oct.pdf

2. IMPACT OF WASTE EXPORT ON RECEIVING COUNTRIES

2.1 Background

Waste trade has increased in recent years and it continues to grow. It is estimated that one in seven containers leaving the EU are shipping waste and, of these, one in ten do not comply with relevant environmental regulations[26].

One of the major driving forces behind waste exportation is economics. Low labour costs found in developing countries, together with weak, poorly enforced or non-existent environmental and social regulations translate into an economical option for waste disposal. The primary destination for European waste is Asia[27]. Sometimes used products are exported to developing countries where they can be re-used or can be salvaged, thus increasing product life. However, other items are exported as waste and are unsalvageable.

Many developing and emerging economies view the importation of waste, even hazardous waste, from the West as a relatively easy and fast way to generate financial gains[28]. In addition, waste imports generally provide income and employment for the poor. As such, there are arguments in favour of the waste trade from both the import and export side. However, the current waste trade is commonly viewed as fundamentally unjust; it is generally detrimental to the importing countries' environment and it is a cause of health and well-being concerns.

The quantity of waste shipped outside of the EU cannot increase indefinitely. Limitations will arise from internal restrictions imposed by the receiving countries as well as the limited capacity of infrastructure – which will have to deal with the increasing quantities of local waste.

The impacts of exported waste on non-OECD countries vary considerably and can be influenced by the level of economic and infrastructural development. The following sections present the environmental, economic and social implications of the exportation of various waste streams, preceded by a short background of these waste streams (see sub-section 2.1.1 below).

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26 Ruessink and Wolters (2009): **Time to End Illegal International Shipments of Waste,** article downloaded from Greenport, Hampshire, http://www.greenport.com/

27 JRC (2010): **Study on the Selection of Waste Streams for End-of-waste Assessment** - *Final Report*, JRC Scientific and Technical Reports, Joint Research Centre.

28 Sonak, *et al* (2008): **Shipping Hazardous Waste: Implications for Economically Developing Countries**, International Environmental Agreements, (2008), Vol 8, pp 143–159.

2.1.1 Waste Streams

Metal and E-waste

Due to increasing consumer demand, production within the electronics industry is growing at a rapid pace, but so is the quantity of e-waste produced. It is estimated that 70-80% of e-waste is exported to countries in Asia and Africa[29].

A sharp rise in the price of metals in 2004 made recycling of scrap metal a cost-effective practice, saving energy and avoiding pollution and resource depletion associated with mining and smelting. A typical metal scrap facility carries out sorting, storage, cleaning, melting, casting, burning and waste disposal. In developing countries the preliminary sorting, which includes separating (or, possibly, burning-off) non-metallic components, is often carried out by the informal sector. This procedure may lack satisfactory facilities, particularly in countries with less stringent environmental and social regulation, and 'backyard' practices are often employed. The subsequent pollutants can cause serious harm and contamination. The long term impacts of metal smelters on the local environment and population is well documented from studies in several countries[30].

Turkey, which is one of the most important recipients of scrap metal from Europe, has been investing in modern waste treatment facilities and new technologies. Box A2.1 describes the Turkish scrap metal industry which has witnessed fast growth in recent years.

Box A2.1: Scrap Metal Recycling in Turkey

Turkey is a major importer of scrap metal and the largest importer of ferrous scrap in the world. In recent years China's importation of scrap metal has declined while Turkey's has increased sharply. Much of this scrap originates from North America and Europe. In 2010, Turkey imported 19.2 million tonnes of scrap, 10.5 million tonnes of which originated from Europe making the country the largest importer of scrap metal from Europe.

Metal scrap is recycled saving energy, avoiding pollution and resource depletion associated with mining and smelting. According to the Turkish Steel Exporter Union, the Turkish Steel industry is striving to reduce the environmental impact of its production methods. The Erdemir plant has been awarded first prize in the Management Category of the EU Environmental Awards. Turkey is committed to meeting EU environmental standards in industrial production and is currently implementing stringent EU environmental legislative norms, which includes proactively integrating the EU Directive on Integrated Pollution Protection Control, which entered into force within the Community in 2007.

A lot of investment has been put into environmental technologies which tackle issues such as waste, pollution and climate change. In fact, the furnaces used in the Turkish steel production industry emit less CO_2 than the global average. For instance, the average CO_2 emission for producing 1 ton of crude steel in Turkey is 0.62 tons while in China it is 3.1 tons.

29 Ibid.

30 Indonesian-Swiss Country-Led Initiative (Cli) To Improve The Effectiveness Of The Basel Convention Second Meeting (2010): Transboundary Movements of Hazardous Wastes Impacts on Human Health and the Environment - Impacts on Human health and the Environment, Wildhaus, Switzerland

Box A2.1: Scrap Metal Recycling in Turkey
In addition, all integrated mills have received ISO 14001 certification and all members of the Turkish Iron and Steel Producers Association also hold the ISO 9001 certification.
Source: Turkish Steel Exporter Union (nd.): Taking on the Environmental Challenge - A Champion Recycler, available at http://www.turkishsteel.eu/index.php?option=com_content&view=article&id=7&Itemid=7

While some of the exported e-waste is made up of used but functional devices which are salvageable, others are obsolete. According to a recent study[31], charitable donations of used electronic devices, which aim to close the 'digital divide', have created a loop-hole for other organisations that export electronics of which the majority are obsolete. When a product is considered second-hand and not categorised as waste, waste provisions and export bans do not apply and the export shipment can be made in a much less regulated and less burdensome manner. There are suggestions that organisations use this loop-hole to export products, the majority of which are unsalvageable, under the guise of 'second-hand electronics' or 'recycling'. These products cannot be used as they were originally intended in the destination country but are generally processed in order to recover specific materials.

End-of-life Vessels

End-of-life vessels are predominantly shipped to Asia where they are broken down in ship-breaking yards. The ship-breaking industry incorporates vessels such as Cargo, Containers, Tankers, Passenger, Ro-Ro, Naval, Aircraft Carriers, etc.

The European Waste Shipment Regulation (1013/2006) is the European Union's implementation of the Basel Convention. It applies to "*vessels and other floating structures for breaking up, properly emptied of any cargo and other materials*".

The NGO Shipbreaking Platform has recently released a list of European countries that sent toxic waste from ship dismantling into south-Asia in 2011. It found that, altogether, 210 shipments have been exported[32]. The largest quantities of waste shipments are generally sent from the ports of the North Sea.

It should be noted that waste being exported from one non-OECD country to another non-OECD country is not regulated under the Basel Convention, neither is it regulated under other international regulations, such as the EU Waste Shipment Regulation. Therefore, a popular method of evading environmental costs and regulations is to fly a flag of convenience. Flying a Flag of Convenience (FoC) is a

31 Caravanos, et al. (2011): **Assessing Worker and Environmental Chemical Exposure Risks at an e-Waste Recycling and Disposal Site in Accra, Ghana**, Blacksmith Institute Journal of Health and Pollution, Vol 1, no 1 pp.16-25.

32 NGO Shipbreaking Platform (2012): **List of EU Toxic Ships Sent To South Asia in 2011**, downloaded from http://www.shipbreakingplatform.org/media-alert-ngo-releases-2011-list-of-top-eu-companies-sending-toxic-ships-to-south-asia/

term used to describe the practice of registering a ship in a state different from that of its owners and flying that state's national flag. In this way one non-OECD country can easily export waste to another non-OECD country[33].

Plastic Waste

Plastic is a popular manufacturing material. In recent decades, it has steadily been replacing other materials in every-day modern life and, as such, it has become a major waste stream. Although estimations differ by source, UNEP (2009)[34] claims that plastic is the third major waste component of municipal and industrial waste generated in cities, after food and paper. According to the European Commission in 2007 half a million tonnes of recovered plastics were exported from OECD countries[35].

End-of-life plastic has become one of the waste industry's biggest issues. Plastic is adaptable and durable; it has positive production-side traits but negative characteristics when the product reaches end-of-life. The durability of plastic means it degrades slowly. It is unknown exactly how long it takes plastic to fully-degrade but some estimates suggest that it may take hundreds of years. Increased production and slow degradation has led to serious environmental concerns.

The popular concept of a 'throwaway society' accurately describes the current consumer prospect. Among other consumer products, part of the increased generation of plastic waste is a result of increased demand for, and shortened lifespan of, electronic devices. On average, plastic makes up 21% of electronic devices[36]. Therefore, waste plastic and e-waste should be looked at in conjunction with each other.

Paper Waste

Paper waste is one of the largest components of waste. It is estimated that approximately nine million tonnes out of the 60 million tonnes of paper waste collected in Europe each year is sent for export[37]. Europe has a high, if not the highest, rate of recycling for paper, meaning more than 50% of paper waste is recycled. Recycling is important for the paper industry due to the cost of raw materials, the volatility of the market and the environmental considerations such as CO_2 emissions and climate change targets.

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33 Sonak et al (2008): **Shipping hazardous waste: implications for economically developing countries,** International Environmental Agreements (2008) Vol 8, pp 143–159.

34 UNEP (2009): **Converting Waste Plastics into a Resource; Assessment Guidelines**, downloaded from: http://www.unep.or.jp

35 European Commission (2012): **Environment; Shipment of non-hazardous waste**, downloaded from: http://ec.europa.eu/trade/wider-agenda/environment/shipment-of-non-hazardous-waste

36 UNEP (2009): **Converting Waste Plastics into a Resource; Assessment Guidelines**, downloaded from: http://www.unep.or.jp

37 Interview with CEPI, 2012

Environmental considerations in connection with paper recycling include the treatment of the rejects as well as those materials that are high in contaminants.

The recycling of paper is an energy intensive process and includes elements such as pumping water, creating pulp and drying which means resource efficiency is reduced when something other than paper enters the mill and destroys the batch resulting in a loss of energy. Moreover environmental concerns with waste water can also arise if not properly treated.

2.2 Environmental Impact

2.2.1 Background

Inadequate waste management is a threat to human health and the environment. The degree of hazard posed by inadequate waste treatment technologies varies and is largely dependent upon the specifics of the individual facility as well as the materials that are being processed[38].

The most common environmental impacts of waste and inadequate waste treatment include an increase in greenhouse gases, air pollution, leachate[39], littering etc.

The following sections describe the environmental impact of the most frequently exported types of materials.

2.2.2 Metal and E-Waste

Processing e-waste involves various procedures such as de-manufacturing, dismantling, shredding, burning, and dissolution in strong acids. From an environmental standpoint this can be very harmful for the receiving region, as it can result in localised pollution. However, the pollutants can spread, resulting in the contamination of an entire region; affecting water, air, soil and biota[40]. These impacts are further magnified if the region is ill-equipped to manage them.

Landfills are generally not completely secure; the older they are or the less well designed they are the greater the leakage which will occur. This can result in hazardous substances leaching into the groundwater.

The composition of e-waste is extremely varied. However, most items contain different quantities of metals, various types of plastics, ceramics, electronic components, circuit boards, wires, resistors, capacitors, and glass. Potential contaminants commonly found in e-waste include: lead (Pb); antimony (Sb); mercury (Hg); cadmium (Cd); Nickel (Ni); polybrominated diphenyl ethers (PBDEs), and

38 Ministry of Environment, Japan (2011): **Study on Criteria and Requirement on Environmentally Sound Management of Hazardous Wastes and Other Wastes**, 31 March 2011 Final Report

39 Leachate is the liquid that drains or 'leaches' from the waste source.

40 Robinson (2009): *E-waste:* **An assessment of global production and environmental impacts**, Science of the Total Environment Vol 408, pp183 – 191.

polychlorinated biphenyls (PCBs). With time, or as a result of processing these substances can seep into the ground, water and air. Processing e-waste, especially though burning, can generate dioxins, furans, polycyclic aromatic hydrocarbons (PAHs), polyhalogenated aromatic hydrocarbons (PHAHs), and hydrogen chloride[41].

Heavy metals, such as those mentioned above, are detrimental to the environment. It is estimated that about 70% of heavy metals found in landfills are a result of e-waste[42]. PBDEs are used as flame retardants in plastics. However, they are not chemically bonded with the plastic and can easily leach into the environment. PBDEs have harmful endocrine disrupting properties and they are lipophilic, resulting in their bio-accumulation in organisms and bio-magnification in food chains. Chloro-fluorocarbons (CFCs) are generally found in older refrigerators, freezers and air conditioning units. CFCs can escape into the atmosphere and play a part in ozone depletion[43].

Many substances which comprise e-waste are known to have a detrimental impact on the environment. However, due to the ever-changing nature of the industry there are many other substances which have not been fully researched and it is therefore unknown what the potential effect may be on the environment. Examples include lithium (batteries); beryllium (contact material); antimony (flame retardant); and gallium and indium (used in silicon chips and LCD monitors)[44].

Water Pollution

Water can become contaminated in various ways from e-waste. Contaminants can leach from e-waste devices on the dumpsite into the aquatic system. Harmful acids used in the hydro-metallurgical processes can be discarded onto soils or water. Water systems can also be contaminated through airborne contaminants. Contaminated waterways have the potential of further contaminating other natural resources such as soils, crops, drinking water, fish and livestock.

Air Pollution

E-waste contaminants can be carried through the air in the form of dust. This can be particularly harmful for humans as they can be affected through ingestion, inhalation and skin absorption.

Soil Pollution

Acid leaching as a process to recover valuable metals can result in considerably high levels of PBDEs found in the soil. For example, soils from a site where acid leaching

41 ibid.

42 Puckett *et al* (2002): **Exporting Harm; The High-Tech Trashing of Asia,** [online] available at: http://www.ban.org/E-waste/technotrashfinalcomp.pdf

43 Robinson (2009): **E-waste: An Assessment of Global Production and Environmental Impacts**, Science of the Total Environment Vol 408, pp183 – 191

44 ibid.

was used, contained up to 4250 ng/g PBDEs[45]. Table A2.1 summarises the potential environmental hazards present in e-waste.

Table A2.1: Potential Environmental Hazard of Computer / E-Waste Components	
Computer / E-Waste Component	**Potential Environmental Hazard**
Cathode ray tubes (CRTs)	Lead, barium and other heavy metals leaching into groundwater, release of toxic phosphor.
Printed circuit boards	Air emission of same substances.
Dismantled printed circuit board processing	Tin and lead contamination of immediate environment including surface and groundwater; Brominated dioxins, beryllium, cadmium, and mercury emissions.
Chips and other gold plated components	Hydrocarbons, heavy metals, brominated substances, etc. discharged directly into river and banks; Acidifies the river destroying fish and flora.
Plastics from computer and peripherals, eg. printers, keyboards, etc.	Emissions of brominated dioxins and heavy metals and hydrocarbons.
Computer wires	Hydrocarbon ashes including PAH's discharged to air, water, and soil.
Miscellaneous computer parts encased in rubber or plastic, e.g. steel rollers.	Hydrocarbon ashes including PAH's discharged to air, water, and soil.
Toner cartridges	Cyan, yellow and magenta toners unknown toxicity.
Secondary steel or copper and precious metal smelting	Emissions of dioxins and heavy metals.
Source: Puckett et al (2002): Exporting Harm; The High-Tech Trashing of Asia, available at: http://www.ban.org/E-waste/technotrashfinalcomp.pdf.	

Pollution from e-waste is mainly the result of backyard operations, using crude recycling methods. In order to recover copper from e-waste, for instance, wires are pulled out, piled up and burned to remove insulation covering the copper. This emits dioxins and other pollutants. Moreover toxic cyanide and acid that are used to remove gold from circuit boards of junked computers are also released into the environment[46].

2.2.3 End-of-life Vessels

Background

It is argued by some that the ship-breaking industry which deals with end-of-life vessels can be considered a 'green industry' if looked at from a broad perspective. In fact, almost all components of the vessel are recycled, reused or resold. Therefore, it

[45] ibid.

[46] Science Daily (2010): **E-Waste: Crude Recycling Methods Used in Developing Countries Contaminate Air, Water and Soil, Researchers Say**, downloaded from: http://www.sciencedaily.com/releases/2010/03/100322073534.htm

reduces waste, reduces mining activity, reduces carbon emissions, reduces energy demand and conserves natural resources[47].

However, regional studies suggest that the profitability of the ship-breaking industry comes at a high environmental and social cost. In many cases, these vessels are dismantled by hand with little protection given to the workers, the surrounding area or the community. End-of-life vessels contain high levels of hazardous waste which can be severely detrimental to the environment especially where there is a lack of knowledge, infrastructure or resources to deal with such waste in an environmentally sound manner. Due to the geographical nature of the industry there is an especially adverse effect on the coastal inter-tidal zone and its habitat.

Potentially hazardous waste in the form of liquid, metal, gaseous and solid pollutants are present in large quantities due to the size of the vessels. They therefore hold serious implications for the health of air, soil and water. According to a report studying the implications of ship-breaking in Bangladesh[48], the average weight of an unladen ship is over 13 000 tons. It is estimated that 95% of it is comprised of steel which is generally coated in paint containing lead, cadmium, organotins, arsenic, zinc and chromium. Other harmful substances include: sealants containing PCBs; ammonia, asbestos; and oil (engine oil, bilge oil, hydraulic and lubricants oils, residual oil and grease).

Soil/Sand Pollution

Various components of ships contain heavy metals. These are often burned or dumped causing soil contamination. Ship-breaking areas tend to have high levels of heavy metal present in the soil.

A study measuring soil contamination in ship-breaking sites in Bangladesh and Pakistan noted the following results[49]:

- cadmium - from 0.6 to 2.2 mg/kg;
- chromium - from 2.42 to 22.12 mg/kg;
- lead - from 11.3 to 197.7 mg/kg; and
- mercury- from 0.078 to 0.158 mg/kg.

This stands in comparison to the naturally occurring background concentrations of these substances in soil:

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47 YPSA (2010): **Ship Breaking in Bangladesh; Benefits.** Young Power in Social Action, [online] available at: http://www.shipbreakingbd.info/Benefits.html.

48 Hossain, and Islam, (2006): **Ship Breaking Activities and its Impact on the Coastal Zone of Chittagong, Bangladesh: Towards Sustainable Management.** Young Power in Social Action (YPSA), Chittagong, Bangladesh, available at: http://ypsa.org/publications/Impact.pdf.

49 Sarraf, *et al.* (2010): **The Ship Breaking and Recycling Industry in Bangladesh and Pakistan**, Report No 58275-SAS, World Bank. available at: http://kep.divest-project.eu/sites/default/files/ShipBreakingReportDec2010.pdf

- cadmium - from 0.2 to 0.4 mg/kg[50];
- chromium - from 1 to 2000 mg/kg (37 mg/kg mean level)[51];
- lead - from 2 to 25 mg/kg (an above 25 mg/kg concentration of lead in soil is considered elevated, while 100 mg/kg is the permissible limit set by the WHO)[52]; and
- mercury- from 0.07 to 1.22 mg kg^{-1}[53].

Other heavy metals which leach into the soil include: arsenic; copper; manganese, zinc, etc.

Persistent Organic Pollutants (POP's) can also be released during ship-breaking, these substances are toxic and remain intact in the environment for long periods. They can cause adverse effects to humans, wildlife and the environment[54]. They are responsible for contamination of groundwater, air and marine biodiversity at a high trophic level. Examples include: Polychlorinated Biphenyl Compounds (PCBs); Dioxins; Polyvinyl Chloride (PVC); Polycyclic Aromatic Hydrocarbons (PAHs) and Organotins.

Metal fragments of ships can also accumulate in the sand and soil, thus reducing binding properties and consequently increasing susceptibility to soil/sand erosion. Additionally, there is the danger of accelerating coastal erosion, as well as increasing seawater turbidity, due to mechanical activities carried out[55].

Water Pollution

Oil residues as a result of ship-breaking have adverse implications for marine biodiversity. Oil can inhibit photosynthesis due to reduced light entering the water column. Oil also reduces the exchange of oxygen and carbon dioxide in seawater, decreasing its ability to support marine life. The release of ammonia from ship-breaking into the seawater, on top of oil and lubricants, can alter the pH level, which can be harmful for fish.

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50 OSPAR Commission (2002): **Hazardous Substances Series: Cadmium**, downloaded from http://www.ospar.org/documents/dbase/publications/p00151_background%20document%20on%20cadmium.pdf

51 US Department of Health and Human Services (2008): **Draft Toxicological Profile for Chromium**, downloaded from http://www.atsdr.cdc.gov/ToxProfiles/tp7.pdf

52 Ona LF et al (2006): **Levels of Lead in Urban Soils from Selected Cities in a Central Region of The Philippines**, Environmental Science and Pollution Research International, 2006 May;13(3):177-83. Downloaded from http://www.ncbi.nlm.nih.gov/pubmed/16758708

53 Environment Agency (nd): **Using Science to Create a Better Place, Soil Guideline Values for Mercury in Soil**, Science Report SC050021 / Mercury SGV, downloaded from http://www.environment-agency.gov.uk/static/documents/Research/SCHO0309BPQG-e-e.pdf

54 Sarraf, *et al.* (2010): **The Ship Breaking and Recycling Industry in Bangladesh and Pakistan**, Report No 58275-SAS, World Bank. available at:

http://kep.divest-project.eu/sites/default/files/ShipBreakingReportDec2010.pdf

55 Hossain, and Islam, (2006): **Ship Breaking Activities and its Impact on the Coastal Zone of Chittagong, Bangladesh: Towards Sustainable Management**. Young Power in Social Action (YPSA), Chittagong, Bangladesh, [online] available at: http://ypsa.org/publications/Impact.pdf

Bilge and Ballast water, which may contain harmful substances, is discharged into the waters around the ship-breaking yard, which may impact on the marine environment. Hazardous waste which reaches the sea can be detrimental and/or fatal for seabirds, fish, mammals, crabs, and other organisms[56].

Air Pollution

Various substances generated in the ship-breaking process are a cause of air pollution. Heavy metals such as asbestos fibres are of particular concern. Asbestos was commonly used in the insulation of old ships. Through the ship-breaking procedure, asbestos fibres and particles enter into the air. The particles not only affect the workers but can be carried through the air, and affect the whole community. In addition, dioxins and furans are released from materials containing the industrial chemical polychlorinated biphenyl (PCBs)[57].

2.2.4 Plastic Waste

Background

When considering the increased production and slow degradation rate of plastic, their sheer quantity impacts the environment. In addition, plastics contain many harmful substances such as cadmium, lead, PVC, plasticizers, brominated flame retardants and stabilizers. Older plastics generally contain higher quantities of toxic substances. However, due to slow rates of degradation, many of these plastics still exist and are slowly leaching toxins into the environment.

Developing countries generally recycle plastics or dispose of them in landfill sites or through burning processes. Both of these methods can cause harm to the environment. Burning plastics, which often happens in an uncontrolled manner in developing countries, generates greenhouse gases and fumes which may be toxic. These fumes can cause harm, not only to the area around the site of burning but also airborne particles can travel through the air and cause environmental degradation far beyond the site. In addition, discarded by-products from incineration such as ash and slag can also negatively affect the environment.

The disposal of plastics in landfill sites also has implications for the environment. With recent developments in plastic production, many manufacturers are moving to bio-plastics. However, these are also responsible for the release of greenhouse gases in landfill sites[58].

56 Ibid.

57 Ibid.

58 European Commission (2011): **Plastic Waste in the Environment**, in association with BIO Intelligence Service and AEA Technology, Brussels, European Commission.

Water Pollution

Some plastics are light and can be blown off unprotected landfill sites. This causes litter in the surrounding areas but can often lead to plastics ending up in the marine environment[59]. This can have negative implications for marine ecosystems and marine life. Giant masses of plastic waste have been found in the North and South Atlantic, the North and South Pacific and the Indian oceans. Plastics within the marine environment can not only harm sea-life but also enter into the food chain, which may ultimately harm human health.

Air Pollution

Burning plastics in an unregulated manner can have serious ramifications. Incineration can give rise to the release of persistent organic pollutants (POPs) such as polybrominated diphenyl ethers (PDBEs), dioxins and furans. These can circulate through the air across long distances.

A study carried out in Guiya in China found elevated levels of heavy metals and POPs in the air as a result of melting and burning plastics. This can affect the surrounding environment, and can also enter into soils and rivers, affecting crops and marine ecosystems[60].

Soil Pollution

Landfills are rarely completely sealed, especially those that are poorly constructed or maintained. Leaching of toxic substances from landfills can affect the soil's biological balance and organic processes. Contaminants can spread through the soil in groundwater which, in turn, can affect crops and enter the food chain.

2.2.5 Paper Waste

Background

Paper waste is generally composed of paper itself and various inks, dyes and bleaches. These can contain heavy metals, non-renewable oils and volatile organic compounds (VOCs). VOCs are usually highly toxic and can be released into the air, but also into the water.

Decomposition of paper can produce methane gas which is a major contributor to global warming. This occurs through anaerobic decomposition which may happen in landfill sites where compression systems are used to reduce the volume of waste while at the same time expelling air. This inhibits the natural aerobic decomposition, and anaerobic decomposition takes place instead.

59 ibid.

60 ibid.

However, studies have found that in general, there is an overall positive environmental impact of paper production using paper waste. Average water consumption in mills using waste paper is only 125 m^3 in comparison to around 275 m^3 or more per tonne of paper produced in wood and agro-based mills. This reduces the volume of waste water discharge. The concentration of waste in wastewater is also reduced by 3-10 times when production uses waste paper rather than wood and agro-based inputs. This is due to the absence of digesting chemicals and black liquor which are by-products of the production process. Solid waste generated is also much lower. Similarly, average power consumption in most of the waste paper based mills is 3-4 times less than for other raw materials[61].

An increase in the recovery capacity would be an efficient solution to the growing problem of uncollected urban solid waste[62].

2.3 Social Impact

2.3.1 Background

Social impacts of exported waste are closely interlinked with one another and include issues such as health, working conditions, child labour, sanitation, hazardous conditions, etc. Different types of waste tend to have similar social impacts, although some are exerted to a greater extent than others.

Many different types of waste contain toxic and hazardous substances while others present risks during the processing procedure. Developing countries often have limited or non-existent labour and health regulations. This, coupled with poor working conditions and inadequate sanitation, can have serious health implications.

It has been noted that workers in waste treatment facilities often lack any type of protective clothing such as gloves, masks, proper footwear, etc. For example, workers in e-waste dumpsites may sort through, dismantle and burn parts of electronic devices with their bare hands or with home-made tools or stones.

Table A2.2 (next page) shows the health implications of the different waste recovery operations in non-OECD countries.

[61] van Beukering and Sharma (1998): **Waste Paper Trade and Recycling in India**. Jodphur, India, Pawan Kumar Scientific Publishers.

[62] ibid.

Table A2.2: Africa's Largest Dumpsites and their Related Health Implications			
	Dandora dumpsite	**Agbogbloshie E-waste Dumpsite**	**Lagos Dumpsites**
Location	Nairobi, Kenya	Accra, Ghana	Lagos, Nigeria
Type of waste	Industrial, agricultural, and hospital waste	E-Waste	Municipal solid waste and E-Waste
Impact on Health	The Dandora dumpsite is an unrestricted dumping site and contains many hazardous materials. Heavy metals such as lead and mercury and organic pollutants such as DDT and PCBs enter the air and soil in the area. The United Nations did a study of more than 300 schoolchildren near Dandora and found that about 50% of them had respiratory problems. In addition, 30% had blood abnormalities that signalled heavy-metal poisoning. Used syringes are also dumped in Dandora.	The Basel Action Network has singled out Accra as a destination for huge amounts of e-waste. Unregulated dumping of e-waste is causing health problems for nearby residents, but especially for those who live and work on the dumpsite. When burned, noxious fumes from e-waste can cause respiratory illnesses. (see also Box A2.2 case study on Agbogbloshie E-waste Dumpsite, Ghana).	The Basel Action Network estimates that 500 shipping containers arrive at the port each month, and up to 75% of it is e-waste. E-waste is not allowed in the landfills, but it gets dumped around the city. Electronics, shipped from developed countries, are a significant health problem for the area. When burned, noxious fumes from e-waste can cause respiratory illnesses. Toxins released while stripping the computers for precious metals can cause respiratory problems, birth defects, and cancer.
Source: Holden (2012): Biggest Garbage Dumps, Bloomsberg business week, available at: http://images.businessweek.com/ss/09/08/0805_biggest_garbage_dumps/			

2.3.2 Working conditions

The ship-breaking industry is also characterised by dangerous working conditions where workers are exposed to explosions, falling parts, and toxic waste[63].

These hazardous conditions are magnified as a result of the lack of accessible information for workers. The ship-breaking industry for example, provides little training to its labourers and those working on dumpsites tend to lack information about the full extent of the risks which they face daily. Furthermore, it is not only the workers who are affected by these risks. In many cases there is a large support community and residential area which suffer the consequences of contaminated air, water, food etc. Although health impacts are more pressing, waste arriving from Europe and other industrialised countries can also have an impact on human well-

[63] Hossain, and Islam, (2006): **Ship Breaking Activities and its Impact on the Coastal Zone of Chittagong, Bangladesh: Towards Sustainable Management**. Young Power in Social Action (YPSA), Chittagong, Bangladesh, [online] available at: http://ypsa.org/publications/Impact.pdf.

being and quality of life. Poorly managed waste has various environmental impacts, as it is a cause of smells, noise and it is unsightly, therefore reducing the visual amenity of the surrounding area.

In the plastic waste industry, one of the main risks is the contamination of plastic waste with unknown substances[64]. Workers sorting through garbage are at risk of injury from sharp, toxic or unsanitary items which have been discarded. Even in recycling plants, there is a risk that other items have entered the waste stream which may cause harm to the workers[65]. Chipping and melting plastic can have negative impacts on human health, especially if this process takes place in an unventilated place. In the past many hazardous heavy metals, such as lead, cadmium, mercury and chromium were commonly used in plastics. However, current regulations often ban various harmful substances from plastic production. Nevertheless and despite regulations, a 2007 study in the United States detected these substances present in plastics being imported into America[66]. Heavy metals also hold serious implications for human health.

E-waste is a particular concern for human health as it is composed of a large variety of substances, some of which can be hazardous. Table A2.3 summarises the main health implications that can arise from inadequate working conditions.

Table A2.3: Potential Occupational Hazard of Computer / E-Waste Components

Computer / E-Waste Component	**Potential Occupational Hazard**
Cathode ray tubes (CRTs)	Silicosis; Cuts from CRT glass in case of implosion; Inhalation or contact with phosphor containing cadmium or other metals
Printed circuit boards	Tin and lead inhalation; Possible brominated dioxin, beryllium, cadmium, mercury inhalation
Dismantled printed circuit board processing	Toxicity to workers and nearby residents from tin, lead, brominated dioxin, beryllium, cadmium and mercury inhalation; Respiratory irritation
Chips and other gold plated components	Acid contact with eyes, skin may result in permanent injury Inhalation of mists and fumes of acids, chlorine and sulphur dioxide gases can cause respiratory irritation to severe effects including pulmonary edema, circulatory failure, and death.
Plastics from computer and peripherals, e.g. printers, keyboards, etc.	Probable hydrocarbon, brominated dioxin, and heavy metal exposures
Computer wires	Brominated and chlorinated dioxin, polycyclic aromatic hydrocarbons (PAH) (carcinogenic) exposure to workers living in burning works area.

64 Lardinois and van de Klundert (1995): **Plastics recycling in developing countries; A booming business?** Downloaded from: http://collections.infocollections.org/ukedu/en/d/Jgq953e/3.1.html

65 European Commission (2011): **Plastic Waste In The Environment**, in association with BIO Intelligence Service and AEA Technology, Brussels, European Commission.

66 Dillon, P. (2007): **Toxic Heavy Metals Found In Packaging In Violation Of State Laws**, Toxics in Packaging Clearinghouse, downloaded from: http://des.nh.gov/media/pr/documents/070717.pdf

Table A2.3: Potential Occupational Hazard of Computer / E-Waste Components	
Computer / E-Waste Component	**Potential Occupational Hazard**
Miscellaneous computer parts encased in rubber or plastic, e.g. steel rollers.	Hydrocarbon including PAHs and potential dioxin exposure
Toner cartridges	Respiratory tract irritation; Carbon black possible human carcinogen; Cyan, yellow and magenta toners unknown toxicity
Secondary steel or copper and precious metal smelting	Exposure to dioxins and heavy metals
Source: Puckett et al (2002): Exporting Harm; The High-Tech Trashing of Asia, available at: http://www.ban.org/E-waste/technotrashfinalcomp.pdf.	

According to the findings of UNEP[67], there is great variety regarding the level of recycling and waste treatment amongst the cities and towns of developing countries. Urban places can have high (e.g., Calcutta, Cairo) to very low recycling potential. Typically the latter are remote islands, enclosed countries, or those having a military base e.g., Suva, Guam, St. Kitts. The following Box A2.2 details a case study of working conditions on one of Africa's largest e-waste dumpsites situated in Ghana.

Box A2.2: Agbogbloshie E-waste Dumpsite, Ghana

Agbogbloshie, a suburb of Accra, and is the site of one of Africa's largest e-waste dumping grounds. It became a destination for used electronic items in the 1990s, when the West started sending used computers as a way to 'bridge the digital divide'. However, soon this market became corrupt and mass quantities of e-waste poured in. Today millions of tonnes of e-waste are processed here every year, arriving from the United States, Europe, Japan and other industrialised countries. The situation is on-going as Ghana lacks regulations for recycling and disposing of e-waste and regulations for air, water and soil quality are weak and generally not enforced.

Agbogbloshie is spread over 15 acres. There is a large residential area, located to the East of the dumping site, which consists of small, make-shift settlements with limited electricity, water and sanitation. Most of the residents are economic-migrants. They are generally unskilled labourers looking for a way to make a living. Workers can earn about 8-10 Ghana cedis per day (4 -6 USD). However, both living and working conditions are very poor and crime and disease are high.

The age range of those working on the site varies greatly however, according to a study by Greenpeace (2008), the majority of workers are boys aged between 11 and 18. There are also many young children, some as young as 5. Workers search for metals, such as copper and aluminium, to sell later on. The process involves manual disassembly and burning of different e-waste parts. Work is generally carried out unprotected or with the use of hand-made tools. Fumes released from burning plastics and metals are high in toxic chemicals and carcinogens. Exposure to such chemicals is especially dangerous for the young. Many of the toxins present are associated with inhibiting the development of the reproductive system, the nervous system and the brain. Other ailments include chest and respiratory problems, kidney damage, developmental and behavioural disorders, infected

[67] UNEP (nd): **Municipal Solid Waste Management, Sound Practices for Cities of Developing Countries**, Newsletter and Technical Publications downloaded from: http://www.unep.or.jp/ietc/ESTdir/Pub/MSW/SP/SP2/SP2_4.asp

Box A2.2: Agbogbloshie E-waste Dumpsite, Ghana

cuts, diarrhoea, cholera, nausea, headaches and high levels of lead in the blood system. The urban nature of the site, its large population and its proximity to a food market are further calls for concern in terms of human health.

Pollution from e-waste causes harm, not only to human health and well-being, but also to the environment and surrounding areas. A study carried out by Caravanos et al. (2011) revealed elevated levels for aluminium, copper, iron, lead and zinc in breath samples collected from workers and also from ambient air samples. Furthermore, more than half the soil samples taken were above the US Environmental Protection Agency standard for lead. Substances such as lead, mercury, arsenic, dioxins, furans, and brominated flame retardants seep into the soil, water and air as a result of the waste. Agbogbloshie is situated on flat wetland by the Densu River. Heavy rainfall frequently causes flooding which then carries contaminated top soil and debris into the lagoons and the river.

Source:
Caravanos, et al. (2011): Assessing Worker and Environmental Chemical Exposure Risks at an e-Waste Recycling and Disposal Site in Accra, Ghana, Blacksmith Institute Journal of Health and Pollution, Vol 1, no 1 pp.16-25
GreenPeace (2008): Poisoning the poor; Electronic waste in Ghana, The Netherlands, GreenPeace, available at: http://www.greenpeace.de/fileadmin/gpd/user_upload/themen/chemie/ GhanaEWaste _FINAL.pdf.

In order to improve conditions suggestions have been put forward by NGOs operating in the field to subsidize protective clothing, provide access to basic health care and inoculations against tetanus.

Support for workers at dumpsites is very difficult to attain. Most municipal authorities simply do not have the capacity to prohibit waste picking, and even if they would they are likely to meet disapproval from the many thousands of poor people who survive on earnings from this activity. Furthermore, informal sector entrepreneurs and workers frequently lack the technologies to optimize recycling methods and to deal with new waste materials. They are also usually denied the assistance in financing (e.g., bank loans) that large, established firms can access as a matter of course. The working conditions for itinerant waste buyers are further complicated by other handicaps, such as harassment and extortion from local authorities and larger enterprises[68].

2.3.3 Hazardous Substances

Exposure to hazardous substances from waste exports coming from Europe and other industrialised countries can have grave impacts on worker health. Exposure can occur through both direct and indirect contact. Contaminants can spread from source, at the dumpsite, throughout the country.

Indirect contact with contaminated air, water, soil, crops, food stuffs, etc. can have serious implications for the much wider community. In addition there are costs incurred through medication and health care. Table A2.4 shows the three main routes of exposure.

[68] Ibid.

Table A2.4: Forms of Exposure and Contact	
Type of contact	**Route of exposure**
Dermal contact	Dermal contact or dermal absorption includes direct contact with contaminated dust, soil, sand or water in the surrounding area or on site. For workers, in particularly, there is also the risk of injury. This may be in the form of cuts, bruises, burns, falls, etc.
Inhalation	Inhalation of aerial contamination in the form of smoke and dust can cause respiratory irritation and disease.
Ingestion	Ingestion occurs through intake of contaminated drinking water or food. Pollutants can also enter the food chain through crops, fish, livestock etc.
Source: *Robinson (2009): E-waste: An assessment of global production and environmental impacts, Science of the Total Environment Vol 408, pp183 – 191* *Hossain, and Islam, (2006): Ship Breaking Activities and its Impact on the Coastal Zone of Chittagong, Bangladesh: Towards Sustainable Management. Young Power in Social Action (YPSA), Chittagong, Bangladesh, [online] available at: http://ypsa.org/publications/Impact.pdf.*	

Waste exported from developing countries contains various different substances. However, many of these recur in many different types of waste shipments. Although the negative impacts of some substances on human health are well known there are still many substances which have not been thoroughly tested and researched and as such evidence on both their short- and long-term effect on human health is limited[69]. Examples of some commonly found substances are listed in Table A2.5 below.

Table A2.5: Health Impacts of Substances Commonly Found in Waste	
Substance	**Health impacts**
Asbestos	Asbestos is well known as a high risk substance and is banned in many countries. Exposure to asbestos can cause cancer, a scarring of the lungs and diffuse pleural thickening.
Dioxins	Dioxins can damage the immune system, interfere with hormones and cause cancer. The developing foetus is especially vulnerable to the effects of dioxins. Dioxins are highly toxic and can interfere in healthy reproduction and development. It is believed that dioxins are taken up by humans through air, water, or food as high levels have been detected in human milk, placenta and hair. This may cause a serious health threat.
Heavy metals (eg. lead, cadmium, mercury, chromium, etc.)	Prolonged exposure to heavy metals can result in elevated levels in the blood system. Heavy metals are detrimental to the healthy functioning of many organs and tissues. Exposure is particularly harmful for children as these elements inhibit the development of the nervous system, the reproductive system and the brain. They can also cause behavioural disorders, abdominal pain, headaches, anaemia, seizures, coma and death.
PAHs (polycyclic aromatic hydrocarbon) and Inorganic acids	Exposure to PAHs and inorganic acids can result in short-term and long-term health problems. PAHs are associated with eye irritation, nausea, vomiting, diarrhoea, confusion, skin irritation and inflammation. Long-term health risks include decreased immune function, cataracts, kidney and liver damage, respiratory problems, and cancer.

[69] Robinson (2009): *E-waste: An assessment of Global Production and Environmental Impacts,* Science of the Total Environment, Vol 408, pp183 – 191

Table A2.5: Health Impacts of Substances Commonly Found in Waste	
Substance	**Health impacts**
PCBs (polychlorinated biphenyl)	Exposure to PCBs can affect sperm motility, foetal growth and development and neurological functions.
PDBEs (Polybrominated diphenyl ethers)	PDBEs are a type of persistent organic pollutant (POP) which can accumulate in the human body causing a variety of maladies such as thyroid hormone disruption, permanent learning and memory impairment, behavioural changes, hearing deficits, delayed puberty onset, impaired infant neurodevelopment, decreased sperm count, foetal malformations and possibly cancer.
PVC (polyvinylchloride) plastic	The burning of polyvinylchloride (PVC) plastics produces furans and dioxins which are persistent organic pollutants (POPs). Particles are released into the air and can be inhaled by humans. These have been associated with immune and enzyme disorders, cancer and can also disrupt reproduction and development.
VOCs (volatile organic compounds)	VOCs are usually highly toxic, and often carcinogenic
Sources: *GreenPeace (2008): Poisoning the poor; Electronic waste in Ghana, The Netherlands, GreenPeace, available at: http://www.greenpeace.de/fileadmin/gpd/user_upload/themen/chemie/ GhanaEWaste _FINAL.pdf.* *Lah (2011): Polycyclic Aromatic Hydrocarbons, Toxipedia; connecting Science and people, available at: http://toxipedia.org/display/toxipedia/Polycyclic+Aromatic+Hydrocarbons* *Robinson (2009): E-waste: An assessment of global production and environmental impacts, Science of the Total Environment, Vol 408, pp183 – 191* *WHO (2003): Polychlorinated Biphenyls: Human Health Aspects, A Concise International Chemical Assessment, Document 55, available at: http://www.who.int/ipcs/publications /cicad/ en/cicad55.pdf.* *WHO (2010): Dioxins and their effects on human health, Fact sheet N°225, available at: http://www.who.int/mediacentre/factsheets/fs225/en/.*	

As Table A2.5 above lists, there are long-term and often lethal implications of inadequate waste treatment conditions. Continuous environmental monitoring of waste treatment sites can support further development and lead to improved assessments and management strategies for the individual facilities.

2.3.4 Child Labour

Child labour occurs in many developing countries. It is generally driven by an economic situation whereby families rely on child labour in order to survive. Although most child labour is related to agriculture[70], it can also include working at waste treatment facilities. It is therefore likely that waste received from Europe and other industrialised countries will contribute to the labour demand as well as providing the potential of earning a living.

[70] International Labour Organisation (2010): **Facts on Child Labour 2010**, available from: http://www.ilo.org/global/publications/WCMS_126685/lang--en/index.htm

Box A2.3: Child Labour in Kenya and India
Many factors attract children to work on the dumpsite. Poverty and the potential of quick money is a major driving force. According to a study carried out in Dandora, Nairobi's largest dumpsite, a child can earn between 200 and 400 shillings (US $ 3 – 6) per day from the sale of collected plastics and metals. BBC (2010) reports that in Govandi, Mumbai, children can earn anywhere between US $1 and $6 a day. In addition to cash there is generally access to food which is also dumped on site. However, rather than helping to break the inter-generational cycle of poverty, child labour and lack of education reinforces it. The study carried out in Dandora estimates that close to 10,000 people work onsite and of this the majority are children under the age of 18. Some are as young as 10. Some are full-time workers while others work part-time on weekends or during school holidays. Children often drop out of school in order to earn money for themselves and their families on the dumpsite. The majority of workers are male.
Source: *ANPPCAN (nd): Combating Child Labour in Embakasi, downloaded from http://www.anppcankenya.co.ke/index2.php?option=com_content&do_pdf=1&id=43 and ,* *BBC (2010): From rubbish dump to school room in Mumbai, downloaded from http://www.bbc.co.uk/news/10133159*

Ship-breaking yards also employ children as child labour is generally less expensive than adult labour. However, males are employed due to the physical strength required. According to FIDH and YPSA[71] around 10% of the workers at Chittagong's shipbreaking yards in Bangladesh are under 12 years old. 15-20% of the workforce is under 15 years old and 25% is under 18 years. Children can earn about 120 taka for 15 hours work.

2.4 Economic Impact

2.4.1 Background

The driving force behind waste exportation to non-OECD countries is grounded in global economics. Waste has grown in prominence as an international commodity and big international container ports have become important hubs for the transportation of this waste[72]. The reasons behind this have been examined from both the standpoint of the exporting country and from that of the receiving country.

For the exporting country, the main incentive to export waste lies in the difference in price between domestic and overseas treatment and disposal, as well as in achieving targets related to recycling. Treating waste in accordance with the environmental and social standards in place in industrialised nations can be costly whereas developing

[71] International Federation for Human Rights (2008): **Childbreaking Yards**, Child labour in the Ship Recycling Industry in Bangladesh, downloaded from http://www.fidh.org/IMG/pdf/bgukreport.pdf

[72] Ruessink and Wolters (2009): **Time to end illegal international shipments of waste**, article downloaded from **Greenport**, Hampshire, available at: http://www.greenport.com/features101/tugs,-towing,-pollution-and-salvage/guidelines/time-to-end-illegal-international-shipments-of-waste

countries and emerging economies tend to offer a cheaper alternative. Cheap labour in developing countries drives the cost down. Less stringent environmental, social and health regulations also allow for a lower treatment cost[73].

For the receiving country, waste from industrialised nations can be a source of valuable raw materials and job opportunities. In developing countries, precious metals such as gold, silver, platinum, palladium or rhodium can be recovered from various waste shipments at a much lower cost than in industrialised nations. Recycling waste can provide important raw materials. This can be viewed as an efficient and welcome opportunity for countries with a growing production economy and a growing demand for recycled raw materials, as can be seen, for example, in many Asian countries.

Raw materials feed the domestic market, which, in turn, encourages industrial growth. In addition, there is a market, particularly in Africa, for used and discarded items such as car parts and electronic equipment. Overall, waste can generate employment opportunities, industrial growth and can fill the gap in the domestic market for cheap recycled raw materials[74].

Box A2.4: Challenges for Dealers and Authorities

One of the challenges for both dealers and enforcement agencies is to balance international and national regulations when it comes to conditions of export. The Basel Convention forbids the export of waste unless for treatment or recycling. The Convention provides an extensive list of waste codes and each country then has its own rules as to which wastes it will receive and under what conditions. One country may accept a certain scrap metal whilst another might ban it for a number of reasons including the protection of their own recycling industry. However, for many exporters and for the enforcement agencies, there is often a conflict between the export movement codes and the markets.

An overseas re-processor in the Far East might be delighted to receive paper that has come out of a sorting facility and which contains plastic contamination as it might be financially viable for them to then do more sorting. But there is not a Convention code – or a European Waste Catalogue (EWC) code – that allows that to be exported as it would be considered to be waste rather than recyclable waste.

Another issue facing exporters is the wrong classification of waste when it does get exported. Electrical equipment, for instance, can be exported as product if it can continue to be used for the purpose for which it was designed. 'Product' does not have any of the controls that waste has and can therefore be moved freely without waste documentation and without concerns about country restrictions. However, much of the used equipment that gets sent abroad is beyond economic repair in, for example, the UK.

One view is that this type of equipment could be classified as waste and only exported under very strict controls to demonstrate that it will be repaired and put back on the market in the destination country. What is not in doubt is that there is a growing trade in illegal exports of hazardous WEEE, especially IT equipment and televisions, which leads to extremely dangerous processes that often appear in investigative television programmes. There is now a much greater level of global coordination to try to stamp out these exports.

Source: DS Smith Recycling downloaded from http://www.dssmithrecycling.com/news/waste-exports

73 ibid.

74 Sonak, *et al* (2008): **Shipping Hazardous Waste: Implications for Economically Developing Countries**, International Environmental Agreements, (2008), Vol 8, pp 143–159.

While trade in waste can result in benefits for both exporting and receiving nations, and restrictions and/or bans on such trade would be counter-productive, it is undeniable that the negative social, environmental and economic implications arising from the poor management of waste is causing long-term damage to countries[75].

Non-OECD countries can be inadequately prepared to manage the quantity of waste inflows. They lack the resources to safely treat and dispose hazardous waste, to deal with accidents and occupational hazards, and to protect the rights of the workers.

Inadequate and inefficient treatment of discarded products, especially those containing critical raw materials, can lead to a considerable amount of valuable elements being lost. UNEP's status report[76] on the recycling rates of metals identifies three levels of recycling efficiency, these are: old scrap collection rate, recycling process efficiency rate and end-of-life recycling. In the case of exported materials, the ratio of both recycling process efficiency and end-of-life recycling rate depend on the extraction process implemented in third country waste treatment plants. Inefficient recovery of metals can open up the life-cycle loop and result in the loss of these materials. Resource recovery rates are therefore a reflection of the efficiency of both collection and recycling of the elements. Improvements in collection rates, reductions in illegal exports – and consequently unmonitored waste treatment – as well as improved standards in third country processing plants can contribute to increased recovery rates of raw materials[77].

Less stringent regulatory requirements and cheaper labour can facilitate the increase of waste flows from industrialised countries to developing countries, where there will be a continued struggle with the rising quantities of waste. Under such circumstances, it is argued that the environmental and social costs endured far outweigh any economic benefits acquired locally.

The economic benefits go hand-in-hand with social and environmental costs arising from inadequate regulations and improper management of waste. Therefore, waste trade can reflect inequalities (environmental, social, etc.) resulting from asymmetrical economic status[78].

2.4.2 Metal and E-Waste

Printed circuit boards are a major component of e-waste and are of particular value. They are a complex composition of plastic, glass, ceramics and metals, including precious metals such as silver, gold, palladium and platinum. Therefore, they are the

75 Sonak, *et al* (2008): **Shipping Hazardous Waste: Implications for Economically Developing Countries**, International Environmental Agreements, (2008), Vol 8, pp 143–159.

76 UNEP (2011): Status Report, Recycling Rates of Metals, a report of the working group on the global metal flows to the International Resource Panel

77 International Platinum Group Metals Association (2011): Resource Efficiency: How to Improve Recovery Rates of Valuable Raw Materials, downloaded from http://www.ipa-news.com/en/files/ipa_newsletter_spring_2011.pdf

78 Sonak, *et al* (2008): **Shipping Hazardous Waste: Implications for Economically Developing Countries**, International Environmental Agreements, (2008), Vol 8, pp 143–159.

most sought after item within the e-waste rubric. In fact, the precious metal concentrations found in printed circuit boards are ten-fold higher than commercially mined minerals[79]. Securing access to these raw materials in Europe is essential.

The European Commission's Raw Materials Initiative has identified a list of 14 economically important raw materials which are subject to a higher risk of supply interruption. These include antimony, beryllium, cobalt, fluorspar, gallium, germanium, graphite, indium, magnesium, niobium, platinum group metals, rare earth elements, tantalum and tungsten. Electronic equipment contains a number of valuable and scarce metals, including some of the critical raw materials such as gold, tantalum, rare earths and indium. These metals are important for the future development of industries such as wind power, photovoltaics and electric mobility[80].

In order to secure access to these critical raw materials, while maintaining resource efficiency targets and securing a sustainable production process, it is essential that e-waste is treated in such a way that the highest possible percentage of these substances is extracted. Appliances can be dismantled prior to export; they are broken down and the most valuable components are extracted ("high-grading"), while the rest of the material is put into containers according to waste type (plastic/wires/circuit boards/etc.). In other cases the appliances are exported in bulk without any sorting[81]. While the efficient recovery of raw materials depends to a large extent on the infrastructure, technology and know-how applied during the waste treatment process, a 2006 OECD study on Improving Recycling Markets[82] has identified a number of market-based challenges as well. These included transaction costs, information failures between buyers and sellers and other externalities such as market trends. The study highlights the importance of policy mixes that incorporate not only environmental legislation but market and industry related regulations as well.

2.4.3 End-of-life vessels

Ship-breaking operations are primarily carried out in Asia. In fact, Asian yards account for 95% of the industry[83]. Alang (India) is the most important yard followed by Chittagong (Bangladesh). Other major ship-breaking destinations include China, Turkey and Pakistan.

According to the NGO Shipbreaking Platform, approximately 800 ships reach their end-of-life annually; of this 80% are run aground on the shores of developing

79 Robinson (2009): **E-waste: An assessment of Global Production and Environmental Impacts**, Science of the Total Environment Vol 408, pp183 – 191

80 Oko Insitut e.v. (2012): **Recycling Raw Materials from Waste Electronic Equipment**, downloaded from http://www.oeko.de/about_us/dok/1331.php

81 Puckett et al (2002): **Exporting Harm; The High-Tech Trashing of Asia**, downloaded from: http://www.ban.org/E-waste/technotrashfinalcomp.pdf

82 OECD (2006): **Improving Recycling Markets**, Executive Summary downloaded from http://www.oecd.org/dataoecd/34/30/37760122.pdf

83 FIDH (2002): **Where do the "floating dustbins" end up? Labour Rights in Shipbreaking Yards in South Asia.** The cases of Chittagong (Bangladesh) and Alang (India), International Federation for Human Rights, [online] available at: http://www.fidh.org/IMG/pdf/bd1112a.pdf.

countries. The majority of vessels arrive from industrialised countries in the West. Sources suggest[84] that Europe owns more than 40% of the world's fleet and it is common for European ship owners to sell end-of-life vessels to ship breaking facilities in Asia. In 2009 Greece topped the list with more than 60 large ships sold to Bangladesh or India.

Box A2.5: Economic Benefit of Ship Dismantling in Bangladesh

During the last three decades one of the main recipients of ships bound for dismantling has been Bangladesh. In order to maximize profits instead of locally dismantling, ship owners sent their vessels to the scrap yards of India, China, Pakistan, Bangladesh, the Philippines and Vietnam, where wages, health and safety standards are minimal and workers are desperate for work. YPSA, the Organisation of Social Development in Bangladesh has listed the main economic benefits which the ship-breaking industry has brought to Bangladesh:

- Supply of Steel - ship-breaking is a major source of steel. The provision of steel to the Bangladeshi market reduces the demand for imported steel materials and therefore saves on foreign exchange;
- Supply of Iron - Bangladesh does not have iron and therefore iron salvaged from the ship-breaking industry supplements Bangladesh's demands and feeds the re-rolling mills and the steel factories. Ship-breaking activities supply about 90% of iron materials required by the country;
- Raw materials for industry - Almost all components of the vessels are recycled, reused and resold. Ship-breaking provides raw materials for asbestos re-manufacturing and oil regeneration. It also provides materials for trade such as furniture, paint, electrical equipment, lubricants, and oil;
- Employment – the ship-breaking industry directly employs more than 20 000 people. Indirect employment is also a major economic factor. Many new businesses have been generated and have expanded as a result of the ship-breaking industry. For example the provision of oil generated from the ship-breaking industry has resulted in new businesses development, retail and other businesses are also created to trade in the materials recovered and to provide for the workers and community. In addition, the industry provides employment to some of the poorest people. They are often unskilled, lack proper education and have few other means of employment; and
- Tax revenue – the ship-breaking industry generates large amounts of revenue for various Government authorities through the payment of taxes. Every year the Government collects almost nine billion taka in revenue from the shipbreaking industry through import duty, yards tax and other taxes.

In addition to the direct employment, the industry generates many downstream activities. Almost 100% of the ship is recycled, reused or resold. This entails a large workforce directly employed through the industry and an even greater number of people whose work is indirectly related to the industry. Ship-breaking has brought with it multiple spin-off industries and entrepreneurial opportunities for commerce. FIDH (2002) estimates that more than 100 000 people are indirectly involved in the industry through their work in recycling and in businesses which have grown around the ship-breaking yards.

Sources: Hossain, and Islam, (2006): Ship Breaking Activities and its Impact on the Coastal Zone of Chittagong, Bangladesh: Towards Sustainable Management. Young Power in Social Action (YPSA), Chittagong, Bangladesh, [online] available at: http://ypsa.org/publications/Impact.pdf.
FIDH (2002): Where do the "floating dustbins" end up? Labour Rights in Shipbreaking Yards in South Asia. The cases of Chittagong (Bangladesh) and Alang (India), International Federation for Human Rights, [online] available at: http://www.fidh.org/IMG/pdf/bd1112a.pdf

[84] Ecologist (2010): **Shipbreaking: clampdown in Asia will send it to Africa**, The Ecologist, March 2010, downloaded from: http://www.theecologist.org/News/news_analysis/430969/shipbreaking_clampdown_in_asia_will_send_it_to_africa.html

Ship-breaking is an important industry in many developing countries. It is a particularly profitable business for yard owners as it requires little investment, low labour costs, little investment in worker health and safety, and environmental protection[85]. However, it also has a major impact on the local and national economy; providing direct and indirect employment and a source of raw materials. In addition, it has been argued by some that it is a sound sustainable industrial activity[86].

2.4.4 Plastic Waste

As with other waste streams, plastic waste exported to developing countries generally generates growth and jobs. High unemployment and low labour costs make labour intensive work such as rubbish collecting, sorting and cleaning feasible. Due to low-income consumers, low quality products are generally more accepted in the domestic market. This is accompanied by few or no regulations.

Recycling plastic is more economical than producing new plastic and it is becoming more feasible and more widely practiced in developing countries. In recent years there has also been on-going research on methods to convert plastic waste to fuel[87]. This could generate energy, provide jobs and reduce GHG emissions. Overall the benefits of plastic recycling include[88]:

- income generation;
- low levels of investment;
- technically uncomplicated production processes to produce a wide variety of products for a broad market; and
- less waste disposal.

Recycling often takes place on an individual basis or within informal small-scale enterprises with the use of out-dated and often repaired machinery. In developing countries, most employment is generated at the collecting stage of recycling. These are low-skilled jobs which require little initial investment and enable those who have little education and skills to make a living. Waste reprocessing enterprises also provide work for a number of craftsmen, electricians and fitters, who carry out critical tasks in maintaining the production process. Wages within the recycling sector vary a great deal according to the type of work performed[89].

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85 Sonak, *et al* (2008): **Shipping hazardous waste: implications for economically developing countries**, International Environmental Agreements, (2008), Vol 8, pp 143–159.

86 Hossain, and Islam, (2006): **Ship Breaking Activities and its Impact on the Coastal Zone of Chittagong, Bangladesh: Towards Sustainable Management**. Young Power in Social Action (YPSA), Chittagong, Bangladesh, [online] available at: http://ypsa.org/publications/Impact.pdf

87 UNEP (2009): **Converting Waste Plastics into a Resource; Assessment Guidelines**, downloaded from: http://www.unep.or.jp

88 Lardinois and van de Klundert (1995): **Plastics Recycling in Developing Countries; A Booming Business?** Downloaded from: http://collections.infocollections.org/ukedu/en/d/Jgq953e/3.1.html

89 Ibid

However, there are also negative economic impacts associated with waste imports. In developing countries, a much larger proportion of people rely on natural resources for their livelihoods than those in industrialised countries. Waste can affect the economic benefits which people derive from these resources and people's livelihoods can be negatively impacted as a result of the environmental impacts caused by plastic waste.

Plastics are also responsible for leaching toxic substances into soils and groundwater, affecting crops. Plastic particles can blow off poorly designed and managed landfill sites and end up on the streets or in the sea. This can impact fishing, shipping, tourism, and the marine ecosystem as a whole.

2.4.5 Paper Waste

It is suggested that the recovery of waste paper is much more market driven in developing countries than it is in industrialised countries. In addition, countries which are highly forested tend to utilise waste paper less than those which have less forested areas per capita[90]. As such, China is a major importer of waste paper.

It is estimated that about 69% of European paper is recycled[91]; this figure is calculated on the basis of paper consumed in the EU Member States plus Norway and Switzerland. Approximately nine million tonnes of waste paper is exported for treatment, 75% of which is sent to China.

Exporting waste paper has implications for Europe as the current system of waste exporting could threaten climate change targets. The production of virgin paper, which takes place in Europe, requires considerably more energy than the recycling process, which takes place in Asia. Therefore the paper that is used in Asia is being produced or "reproduced" using a lot less energy.

China's demand for paper is rising and due to limited forest resources to generate virgin pulp China has seen an increased demand for paper waste. Input costs, such as the price of waste paper relative to virgin materials, are also a determining factor affecting the imports. Production costs can be reduced through the utilisation of waste paper. Paper mills consuming waste paper cost much less to run (but also to construct) than those using wood pulp. Therefore, through recycling, the paper industry can save on raw materials and conserve resources[92].

A study from India[93] suggests that with increased trade in waste paper the environmental impacts are less than those without free trade. The positive impacts of recycling exceed the negative impacts associated with transportation. However, the economic crisis has affected this market. Reduced consumption in the West translates to reduced exportation of paper waste to Asia. Prices for recycled paper have dropped

90 van Beukering and Sharma (1998): **Waste Paper Trade and Recycling in India**. Jodphur, India, Pawan Kumar Scientific Publishers.

91 Interview with CEPI, 2012

92 ibid.

93 ibid.

since the beginning of the economic crisis, and often fail to cover the costs of collection and shipping[94].

2.5 Regulatory Regimes in Place in Receiving Countries

2.5.1 Background

The export of hazardous wastes for final disposal and recycling from EU and OECD members and Liechtenstein, to all other Parties to the Basel convention is prohibited. Within the EU, it is Article 37 of the Waste Shipment Regulation 1013/2006/EC which describes the conditions of export of green-listed waste to non-OECD countries that are party to the Basel Convention.

Box A2.6: Article 37 of the Waste Shipment Regulation on Procedures when exporting waste listed in Annex III or IIIA

In the case of waste which is listed in Annex III or IIIA and the export of which is not prohibited under Article 36, the Commission shall, within 20 days of the entry into force of this Regulation, send a written request to each country to which the OECD Decision does not apply, seeking:

- confirmation in writing that the waste may be exported from the Community for recovery in that country, and
- an indication as to which control procedure, if any, would be followed in the country of destination.

Each country to which the OECD Decision does not apply shall be given the following options:

- prohibition; or
- procedure of prior written notification and consent as described in Article 35; or
- no control in the country of destination.

Source: European Commission downloaded from http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:190:0001:0098:EN:PDF

Further to the measures listed in the Waste Shipment Regulation, the European Commission has requested responses from countries to whom OECD Decision C(2001)107/Final on the control of transboundary movements of wastes destined for recovery operations does not apply.

Regulation 1418/2007/EC identifies the countries that have responded in writing as being: Algeria, Andorra, Argentina, Bangladesh, Belarus, Benin, Bosnia and Herzegovina, Botswana, Brazil, Chile, China, Chinese Taipei, Costa Rica, Côte d'Ivoire, Croatia, Cuba, Egypt, Georgia, Guyana, Hong Kong (China), India, Indonesia, Iran, Israel, Kenya, Kyrgyzstan, Lebanon, Macau (China), Malawi, Malaysia, Mali, Moldova, Morocco, Oman, Pakistan, Paraguay, Peru, Philippines, Russia, Seychelles, South Africa, Sri Lanka, Thailand, Togo, Tunisia, Ukraine and Vietnam.

94 French, P (2009): **Paper recycling – China's Rubbish Economy**, Ethical Corporation Magazine, downloaded from: http://www.ethicalcorp.com/environment/paper-recycling-%E2%80%93-china%E2%80%99s-rubbish-economy

Certain countries that have not issued a written confirmation that the waste may be exported to them from the Community for recovery are considered to have a procedure of prior written notification and consent. As Regulation 1418/2007/EC is directly applicable for Member States, the requests from the non-OECD countries have the force of law. DG-Trade keeps track of incoming reactions and offers information in an online database[95].

The Regulation 1418/2007/EC is being updated on a regular basis, and has already been amended – by Regulation 740/2008/EC – with regard to the procedures to be followed for export of waste to certain countries. The amendment deals with the export of green waste for recovery to non-OECD countries such as China, India or Malaysia. A summary of the responses of countries identified as the primary recipients of exported waste for the most prominent waste streams can be found in Annex 2 of this report.

Beside the legislative measures, European Union Member States also provide summary tables regarding the different regulatory regimes of waste receiving countries to assist exporters of green list waste.

The following subsections detail the regulatory regimes applied in the receiving countries for the most prominent waste types - metal, paper and cardboard and plastic waste.

2.5.2 Turkey

Turkey is one of the most important recipient countries for metal waste arriving from the European Union. The country is a member of the OECD therefore the provisions of OECD Decision C(2001)107 on the Control of Transboundary Movements of Wastes Destined for Recovery Operations are applicable.

The OECD Decision regulates the transboundary movement of waste supervised and controlled under a specific intra-OECD Control System, based on two types of procedures:

- Green List Control Procedure: for wastes that present low risk for human health and the environment and, therefore, are not subject to any other controls than those normally applied in commercial transactions; and
- Amber List Control Procedure: for wastes presenting sufficient risk to justify their control.

The OECD Decision takes into account recovery operations only and is limited to import, export and transit in OECD member countries.

[95] European Commission, DGTRADE (2009): **Wider Agenda**, Environment, downloaded from http://ec.europa.eu/trade/issues/global/environment/waste.htm

2.5.3 Egypt

According to an unofficial translation available via the World Intellectual Property Organisation of the Decree 770/2005[96] issuing procedures of imported and exported goods, Egypt allows the import of certain products as 'used goods'. These products are listed in annex two of this Decree. Among them, goods considered waste according to EU legislation are defined as used goods according to Egyptian legislation. Table 2.6 gives the relevant wastes that are defined as used goods and their required procedures for import.

Table A2.6: Conditions Given in Annex 2 of the Egyptian Decree 770/2005 for the Relevant Waste Streams

Item	Conditions Given in Annex 2 of the Decree 770/2005
Waste and metals scrap including used railway tracks	- shall not include used car spare parts. - railway tracks shall be scrapped prior to customs clearance. - it shall be accompanied by an official certificate issued by governmental agencies or auditing companies in the exporting country stating that the consignments are free of explosives or hazardous materials.
Waste, parings and scrap of artificial plastics.	- approval of the Head of Environment Affairs Agency.
Scratch paper, paper used for newspapers and magazines, returned stuff and used books	- approval of the competent authority at the Ministry of Information.

A number of Presidential, Prime Ministerial and Ministerial Decrees were issued in Egypt, streamlining procedures of import inspection, consolidating the authority to complete the necessary inspections under of the General Organization for Export and Import Control (GOEIC). Whilst other Decrees issued recognize certification of inspections conducted by outside accredited agencies[97].

2.5.4 China

China ratified the Basel Convention on March 22, 1990 and, in response to increasing concerns about the impact of unregulated import of waste, in the late 1990s the Chinese government began passing laws and regulations to better regulate the recycling, storage, and disposal of imported wastes, as well as banning imported waste that cannot be used as raw materials[98].

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96 World Intellectual Property Organisation (nd): **Decree by the Minister of Foreign Trade & Industry No.770 /2005** issuing the executive regulation to implement import and export Law no.118/1975 as well as inspection and control procedures of imported and exported goods, downloaded from http://www.wipo.int/wipolex/en/text.jsp?file_id=191626 last accessed 27.05.2012

97 World Trade Organisation (2005): **Trade Policy Review Report** by EGYPT, WT/TPR/G/150WTO 2005, downloaded from http://www.wto.org/english/tratop_e/tpr_e/g150_e.doc

98 European Commission (2011): **Study on the Role of Customs in Enforcement of European Community Legislation Governing the Protection of the Environment and its Best Practice**, downloaded from http://ec.europa.eu/taxation_customs/resources/documents/common/

In 1996, legislation on the *Prevention of Environmental Pollution Caused by Solid Wastes* was adopted by the National People's Congress (NPC) and later amended allowing the importation of 30 types of waste used as raw materials under 10 categories[99]:

In 2001 the State Environmental Protection Administration (SEPA) further imposed control on the import permitted categories by dividing into three licencing categories (restricted, automatic, and prohibited.):

a) List of Restricted Imported Solid Wastes that Can Be Used as Raw Materials: Any imported wastes that need to be sorted or cured before recycling with low environmental impact are listed as restricted imports. The list permits 21 types of wastes that can be controlled or reduced, which includes e.g.: scrap and leftover plastics; scrap stainless steel; compressed waste cars; waste motors; wires and electronic appliances; scrap tungsten, magnesium, and titanium; as well as waste ocean vessels and other floating structures for shipbreaking.

b) List of Automatic-Licensing Imported Solid Wastes that Can Be Used as Raw Materials: The 24 types of wastes that can be directly recycled with little or no pre-treatment within China includes waste bones, wood, paper and cardboard, textiles, and scrap iron, copper, nickel, aluminium, zinc, tin and tantalum.

c) List of Wastes Prohibited Against Import: This list includes 53 kinds of waste, such as: domestic waste, medical waste, waste organic solvent, waste clothes, waste tyres and tyre pieces, battery waste and scrap, used batteries, as well as 21 household appliances and waste electric motors including air conditioners, televisions and computers (including their parts and accessories, dismantled parts, broken parts and scrap unless stipulated otherwise by the State.)

The Government of China has adopted a strategy to manage the environmental risk of imported waste through the following:

- Prohibition of Import: China bans dumping, storage and disposal of imported solid waste in its territory. Moreover, imports of solid waste that cannot be used as raw materials or used in an environmentally sound way are also prohibited. China also does not permit the transfer of hazardous waste through its territory.

- Import Licensing: Solid waste that can be used as raw materials may not be imported without consent in the form of an import licence. There are two kinds of import licences: (1) an import licence for restricted solid waste that can be used as raw materials; and (2) an import licence for automatic-licensing solid waste that can be used as raw materials.

[99] Base metal scraps (especially iron, steel, copper, and aluminium); (2) smelt slag; (3) wood and wood articles wastes; (4) waste and scrap of paper or paperboard; (5) textile waste; (6) animal wastes; (7) waste electric motors, as well as electric scraps, wires and cables; (8) waste transportation equipment; (9) other wastes demanding special treatment and (10) plastic scrap

- Environmental Standard - Inspection and Quarantine: Imported solid waste must meet national environmental protection standards and be examined and approved by the Administration for Quality Supervision, Inspection and Quarantine (AQSIQ). Foreign waste shall not be shipped to China until it is approved through a pre-shipment inspection.

- Penalties: Those who ship solid waste from outside China and dump, store, or dispose of the waste inside the country and those who import prohibited or restricted solid waste without permission shall be ordered by Customs to ship the waste back and may be subject to penalties. Those who transport hazardous waste via the territory of China shall be ordered by the Customs to ship the waste back and also may be subject to penalties. Those who smuggle solid, liquid or gaseous waste into China could face a sentence of up to five years in prison and a fine.

The following agencies are responsible for the enforcement and coordination of the Chinese laws concerning the import of imported waste:

- the China State Environmental Protection Administration (SEPA**)** is the lead agency and is responsible for: (1) initiating laws, regulations, and policies; (2) coordinating among government departments; (3) implementing the Basel Convention and licensing waste import; and (5) leading the pollution prevention programmes, monitoring and supervising waste exporters and users of imported waste;
- the General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ) is registering overseas suppliers of waste materials and domestic recipients; conducts pre-shipment inspection, entrance inspection, and quarantine according to environmental control standards; and issues Customs Clearance Form of Entry Goods for accepted waste;
- the China General Administration of Customs is responsible for controlling entry inspection, duty collection, and clearance based on import permit, as well as for combating waste smuggling; and
- the National Development and Reform Commission and Ministry of Commerce participate in drafting laws, regulations, and policies relating to the import of waste.

'Green-Listed' waste in China is subject to unilaterally imposed licensing and certification controls as follows:

- Chinese importers of (Green-Listed) waste are required to be licensed by the Chinese Ministry for Environment (SEPA licence);
- suppliers in exporting countries (including the EU-27) are also required to be registered and licensed by the AQSIQ (AQSIQ Licence); and

- consignments of Solid Waste originating in the EU (and worldwide) and destined for China are required to obtain the certification of pre-shipment Inspection issued by an inspection and certification company or agency[100] accredited by AQSIQ.

However the China Certification & Inspection (Group) Co. Ltd (CCIC) indicated that only about 10% of waste originating from the EU is subject to pre-shipment inspection and certification by CCIC. In order to understand the origin and route of the remaining 90% of EU exported waste that ends up in China, it is necessary to examine the case of Hong Kong.

2.5.5 Hong Kong

The provisions of the Basel Convention are applicable to the Hong Kong Special Administrative Region (HKSAR) under China's sovereignty. It is the Environmental Protection Department (EPD) which is designated as the competent authority under the Convention to enforce control on import, export and transit of hazardous waste in the HKSAR[101]. Hong Kong's key regulation controlling the movement of waste is the Waste Disposal Ordinance (WDO).

Under the WDO, any import and export of prescribed hazardous, non-recyclable and contaminated waste for whatever purpose, and import and export of other waste for a purpose other than recycling, must be authorised by the EPD through a permit (the list of substances can be found in the sixth schedule of the WDO). Any violation of the regulation could be subject to a fine or prison term. However trans-shipments of hazardous waste which do not involve any offloading and re-loading of the waste are exempted from the permit control. Unlike China, Hong Kong does not require any pre-shipment inspection of waste consignments nor do the suppliers of waste need prior registration and licencing. Waste originating from the EU and listed under 'Green Listed' waste is therefore exempt from any control.

The port of Hong Kong receives close to four million tonnes of plastic waste per year and exports similar amounts as well, suggesting the plastic that arrives to the port is being traded further. Other significant amounts of shipment include ferrous and non-ferrous metals, as well as paper. It is estimated that up to 90% of waste exported from the European Union to Hong Kong ends up in China.[102]

Further to the Basel Convention, HKSAR signed a Memorandum of Understanding with Mainland China in 2000, which was updated and renamed as "Co-operation Arrangement on Control of Waste Movements between the Mainland and HKSAR" in 2007. It requires the transboundary movements of waste between the two areas or

100 In theory, there is no restriction on the number of companies that could provide the inspection and certification service required by AQSIQ, however in practice the only third party company currently accredited to undertake such pre-inspection and certification is the China Certification & Inspection (Group) Co. Ltd (CCIC), which has its main offices in Rotterdam.

101 European Commission (2011): **Study on the Role of Customs in Enforcement of European Community Legislation Governing the Protection of the Environment and its Best Practice**, downloaded from http://ec.europa.eu/taxation_customs/resources/documents/common/

102 Ibid.

waste shipments to overseas via the ports of the Mainland or the HKSAR to follow the Basel Convention's prior informed consent mechanism.

While the import of electronic waste is illegal into mainline China, it is alleged that legislation in Hong Kong provides loopholes allowing e-waste to enter the country and make its way to scrap yards in China. The loopholes are said to include:

- no clear definition of the terms 'recycling' or 'contamination'; and
- not all types of electronic waste are under control and whilst attention is given to old batteries and cathode ray tubes, printed circuit boards are given less attention[103].

However, there are traders and shipping companies that employ the pre-shipment inspection protocol of CCIC Hong Kong. This entails the sending of a container notification form along with three photographs of each load (at the beginning, mid-point and end of loading) to CCIC Hong Kong. The latter carried out random inspections of containers prior to their movement out of the port. Any container found not to comply with the environmental standards levied by CCIC Hong Kong would be returned[104].

2.5.6 India

According to Regulation 1418/2007/EC the export of metal waste and scrap, paper and cardboard waste and plastic waste is allowed under application of specific procedures in India. These procedures are described by the Ministry of Environment and Forest of India in its Hazardous Waste (Management, Handling and Transboundary Movement) Second Amendment Rules, 2009[105].

A person intending to import or transit hazardous waste is required to send an application form to the Central Government attaching the Prior Informed Consent. A copy of the application form needs to be sent to the State Pollution Control Board to enable them to send their comments and observations, if any, to the Ministry of Environment and Forests (MoEF). The MoEF may grant (or not) the permission for import, subject to the condition that the importer (in India) has:

- environmentally sound recycling, recovery or reuse facilities;
- adequate facilities and arrangement for treatment and disposal of wastes generated; and

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103 UK P&I Club (2008): The Perils of Waste Shipments in Freight Containers, downloaded from http://www.ukpandi.com/fileadmin/uploads/uk-pi/LP%20Documents/Carefully_to_Carry/The%20perils%20of%20waste%20shipments%20in%20freight%20containers.pdf

104 Greenstar (2006): Guide to the waste Shipment Regulations, downloaded from http://www.greenstar.co.uk/downloads/Waste_Shipment_Regulations.pdf

105 Ministry of Environment and Forest (2008): Notification, The Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008, http://www.moef.nic.in/legis/hsm/HAZMAT_2265_eng.pdf

- a valid registration form the Central Pollution Control Board (CPCB) and a proof of being an actual user.

Table A2.7 below summarizes the procedures related to shipments of Hazardous Waste for metal, paper and cardboard and plastic waste.

Table A2.7: Procedures According to the Hazardous Waste Rules (2009) for Metal, Paper and Cardboard and Plastic Waste (India)

Procedure According to the Hazardous Waste Rules (2009)	Waste Streams
'**': Import permitted in the country by the actual users without any license or restriction	B1010: All metal and metal-alloy wastes in metallic, non-dispersible form except thorium and rare earths scrap
	B1040: Scrap assemblies from electrical power generation not contaminated with lubricating oil, PCB or PCT to an extent to render then hazardous
	B1050: Mixed non-ferrous metal, heavy fraction scrap, not containing any of the constituents mentioned in Schedule 2 (of the Hazardous Waste Rules) to the extent of concentration limits specified therein
	B1100: All metal-bearing wastes arising from melting, smelting and refining of metals; except slag from copper processing and tantalum-bearing tin slag with less than 0.5% tin
	B3020: Paper, paperboard and paper product wastes
'***': Import permitted in the country for recycling/reprocessing by units registered with MoEF/CPCB and having DGFT license	B1100: Metal-bearing wastes arising from melting, smelting and refining of metals – slag from copper processing
'****': Import permitted in the country by the actual users with MoEF permission and DGFT license	B1020: Antimony and tellurium scrap
	B1030: Refractory metals containing residues
	B1100: Metal-bearing wastes arising from melting, smelting and refining of metals – tantalum-bearing tin slag with less than 0.5% tin
'No stars': Imported in to the country with the permission of MoEF	B1010: Metal and metal-alloy wastes in metallic, non-dispersible form – thorium and rare earth scrap
	B1020: Cadmium and lead scrap
	B1140: Precious metal-bearing residues in solid form which contain traces of inorganic cyanides
	B3010: Solid plastic waste

MoEF: Ministry of Environment and Forests.
CPCB: Central Pollution Control Board.
DGFT: Director General of Foreign Trade.

However, imported materials may travel illegal routes in India and are recycled at small-scale units in the informal sector. These units are not registered and their operations are considered illegal[106].

[106] Chatterjee, S. and Kumar, K. (2009): **Effective electronic waste management and recycling process involving formal and non-formal sectors**, International Journal of Physical Sciences Vol. 4 (13) pp. 893-905.

In order to ensure compliance of the conditions of imports and safe handling of the hazardous waste, the Ministry forwards a copy of the permission to the CPCB, the concerned State Pollution Control Board and concerned Port and Customs authorities.

The Port and Customs authorities ensures that shipments are accompanied by the Movement Document (form in the Hazardous Waste Rules) and the test report of analysis of the hazardous waste consignment in question, from a laboratory accredited by the exporting country.

The Customs authority collects three randomly drawn samples of the consignment for analysis - except for the products belonging to Basel numbers B1010, B1040, B1050, B1100, B1230 and B3020. For these products, they may, at any time, make random inspection of the consignment prior to clearing it. The importer in India is requested to maintain records of the hazardous waste they imported and also inform the CPCB and the concerned State Pollution Control Board of the date and time of arrival of the hazardous waste.

2.5.7 Technological Standard of Waste Receiving Facilities

Technological standards of waste receiving facilities in third countries vary to a large degree and include state-of-the -art treatment facilities as well as backyard operations. The state of the receiving facilities, the expertise of the management as well as the technical details of the work conducted are equally important.

Box A2.7: Example of Waste Treatment Facility in Nigeria
The city of Lagos, which has an estimated population of over 15 million people, faces challenges managing the high volume of waste generated daily by residents and companies. In order to enhance effective management of solid waste the city has recently unveiled a 24 tonne hydroclave waste treatment plant. The plant, located in the Oshodi area of the state, is said to be the first in West Africa and the second waste Transfer Loading Station, TLS. The new TLS, with its 1 000 tonne capacity, will treat 24 tonnes of medical and health-related waste. There is a plan to open 20 more such transfer stations in the state of Lagos in the next ten years.
Sources: Vanguard online edition: Waste management gets boosts with treatment plant in Lagos, downloaded from http://odili.net/news/source/2011/oct/3/306.html and African Spotlight: Nigeria: Lagos State Govt Gradually Actualizing Its Dream Of Cleaner Mega City, downloaded from http://africanspotlight.com/2011/10/nigeria-lagos-state-govt-gradually-actualizing-its-dream-of-cleaner-mega-city/

The treatment of waste in developing countries can often be divided into two main categories; the formal and the informal sector. According to a 2010 report[107], undertaken in collaboration with the Ghanaian authorities in the city of Accra, between 10,000 and 13,000 tonnes of e-waste are treated annually by the informal

[107] Oko Institute e.V. (2010): **Socio-economic Assessment and Feasibility Study on Sustainable e-waste Management in Ghana,** downloaded from http://www.basel.int/Portals/4/Basel%20Convention/docs/eWaste/E-waste_Africa_Project_Ghana.pdf

sector. In total, the informal refurbishing and e-waste management sector employs between 20,300 to 33,600 people in Ghana, constituting about 0.19% to 0.32% of the country's labour force. This example well reflects the amount of e-waste that is being treated without any regulative control and the employment "*value*" of this informal sector.

Solid waste management has also become a major challenge for Asia due to increased waste as a result of urbanization, economic development and industrialization. This situation is further exacerbated by the flow of imported waste from other nations, including Europe. In general, waste management in Asia is sub-standard. Open dumping, landfilling, and incineration are common methods of dealing with waste. However, it is noted that open dumping is more common in developing Asian countries, where the lack of awareness, technical knowledge, legislation, policies, and strategies concerning solid-waste management is causing significant concerns. In South and Southeast Asia, more than 90% of all landfills are non-engineered disposal facilities[108].

With regards to hazardous waste, it is the lack of capital in many Asian countries that hampers investment into existing waste treatment facilities. Often imported, out-dated second hand equipment is used despite government prohibitions and guidelines[109].

Few Asian waste companies are integrated across recycling and treatment businesses compared to those in the West. This may be due to the fragmented nature of the business which is made up of multiple informal enterprises. In addition, recyclable materials are viewed as commodities, which increases input costs and can pose financial challenge.

Nonetheless there has been investment in Asia into new waste treatment plants with modern facilities being built in recent years. Box A2.8 (next page) describes examples of an integrated hazardous waste treatment plant in Malaysia, and in India.

Treatment technologies and processes vary depending on the types of wastes as well. In relation to paper recycling for example the treatment technology is much the same everywhere in the world and it is unlikely that backyard operations would take place. Unofficial and illegal practices of dismantling and recycling are more common in connection with metal.

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108 Tränkler, J. et al. (2005): **Influence of tropical seasonal variations on landfill leachate characteristics -Results from lysimeter studies**, Waste Management, 25 (2005) 1013–1020.

109 UNEP (2004): **State of Waste Management in South East Asia**, UNEP IETC and the ASEAN Secretariat available at:
http://www.unep.or.jp/Ietc/Publications/spc/State_of_waste_Management/3.asp

Box A2.8: Examples of Waste Treatment Plants in Malaysia and India

Malaysia

An Integrated Hazardous Waste Treatment Plant at Kualiti Alam was officially opened in November 1998. Modeled after the Danish hazardous waste processing plant, Kommunekemi in Nyborg, it is the first integrated facility for the processing of hazardous wastes in Malaysia. More than USD70 million was invested in the facility.

Waste arrives both from transboundry shipments and domestic organisations. The facility receives all types of hazardous wastes except hospital and radioactive wastes.

Organic wastes are burnt in the incineration plant. Acidic and basic organic fluids are chemically treated to neutralize them. The residues from chemical treatment and other solid inorganic residues are bound with lime and cement before being disposed in a double membrane lined landfill, which should have capacity for waste residues storage of up to 20 years.

India

Ramky set up India's first integrated industrial hazardous waste management facility at Hyderabad, Andhra Pradesh. All the facilities are in line with the international guidelines. Ramky operates India's largest hazardous waste incinerator at Taloja, a facility on par with the world's best incinerators with minimum emissions. They comply with the guidelines enunciated by the Central Pollution Control Board and are on par with international industry standards.

Another example for investment into recycling is the 'Crystal project' in India. Umicore, which operates the world's largest precious metals recycling facility, has launched a project with Indian partners, E-Parisaraa, to promote the sustainable recycling of electronic scrap.

In another initiative SMS Envocare Ltd, which is part of Central India's largest civil engineering and infrastructure Development Company, is using the Westinghouse Plasma Gasification plasma technology and reactor vessel design in two 72 tonnes-per-day energy recovery from hazardous waste plants in India.

Sources: UNEP (2004): State of Waste Management in South East Asia, UNEP IETC and the ASEAN Secretariat available at:

http://www.unep.or.jp/Ietc/Publications/spc/State_of_waste_Management/3.asp

Umicore (nd.): Unicore to promote sustainable e-waste recycling in India, available at: http://www.preciousmetals.umicore.com/PMR/News/crystal.html.

AlterNRG (nd.) The World's Largest Plasma Gasification Facility Processing Hazardous Waste

According to the European Association of Metals (Eurometaux) 'backyard' recyclers are not uncommon in non-OECD countries and this practice results in a low yield of materials. There are other units which generally undertake pre-waste/dismantling, once a products is dismantled waste is dumped on dumpsites. Overall in comparison to the size of the industry in non-OECD countries little investment has gone towards improving the conditions of recycling and recovery.

2.6 Predicted Future Trends of Export

2.6.1 Background

Waste treatment trends in the European Union are heading towards zero emission. According to the 2007 IPCC report[110], post-consumer waste is a low contributor to global greenhouse gas emissions (<5%) with total emissions of approximately 1 300 $MtCO_2$-eq in 2005. The largest source is landfill methane (CH_4), followed by wastewater and nitrous oxide (N_2O); in addition, minor emissions of carbon dioxide (CO_2) result from incineration of waste containing fossil carbon such as plastics and synthetic textiles. A reduction of waste not only mitigates greenhouse gas (GHG) emissions but can offer improved public health, and environmental benefits. Moreover, solid waste and wastewater technologies confer significant co-benefits for adaptation, mitigation and sustainable development.

In developing countries, improved waste and wastewater management using low- or medium-technology strategies are recommended to provide significant GHG mitigation and public health benefits at lower cost. Some of these strategies include construction of medium-technology landfills with controlled waste placement and use of daily cover (perhaps including a final bio-cover to optimize CH_4 oxidation), and controlled composting of organic waste.

A major impediment in developing countries is the lack of capital which jeopardizes improvements in waste and wastewater management. These countries may also lack access to advanced and sustainable technologies. Therefore, the selection of truly sustainable waste and wastewater strategies is essential for both the mitigation of GHG emissions and for improved urban infrastructure[111].

2.6.2 Future Trends

Total waste generation is retrieved from literature as described above. Future quantities of paper, metal and plastics waste generation is assessed by calculating the annual growth percentages based on the available data for 2004, 2006 and 2008. This percentage is applied on the last available data (2008) and future waste generation is calculated until 2020.

Table A2.8: Annual Growth Rate for Waste Generation	
Waste Type (generation)	**Annual Growth Rate**
Metal waste	4,49 %
Plastics waste	6,73 %
Paper waste*	1,10 %
** Data for paper waste is uncertain due to the small available dataset. It might be corrected when data for 2010 will be published.*	

110 Intergovernmental Panel on Climate Change (2007): **Climate Change 2007**: Working Group III: Mitigation of Climate Change, Waste Management, downloaded from http://www.ipcc.ch/pdf/assessment-report/ar4/wg3/ar4-wg3-chapter10.pdf

111 ibid

Future waste export is assessed by calculating the annual growth rate, using export data for 2000 and for the latest available year 2011. Time series from COMEXT are larger and more stable than the time series from the Waste Statistics Regulation, and present a more consistent image.

Nevertheless annual growth rates for export out of the European Union are far higher than for generation. In relation to Basel reported data, the years 2007 and 2009 are not considered as datasets for these years are incomplete.

Table A2.9: Annual Growth Rate for Waste Export	
Waste Type (export)	**Annual Growth Rate**
Basel reported waste export	9,40 %
Metal waste	6,76 %
Plastics waste	16,17 %
Paper waste	16,18 %

The growth percentages are applied on the latest available year, 2008 for Basel reported export, and 2011 for metals, plastics and paper.

The assumption of business-as-usual, with a growth rate remaining at the actual level is maintained for all wastes types but paper. Paper export is growing at a fast speed, and it already represents a high percentage of total paper waste generation. Consequently it is expected that exports will level out at 90% of waste generation.

Metal Waste Export

The amount of metal waste generated by the EU-27 Member States has been obtained from EUROSTAT for the years 2004, 2006 and 2008 (shown in Figure A2.1). These data indicate that there has been an increase in the quantity of metal waste generated between 2004, 2006 and 2008 (83.1 million tonnes, 93.8 million tonnes and 99.1 million tonnes respectively).

Potential future metal waste generation is estimated by calculating the yearly growth percentage based on the data for 2004, 2006 and 2008, which is then applied to the last available data (2008). The yearly growth percentage of 4.49% is used to estimate the future annual metal waste generation up to 2020. Therefore, the quantity of metal waste produced by the EU-27 in 2020 is estimated to be approximately 167.8 million tonnes.

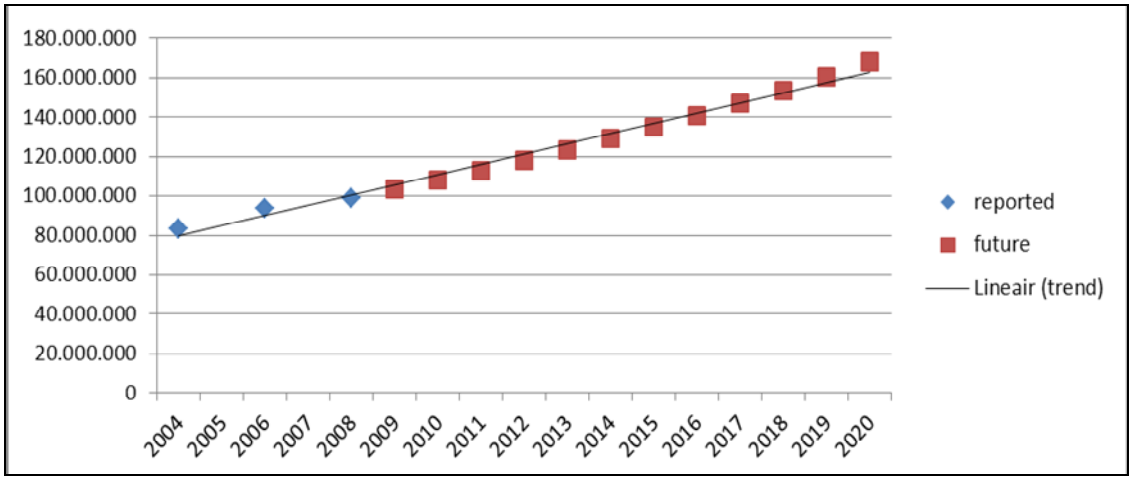

Figure A2.1: Projected Future Generation of Metal Waste within the EU-27

The quantity of metal waste exported from the EU-27 Member States on an annual basis between the years 2000 and 2011 have been obtained from the EUROSTAT COMEXT database. These data indicate that there has been an overall increase in the amount of metal waste exported from the EU-27 between 2000 and 2011. In 2000, the quantity of waste exported was 10.5 million tonnes. By 2011, this amount had more than doubled to 21.5 million tonnes.

It is worth noting that between 2004 and 2007 the amount of metal waste exported from the EU-27 stabilised between 13.1 and 13.7 million tonnes. However, in 2008 the quantity exported increased by almost 2 million tonnes compared to 2007 and increased annually by approximately 3 million tonnes from 2008 to 2010. In 2011, the amount of metal waste exported decreased by approximately 250,000 tonnes compared to 2010.

As annual data exist for a period of 12 years it has been possible to calculate an average yearly growth rate for the export of metal waste from the EU-27 during this period of 6.76%, which can be applied to the 2011 data (and for preceding years) to provide an indication of the possible export quantities in the future.

It is therefore estimated that by 2015 the quantity of metal waste exported from the EU-27 Member States will be 27.9 million tonnes and by 2020 this will have increased to 38.8 million tonnes. The percentage of total waste exported compared to the total amount of waste generated has also been calculated on an annual basis.

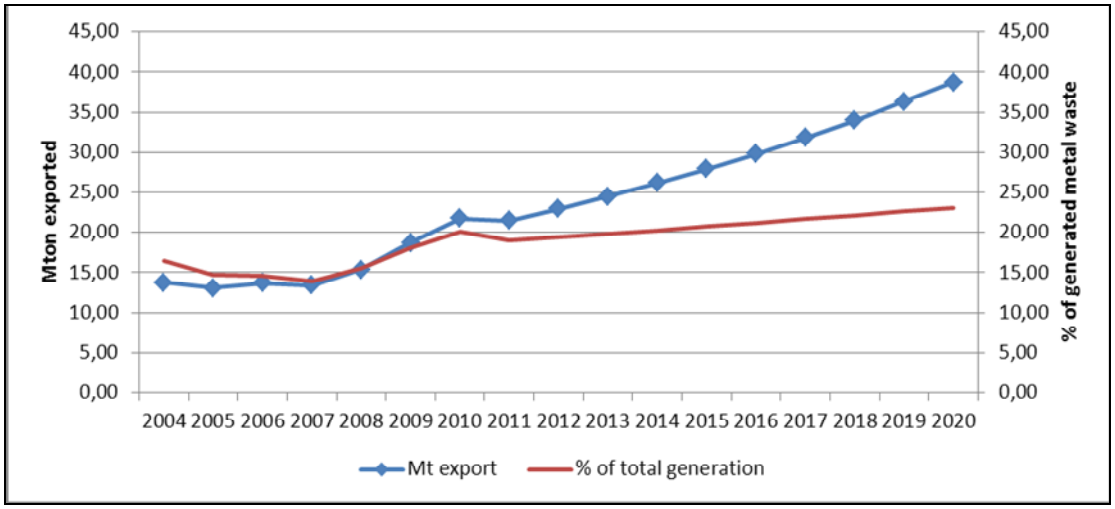

Figure A2.2: Projected Future Export of Metal Waste from the EU-27

In 2004, 16.5% of metal waste generated by the EU-27 Member States was exported. This percentage increased to 19% in 2011. As Figure A2.2 depicts, by 2020, it is assumed that the 23.1% of the metal waste generated by the EU-27 is exported. Therefore, although the quantity of metal waste exported from the EU-27 is expected to significantly increase in the future (almost treble between 2004 and 2020) the percentage compared to the total waste generated is considered to increase at a much lower rate (less than double) between 2004 and 2020. This suggests that a greater amount of metal waste is retained and used within the EU-27.

Paper Waste Export

Paper waste generation data for the EU-27 has been obtained from EUROSTAT for the years 2004, 2006, 2008. This indicates that there has been an overall increase in the quantity of waste generated between 2004 (56.2 million tonnes) and 2008 (58.7 million tonnes). However, it should be noted that the amount of waste generated in 2008 is lower than the quantity produced in 2006 (63.6 million tonnes). By calculating the yearly growth percentage, based on the available data for 2004, 2006 and 2008, an estimate of the future quantity of paper waste generated can be estimated.

Based on the data obtained a growth rate of 1.1% is applied to the 2008 data on an annual basis to calculate the quantity of waste generated in the preceding years up to 2020. Therefore, the amount of paper waste generated by the EU-27 in 2020 is estimated to be approximately 66.9 million tonnes.

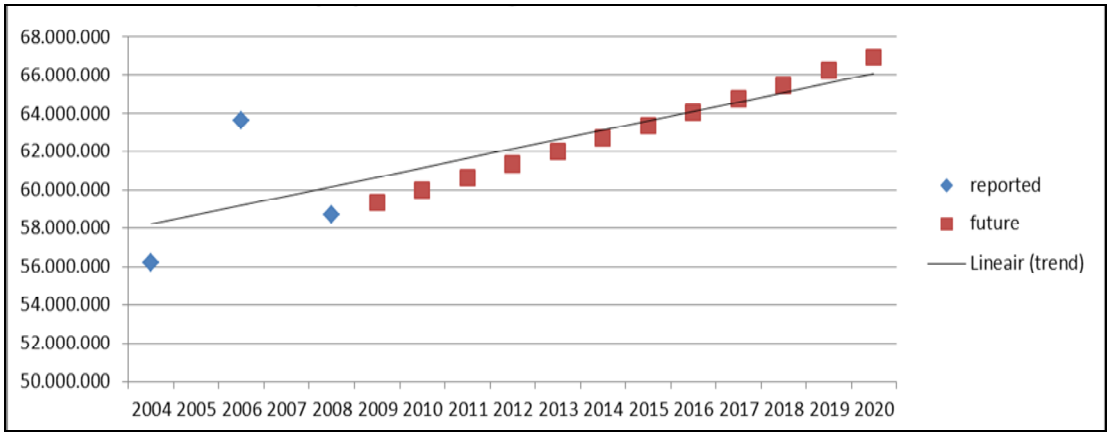

Figure A2.3: Projected Future Generation of Paper Waste within the EU-27

Total annual quantities of paper waste exported from the EU-27 Member States have been obtained from the EUROSTAT COMEXT database between the years 2000 and 2011. During this period the amount of paper waste exported outside of the EU-27 has increased almost five fold. In 2000, the quantity of paper waste exported was 9.2 million tonnes. In 2005 this increased to 24.2 million tonnes and by 2011 the quantity of paper waste exported was 47.8 million tonnes. It is also worth noting that the amount of paper waste exported has increased year on year with the exception of 2010, in which the quantity exported decreased by 2.6 million tonnes compared to 2009.

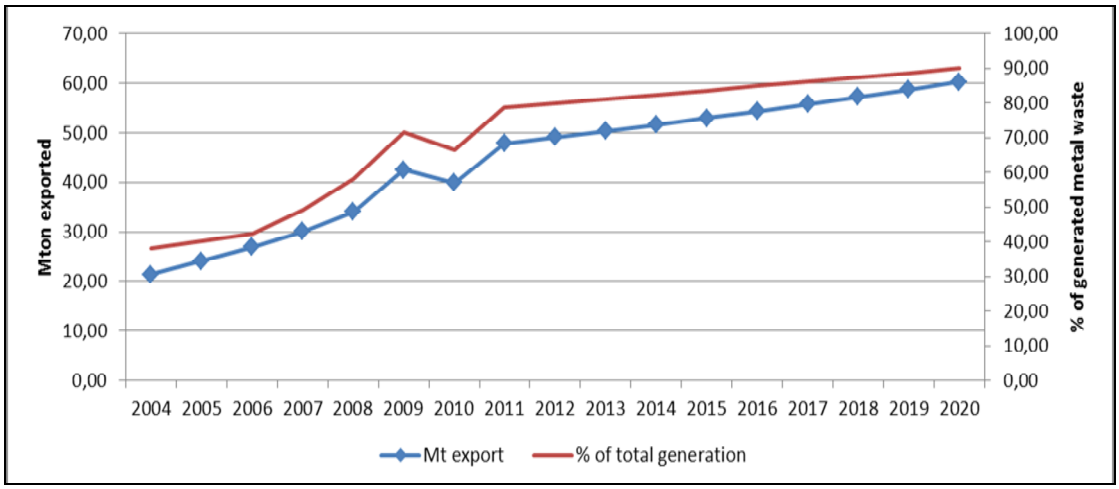

Figure A2.4: Projected Future Export of Paper Waste from the EU-27

Using the data between 2000 and 2011 it has been possible to calculate an average yearly growth rate for the export of waste from the EU-27 of 16.18%. This growth rate has been applied to the final year in which data is available (2011) to calculate the quantity of paper waste exported from the EU on an annual basis between 2012 and 2020. It is therefore estimated that the quantity of waste exported from EU-27 Member States by 2020 will be approximately 60.2 million tonnes. The quantity of

waste exported has also been compared with the percentage of total waste generated that the exported figure represents. In 2004, the quantity of paper waste exported from the EU-27 was 21.3 million tonnes, which represented approximately 38% of the total amount of paper waste generated. By 2011, 47.8 million tonnes of paper waste was exported representing 78.8% of the total quantity generated within the EU-27. This therefore indicates that the export of paper waste is continually growing and already represents a large percentage of the total waste generated. Hence, it has been assumed that the export of paper waste will stabilise at 90% of waste generation by 2020.

Plastic Waste

Plastic waste generation in Europe has increased over time. Although, the economic downturn may have slightly slowed this trend, there is still an increasing amount of plastic waste generation.

It is predicted that there will be a continued upward trend in the demand for plastics. The European Commission[112] provides a baseline scenario of future plastic waste generation in the EU. A projection until 2015 is made based on the current situation of plastic and bio-plastic waste in the EU and existing policies and measures. This is advanced with an extrapolation made up until 2020. The projections show a 57% increase in the overall generation of plastic waste between 2008 and 2015.

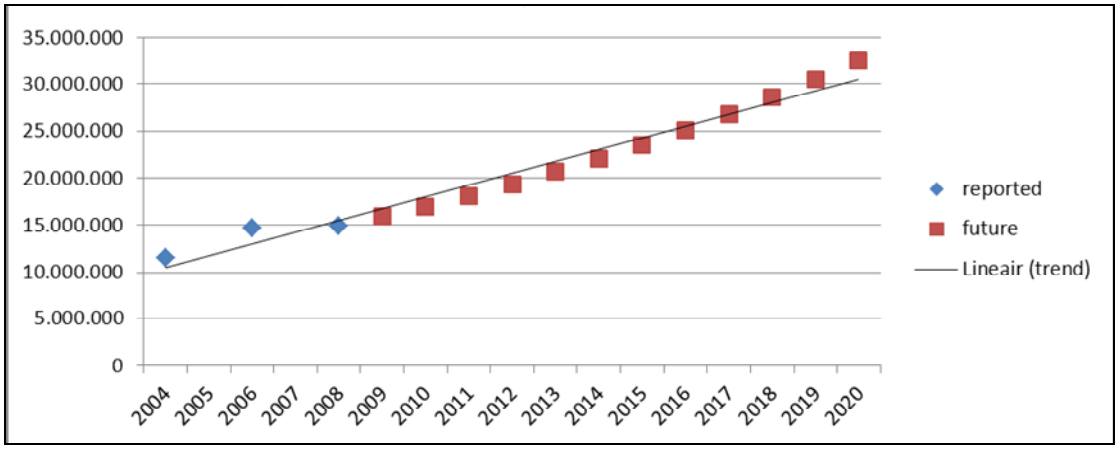

Figure A2.5: Projected Future Generation of Plastic Waste within the EU-27

In addition, to the generation of plastic waste the amount of plastic waste which is exported is also increasing steadily. There are inconsistencies regarding the quantity of plastic waste being shipped to third countries. While Eurostat sources report around 2 million tonnes of export for 2006, another source[113] quotes that around 71% of

[112] European Commission, DG Environment (2011): **Plastic waste in the environment – Final Report,** available online at: http://ec.europa.eu/environment/waste/studies/pdf/plastics.pdf

[113] Institute For European Environmental Policy *et al.* (IEEP): **Final Report – Supporting The Thematic Strategy On Waste Prevention And Recycling**, available online at: http://ec.europa.eu/environment/waste/pdf/Final%20Report%20final%2025%20Oct.pdf

plastic waste (10 million tonnes) was exported from the EU-25 to non-EU countries in 2006. In this future projection COMEXT data have been used to illustrate the plastic waste export to ex-EU-27 since 2000.

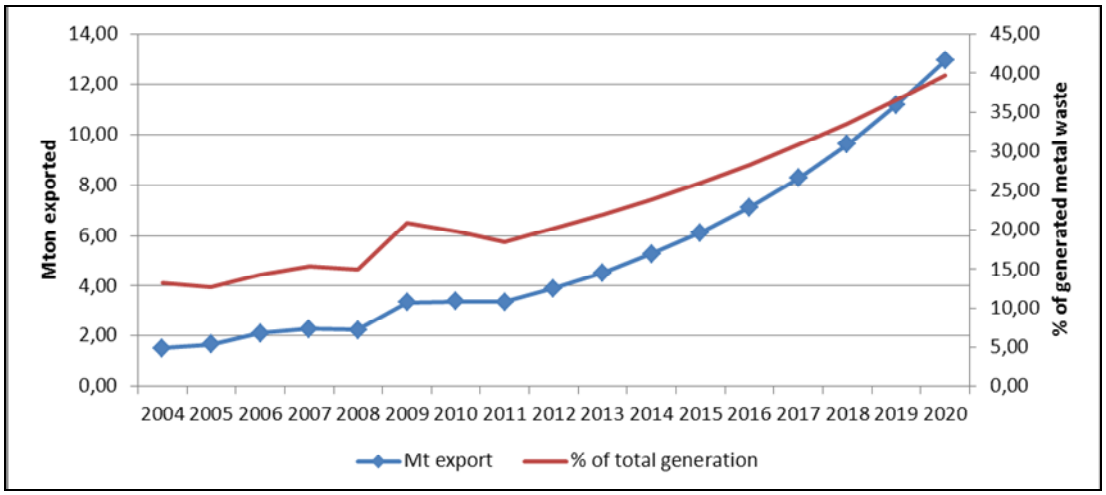

Figure A2.6: Projected Future Export of Plastic Waste from the EU-27

With regard to future trends, the European Commission expects that the level of waste exports will increase, in particular plastic waste for recycling and recovery. Rising levels of recycling in terms of volume and proportion appear to be driving an increase in the level of export of plastic waste for reprocessing.

It is estimated that on average there is approximately 16% annual growth regarding the quantity of plastic waste exported. This estimation, coupled with data collected in 2004, 2006 and 2008 allow for a predicted estimation of the future exports of plastic waste. Projections regarding the increase in the quantity of plastic waste exported for treatment can be seen in Figure A2.6 above.

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ANNEX II:
POSSIBLE AMENDMENTS TO THE TEXT OF THE WASTE SHIPMENT REGULATION

1. POSSIBLE CHANGES NEEDED IN THE WSR IN CASE OF A MANDATORY CERTIFICATION SCHEME

The following sections aim to address the possible changes that might be required in the WSR in case a certification scheme for exported waste would be introduced. The changes that are suggested are based on a preliminary review and condition to the final format of the waste certification scheme.

Furthermore it is important to note that suggested changes are conditioned to regulatory and legal review by the relevant EU and Member State bodies.

It is foreseen that adaptation of the WSR would be required if:

- Option A : No certification scheme is introduced but clarification are added in connection to the request for an ESM; or
- Option B : A certifications scheme is introduced.

Modifications to the current text of the WSR are underlined.

1.1 Article 12: Objections to shipments of waste destined for recovery

Where a notification is submitted regarding a planned shipment of waste destined for recovery, the competent authorities of destination and dispatch may, within 30 days following the date of transmission of the acknowledgement of the competent authority of destination in accordance with Article 8, raise reasoned objections based on one or more of the following grounds and in accordance with the Treaty:

/…/

Option A :
(l) that the waste concerned will not be treated in accordance with the principles of environmentally sound management of waste, included in Annex VIII of this Regulation, or that reasonable doubt may exist that the waste might not be treated in accordance with these principles of environmentally sound management of waste;

Option B:
(l) that certification of the treatment of the waste, in accordance with the principles of environmentally sound management of waste included in Annex VIII of this Regulation and in line with the provisions of Article 49, could not be presented or sufficiently provided for by the notifier;

1.2 Article 18: Waste to be accompanied by certain information

Option B:

1. Waste as referred to in Article 3(2) and (4) that is intended to be shipped shall be subject to the following procedural requirements:

(a) In order to assist the tracking of shipments of such waste, the person under the jurisdiction of the country of dispatch who arranges the shipment shall ensure that the waste is accompanied by the document contained in Annex VII, and with a copy of a duly signed certificate of environmentally sound management of the waste in case of export for recycling to non EU Member States, in line with the provisions of Annex VIII.

(b) The document contained in Annex VII shall be signed by the person who arranges the shipment before the shipment takes place and shall be signed by the recovery facility or the laboratory and the consignee when the waste in question is received.

2. The contract referred to in Annex VII between the person who arranges the shipment and the consignee for recovery of the waste shall be effective when the shipment starts and shall include an obligation, where the shipment of waste or its recovery cannot be completed as intended or where it has been effected as an illegal shipment, on the person who arranges the shipment or, where that person is not in a position to complete the shipment of waste or its recovery (for example, is insolvent), on the consignee, to:

(a) take the waste back or ensure its recovery in an alternative way; and

(b) provide, if necessary, for its storage in the meantime.

The person who arranges the shipment or the consignee shall provide a copy of the contract upon request by the competent authority concerned.

3. The certificate of environmentally sound management of waste, if requested, shall be effective when the shipment starts until all waste is finally recycled.

4. For inspection, enforcement, planning and statistical purposes, Member States may in accordance with national legislation require information as referred to in paragraph 1 on shipments covered by this Article.

5. The information referred to in paragraph 1 shall be treated as confidential where this is required by Community and national legislation.

1.3 Article 49: Protection of the environment

Both options

1. The producer, the notifier and other undertakings involved in a shipment of waste and/or its recovery or disposal shall take the necessary steps to ensure that any waste they ship is managed without endangering human health and in an environmentally sound manner as clarified in Annex VIII throughout the period of shipment and during its recovery and disposal. In particular, when the shipment takes place in the Community, the requirements of Article 4 of Directive 2006/12/EC and other Community legislation on waste shall be respected.

2. In the case of exports from the Community, the competent authority of dispatch in the Community shall:

Option A:
(a) ~~require and endeavour to s~~ Secure that any waste exported is managed in an environmentally sound manner throughout the period of shipment, including recovery as referred to in Articles 36 and 38 or disposal as referred to in Article 34, in the third country of destination;

Option B:
(a) Certify in accordance to Annex VIII that any waste exported is managed in an environmentally sound manner throughout the period of shipment, including recovery as referred to in Articles 36 and 38 or disposal as referred to in Article 34, in the third country of destination;

(b) prohibit an export of waste to third countries if it has reason to believe that the waste will not be managed in accordance with the requirements of point (a).

Option A :
Environmentally sound management may, inter alia, be assumed as regards the waste recovery or disposal operation concerned, if the notifier or the competent authority in the country of destination can demonstrate that the facility which receives the waste will be operated in accordance with human health and environmental protection standards complying with at least the provisions of Annex VIII and ~~that are broadly~~ equivalent to standards established in Community legislation. This assumption shall, however, be without prejudice to the overall assessment of environmentally sound management throughout the period of shipment and including recovery or disposal in the third country of destination. ~~For the purposes of seeking guidance on environmentally sound management, the guidelines listed in Annex VIII may be considered.~~

Option B:
Environmentally sound management may, inter alia, be assumed as regards the waste recovery or disposal operation concerned, if the notifier or the competent authority in the country of destination duly certifies that the facility which receives the waste will be operated in accordance with human health and environmental protection complying with at least the provisions of Annex VIII and ~~that are broadly~~ equivalent to standards that are broadly equivalent to standards established in Community legislation. This assumption shall, however, be without prejudice to the overall assessment of environmentally sound management throughout the period of shipment and including recovery or disposal in the third country of destination. ~~For the purposes of seeking guidance on environmentally sound management, the guidelines listed in Annex VIII may be considered.~~

3. In the case of imports into the Community, the competent authority of destination in the Community shall:

(a) require and take the necessary steps to ensure that any waste shipped into its area of jurisdiction is managed without endangering human health and without using processes or methods which could harm the environment, and in accordance with Article 4 of Directive 2006/12/EC and other Community legislation on waste throughout the period of shipment, including recovery or disposal in the country of destination;
(b) prohibit an import of waste from third countries if it has reason to believe that the waste will not be managed in accordance with the requirements of point (a).

Option B:
Article 56bis

An article should be added in Title VII other provisions, Chapter 1 additional obligations describing how certification needs to be given (e.g. third party certification), who is allowed to certify (e.g. acknowledged bodies), how quality control on certification can be done etc…

1.4 Annex IA

Option B:
Add to box 11: identification number of certificate for environmental sound management of the waste (footnote 10 : to be completed in case of export to non-EU countries.)

1.5 Annex IB

Option B:
Add to box 11: identification number of certificate for environmental sound management of the waste (footnote 10 : to be completed in case of export to non-EU countries.)

1.6 Annex IC

Option B:
Add to point 22 on block 11: The number of certificate should refer to a certification of environmentally sound management of the waste in a recycling plant outside EU-27. In case of export for recycling to a non-EU member state this unique number should be filled in and a copy of the certificate should be added to the notification file. In all other cases note n.a.

Add to point 41 on block 10 and 11 of the tracking form: The number of certificate should refer to a certification of environmentally sound management of the waste in a recycling plant outside EU-27. In case of export for recycling to a non-EU member state this unique number should be filled in and a copy of the certificate should be added to the notification file. In all other cases note n.a.

1.7 Annex II

Part 1: Information to be supplied on, or annexed to, the notification document:

/…/
5.

Option A :
27. If the waste is destined for recovery in a non EU Member State, evidence of environmentally sound management of waste in accordance to Annex VIII has to be added.

Option B:
27. If the waste is destined for recovery in a non EU Member State, a signed valid certificate of environmentally sound management of waste in accordance to Annex VIII has to be added.

1.8 ANNEX VIII: ~~GUIDELINES ON~~ ENVIRONMENTALLY SOUND MANAGEMENT

Option A :
In case of export of waste for recycling in a non EU Member State, the notifier must give evidence that the waste will be treated in an environmentally sound way. Environmentally sound management of waste is assumed if at least the following guidelines are complied with:

Option B:
In case of export of waste for recycling in a non EU Member State, the notifier must provide a certificate that the waste will be treated in an environmentally sound way. Environmentally sound management of waste is assumed if at least the following guidelines are complied with:

The certificate needs to be signed by a third party, acknowledged according to article (56bis) by the competent authority in the Member State of export, and should be valid from the start of the first shipping until all recycling is fully completed.

I. Guidelines adopted under the Basel Convention:
1. Technical Guidelines on the Environmentally Sound Management of Biomedical and Health Care Wastes (Y1; Y3) (1);
2. Technical Guidelines on the Environmentally Sound Management of Waste Lead Acid Batteries (1);
/…/