

# **Study on Criteria and Requirement on Environmentally Sound Management of Hazardous Wastes and Other Wastes**

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## Abbreviation

BAN	Basel Action Network
BCRC	Basel Convention Regional Centre
BCRC-SEA	Basel Convention Regional Centre for South East Asia
BFR	Brominated Flame Retardants
COC	Chain of Custody
COP	Conference of the Parties
CLI	Country-led Initiative
CPE	Core Performance Element
DAO	DENR Administrative Order (in the Philippines)
DENR	Department of Environment and Natural Resources (in the Philippines)
ECC	Environmental Compliance Certificate
EEE	Electrical and Electronic Equipment
EIA	Environmental Impact Assessment
EMB	Environmental Management Bureau (in the Philippines)
EMS	Environmental Management System
EPR	Extended Producer Responsibility
ESM	Environmentally Sound Management
MPPI	Mobile Phone Partnership
MSDS	Material Safety Data Sheet
NEA	National Environmental Agency (in Singapore)
OECD	Organization for Economic Co-operation and Development
PACE	Partnership for Action on Computing Equipment
PCD	Pollution Control Department (in Singapore)
PCO	Pollution Control Officer (in the Philippines)
PPE	Personal Protective Equipment
SME	Small and Medium-sized Enterprise
SMR	Self-Monitoring Report
TBM	Transboundary Movement
TSD facility	Treatment, Storage and Disposal facility (in the Philippines)
ULAB	Used Lead-acid Battery
WCO	World Customs Organization

## Summary

The 3rd Meeting of the Indonesian-Swiss Country-led Initiative (CLI) is expected to discuss international standards for environmentally sound management (ESM). The purposes of this paper are to identify recommendable ESM standards in view of the current status of a legal system, technologies and other relevant matters in Asia and also to consider the measures which can ensure both prevention of illegal transboundary movement (TBM) and the appropriate resource circulation based on the ESM standard.

The study for the paper firstly began with a review of the various technical guidelines which have been prepared within the framework of the Basel Convention and other existing documents relating to ESM. This was followed by the extraction of components to ensure ESM as these were mentioned in these documents. The review results have confirmed that the general requirements for ESM are (i) compliance with the legal requirements, (ii) introduction of an environmental management system, (iii) identification of risks and hazardousness, (iv) occupational safety and health, (v) awareness and competency on the staffs, (vi) monitoring, recording and reporting, (vii) emergency response, (viii) secured financial resource and (ix) ensure ESM in downstream recycling chain, even though the strictness of the criteria varies depending on the purpose and nature of the individual documents (Chapter 2).

The paper then conducted a questionnaire survey on the legal framework for ensuring ESM of imported/exported wastes and its operational status in various countries to extract the ESM components which are ensured by the system. The countries studied were Japan for exports and Republic of Korea, the Philippines and Singapore for imports as all of these countries permit either the export or import of hazardous wastes and other wastes for the purpose of environmentally sound recycling on the condition that ESM is assured on the basis of the provisions of the Basel Convention. The study results have confirmed that many ESM components extracted in Chapter 2 have been ensured by criteria on ESM facilities or screening criteria for imports/exports of hazardous wastes in individual countries (Chapter 3).

For the purpose of understanding the current status of TBM of hazardous wastes in Asia and the situation of the recycling and treatment of imported wastes at facilities, the paper also examined (i) the relationship between the economic situation of the region and the imported volumes of hazardous materials and the state of development of treatment facilities and (ii) analysis of the trends of TBM of individual wastes (lead batteries and E-waste) and the situation of treatment at their destination countries. The information is based on a paper titled "Analysis of Transboundary Movement of Hazardous Wastes and Other Wastes in Asia" which Japanese Government submitted at the 2nd meeting of the CLI. The study results have confirmed that even though there are countries which have adopted a total ban on imports, countries with a relatively high economic level generally possess higher technical capability for treatment and recycling with an advanced development stage of a system designed to ensure ESM (Chapter 4).

Furthermore, the study has examined (1) the expected effects of the introduction of an ESM system, (2) measures to be implemented together with a criteria system and (3) an appropriate resources circulation mechanism in Asia based on the standards system. The study has found that although the standards system is effective to secure TBM in Asia with ESM being ensured, there are some additional measures should be considered. These are: (i) it is necessary to address illegal or illicit TBM under the regime of the Basel Convention to make the standards system function more effectively, (ii) flexible criteria system would be more applicable in Asia where the level of economic development and waste management techniques pose different problems for different countries and (iii) to facilitate appropriate resources circulation in Asia, it is important to promote the development of social infrastructure through various support measures so that facilities to meet the ESM standards can be put into place (Chapter 5).

Finally, based on the above study results, the components of recommendable ESM standards have been compiled along with issues requiring further discussion regarding the concrete contents of ESM standards and their application in the form of a coherent system (Chapter 6).

# Chapter 1 Introduction

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## Background Information and Objective of the Study

At the second meeting of Country-led Initiative (CLI), which was launched by Indonesia and Switzerland based on the Decision IX/26 on the President's Statement at the 9th meeting of the Conference of the Parties of the Basel Convention (COP9), the participants elaborated elements and measures for a way forward (Elements for Inclusion in a Possible Way Forward, hereafter "elements") in order to address the objective of the Ban Amendment. The meeting identified the following elements.

- Standards of Environmentally Sound Management (ESM)
- Linking standards of ESM to transboundary movement (TBM)
- Ensuring that vulnerable countries do not receive wastes that they do not want:
- Providing further legal clarity
- Improvement of existing tools, promotion of better application of existing measures and instruments within the Convention, and possible extensions or enhancements of the convention
- Support for the Basel Convention Regional Centres
- Dealing with illegal traffic
- Building capacity

Among the elements identified above, ESM standards is a measure that allows TBM of waste only if waste is destined for a facility that is able to fulfill these standards. Considering appropriateness and feasibility of ESM standard in international community, the following issues may need to be addressed:

- What components should be considered for ensuring ESM in waste management facility?
- How does each country define or incorporate concept of ESM-facility in national legal framework (e.g., law, regulation or guideline)?
- What kind of operational and/or technical requirement is placed on facility in order to ensure ESM especially when waste is subject to TBM?
- Does a country which established the above mentioned legal system for ensuring ESM actually import wastes and conduct environmentally sound treatment and recycling?
- Considering gaps existing between countries regarding level of economy and technology, which level of ESM should be applied as international standard?
- What measures are required based on the ESM standards system to prevent the illegal TBM of hazardous wastes and other wastes and to facilitate the appropriate resource circulation?

The objectives of this paper are to analyze the above-mentioned issues and to provide the relevant information in order for promoting the understanding on Asian countries' practices as well as for facilitating the discussion with regards to identifying the recommendable components for ESM standard/criteria in the forthcoming CLI meeting.

## Scope of the Study

The scope of the study is as follows:

### **1. Review of ESM in the existing guideline or documents**

The study reviews the existing guidelines or documents developed and publicized by the relevant bodies under the Basel Convention and/or other international organization in order to identify the recommended ESM criteria described in those documents. The study does not focus on the detail technical specification of waste recycling/treatment facility but general requirements on waste management facility.

### **2. Study on criteria and requirement for ensuring ESM of imported/exported hazardous wastes and other wastes in Asian countries**

The study collects information regarding requirement or criteria being currently practiced in Asian countries for ensuring those imported wastes (especially, E-waste) which are recycled or treated in environmentally sound manner. The information was collected through questionnaire survey addressed to the competent authorities to the Basel convention which permit import of hazardous wastes and other wastes only if certain ESM conditions are met.

### **3. Study on TBM of hazardous wastes and other wastes in Asia**

Taking into account the legal systems introduced in some Asian countries for ensuring ESM which were identified the above-mentioned study, the study then reviewed the following items based on the paper titled "Analysis of Transboundary Movements of Hazardous Wastes and Other Wastes in Asia" which was submitted by Japanese Government at the 2nd meeting of the CLI, the following matters are examined.

- Economic level and actual import volumes of hazardous wastes and other wastes and development of treatment and recycling facilities in Asia
- Situation of TBM by individual wastes

### **4. Examination of measures to ensure appropriate TBM in Asia based on ESM standards**

Based on the results of the study components in 1 through 3, the following issues are examined.

- Effects of introducing ESM standards in Asia
- Measures to be implemented in Asia to prevent illegal import/export and to facilitate appropriate resources circulation through ESM (measures to be implemented along with ESM standards)
- Appropriate mechanism for facilitating resource circulation in Asia based on ESM standards

## Chapter 2 Review of ESM in the relevant Guidelines

This Chapter reviews the existing guideline or documents relevant to ESM of hazardous wastes and other wastes and identifies general ESM components which are recommended in the following documents/guidelines.

- **”Guidance Document on the Preparation of Technical Guidelines for the Environmentally Sound Management of Wastes Subject to the Basel Convention”**  
<http://www.basel.int/meetings/sbc/workdoc/framework.doc>
- **”OECD Guidance Manual on Environmentally Sound Management of Waste”**  
<http://www.oecd.org/dataoecd/23/31/39559085.pdf>
- **”Technical Guidelines on the Reduce, Reuse, Recycle (3R) of End-of-life Electronic Product”**  
(developed by Basel Convention Regional Centre for South-East Asia (BCRC-SEA))  
<http://www.bcrc-sea.org/?content=publication&cat=2>
- **”Guideline on Material Recovery and Recycling on End-of-life Mobile Phone”**  
(developed by Mobile Phone Partnership Initiative (MPPI))  
<http://www.basel.int/industry/mppiwp/guid-info/guidmaterial.pdf>
- **”Environmentally Sound Management (ESM) Criteria Recommendations”**  
(developed by Partnership for Action on Computing Equipment (PACE))  
<http://www.basel.int/industry/compartnership/docs/FinalApprovedReportESM-22March2010.pdf>
- **”The e-Stewards Standard for Responsible Recycling and Reuse of Electronic Equipment”**  
(developed by Basel Action Network (BAN))  
[http://e-stewards.org/wp-content/uploads/2010/02/e-StewardStandard\\_ExcerptedVersion.pdf](http://e-stewards.org/wp-content/uploads/2010/02/e-StewardStandard_ExcerptedVersion.pdf)  
<http://e-stewards.org/wp-content/uploads/2009/10/e-StewardsStandardGuidanceDocument.pdf>

### Guidance Document of the Basel Convention

Only the Basel Convention includes the definition of ESM in the body text of a convention. Article 2, Paragraph 8 of the Basel Convention defines ESM by the following general wording which can be broadly interpreted.

#### ***Definition of ESM in the Basel Convention***

ESM means 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 the adverse effects which may result from such wastes.

In Article 4 (8) of the Convention, it requires that “*hazardous wastes or other wastes, to be exported, are managed in an environmentally sound manner in the State of import or elsewhere. Technical guidelines for the ESM of wastes subject to this Convention shall be decided by the Parties at their first meeting*”. In this context, several key principles with respect to ESM of waste were articulated in the “*Guidance Document on the Preparation of Technical Guidelines for the ESM of Waste Subject to the Basel Convention*”. The paragraph 9 of the document recommends a number of legal, institutional and technical conditions (so called ESM criteria) to be met for achievement of ESM as follows. These principles are used as reference for preparation of technical guidelines developed under the framework of the Convention.



***ESM Criteria of the Basel Convention Technical Guideline***

- a) There exists a regulatory infrastructure and enforcement that ensures compliance with applicable regulations;
- b) Sites or facilities are authorized and 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;
- c) Operators of sites or facilities at which hazardous wastes are managed are required, as appropriate, to monitor the effects of those activities;
- d) Appropriate action is taken in cases where monitoring gives indication that the management of hazardous wastes have resulted in unacceptable emissions;
- e) Persons involved in the management of hazardous wastes are capable and adequately trained in their capacity.

**OECD Guidance Manual**

Because ESM is such a broad and complex concept, no formal agreement has yet been reached on an official definition of this term within the OECD. According to “*OECD Guidance Manual on Environmentally Sound Management (ESM) of Waste, 2007*”<sup>1</sup> however, the following “working definition” was used in the initial stages of ESM.

***The OECD working definition of ESM***

*A scheme for ensuring that wastes and used and scrap materials are managed in a manner that will save natural resources, and protect human health and the environment against adverse effects that may result from such wastes and materials.*

The OECD Council Recommendation (c(2004)100) stipulates in its Annex I that “*waste management facilities, including recovery facilities, should, within the framework of laws, regulations and administrative practices in the countries in which they operate, and in consideration of applicable international agreements, principles, objectives and standards, take due account of the need to protect the environment, public health and safety, and generally conduct their activities in a manner contributing to the wider goals of sustainable development*”. The Council adopted the following Core Performance Element (CPEs) of ESM which can be applied to waste management facility located in the member countries.

***Core Performance Elements (CPEs) of ESM under the OECD***

- 1) The facility should have an applicable environmental management system (EMS) in place;
- 2) The facility should take sufficient measures to safeguard occupational and environmental health and safety;
- 3) The facility should have an adequate monitoring, recording and reporting programme;
- 4) The facility should have an appropriate and adequate training programme for the personnel;
- 5) The facility should have an adequate emergency plan; and
- 6) The facility should have an adequate plan for closure and after-care.

<sup>1</sup> OECD. Guidance Manual on Environmentally Sound Management (ESM) of Waste, 2007. <http://www.oecd.org/dataoecd/23/31/39559085.pdf>, (2009-09-07).

It should be noted that CPEs are recommendation and as for application of CPEs to the actual waste management facility should be flexible with taking into account the following matter.

- ◇ Size of the enterprise, especially the situation of SMEs (small and medium-sized enterprise)
- ◇ The type and amount of waste
- ◇ The nature of the facility operation
- ◇ Domestic legislation

## Technical Guideline of BCRC-SEA

### Outline of the BCRC-SEA's guideline

BCRC-SEA located in Jakarta developed “*Technical Guidelines on the Reduce, Reuse, Recycle (3R) of End-of-Life Electronic Products*” in 2007. The guidelines is principally intended to provide guidance to Asia & Pacific countries which are building their capacity for ESM of E-waste, in their development of procedures or strategies for repairing, refurbishment and 3R activities of used electronic appliances, and to encourage further recovery and recycling of used electronic appliances in an environmentally sound manner.

The electronic appliances which are subjected in this guideline consist of refrigerator, air conditioner, washing machine, TVs and audio system, PCs, and fluorescent lamps. The guideline covers the following items:

- ◇ Technical guidance for facilities
- ◇ Sorting and temporary storage
- ◇ Collection
- ◇ Transportation and handling
- ◇ Assessment of appliances
- ◇ Testing and repairing of used electronic appliances
- ◇ Labeling and marking
- ◇ Testing sequence
- ◇ General repairs and retesting
- ◇ Testing and repairing specific appliances
- ◇ Pretreatment before recycling and waste processing
- ◇ Dismantling end-of-life appliances
- ◇ Environmental concern
- ◇ Existing advance recovery technology for recycling electronic appliances Components

Compare to developed countries, the activities of repair and refurbishment in developing countries are dominant rather than activities of reduce, reuse and recycling. Therefore, the guideline focuses more on ESM of repair and refurbishment as part of reuse activities of E-waste.

### ESM components in the BCRC-SEA's guideline

The basic components of ESM are described in the Chapter III (technical guidance for facilities) and more specific technical guidance is introduced in the subsequent chapter. In the Chapter III introduces the following ESM components:

#### General Requirements

- Facilities should be properly authorized by the local, regional or national government
- Facilities should be located at suitable location. Feasibility study is advised.

- Facilities that handle a significant volume of used electronics appliances should maintain a financial instrument that will assure gross mismanagement and closure of the facility
- Business transactions that involve the TBM of used electronic appliances and components should be based on contracts (or equivalent commercial arrangements) made in advance that detail the quantity and nature of the materials to be shipped and keep its record.
- All operations should be conducted indoors, with impervious floors.
- Storage areas should be adequate to hold all inventory and waste materials.
- The areas must be safe and practical, and must be large enough to accommodate staff and the number of waste appliances and components that are expected.
- The facilities should ensure that all items of used electronic appliances be managed in an environmentally sound manner and in accordance with the Basel Convention when destined for TBM. Facilities should be aware of the Basel Convention guidance documents on “TBM of Hazardous Waste destined for Recovery Operation”.

### **Safety and Health Control Requirements**

- The facility needs to assure that personnel are properly trained with regard to material and equipment handling, worker exposure, controlling releases, health, safety and emergency procedures.
- Workers at a facility should be trained specifically for particular electronic appliance. They should be either certified technicians in their field and have received relevant trainings required.
- Facilities operations should be inspected on a periodic basis by the competent authority for compliance with the facility license, as well as other safety, health and environmental requirements.
- The facility itself should conduct regular audits and/or inspections of its environmental compliance.
- A facility should have the appropriate equipment for proper processing of the incoming materials as well as controlling environmental releases. A system needs to be in place for identifying and properly managing hazardous components that are removed from used electronic appliances during disassembly.
- The facility authorization (license or permit) should describe the capacity of the operation, particularly the amount of hazardous wastes that are allowed to be kept on site.
- Facilities should manage all materials to minimize adverse exposures to workers and release to the environment that may be the side effect of dismantling and/or other activities.
- Medical test for worker is important to be conducted periodically.

### **Environmental Control Requirements**

- The facility should have procedures for monitoring, reporting and responding to pollutant releases and other emergencies, such as fires.
- Facilities that engage in raw material recovery will require a higher degree of governmental environmental oversight
- With regard to metal recovery facilities, the metals contained in electronic appliances do not raise unusual or special environmental concerns. However trace metals in electronic appliances and scrap (e.g. Beryllium), which is not normally present in ores and emissions resulting from organic compounds, should be taken into consideration.

### **Disposal System**

- The facilities should dispose the residues, which cannot be used or cannot be recycled again, with an environmentally sound and appropriately authorised landfill.
- The facilities should characterize the residues since it important when determining the appropriate pretreatment of disposal method.
- The facilities should encourage minimizing the land filling of used electronic appliances and materials and arranging for appropriate recovery where practicable.
- The facilities should also use the Basel Convention guidance documents to ensure that downstream

materials recovery and recycling facilities operate in a manner that according to the relevant regulations.

### Issues to be considered for ESM

- The degree of hazard posed to workers and the environment varies greatly and is dependent upon, to a large degree, the specifics of individual facility operation. This is because the potential for adverse impacts on worker health and the environment is very much dependent upon the nature of the refurbishment, dismantling or materials recycling activities that are used at a particular facility.
- The appropriate degree of governmental control and oversight is dependent upon which of those activities are engaged in, as well as the magnitude of the operations. National, regional and local government programs, therefore, need to be tailored to the nature and size of these operations.

## Guideline of MPPI

### Outline of the MPPI's guideline

The Mobile Phone Partnership Initiative (MPPI) is the partnership program conducted under the framework of Basel Convention. The MPPI welcomed wide range of participation from NGO or industries and developed “*Guideline on Material Recovery and Recycling on End-of-life Mobile Phone*”. The guideline covers refurbishment, material recovery, and recycling, awareness-raising at the stage of design, and TBM issues of end-of-life mobile phone. The guideline was finally adopted by the COP9 of the Basel Convention.

### ESM components in the MPPIs guideline

The chapter 4 of the guideline introduces environmentally sound material recovery and recycling practice and at the section 4.1, it reviews the general facility guidelines as follows;

- **Environmental Management System (EMS)**
  - ✧ The material recovery and recycling facility should possess and maintain a documented EMS to ensure adequate control over impact on the environment. This EMS could include, but is not limited to, ISO 14000 certified management systems.
  - ✧ The EMS system should also incorporate record keeping of shipping documents, bills of lading and chain of custody of material destined for downstream markets in the form of audits.
  - ✧ The facility should operate pursuant to written standards or procedures regarding operating methods for the plant and equipment, systems for management, control of site activities, site safety rules and requirements and methods for ensuring observation/monitoring (i.e., an overall operating/systems/safety manual).
- **Licensing/Permits**
  - ✧ The facility must comply with all applicable environmental regulations and must be licensed by all appropriate governing authorities. Licensing and permits should be consistent with governmental, regional and local regulatory requirements.
- **Monitoring and Record Keeping**
  - ✧ The facility should have adequate record keeping systems to ensure compliance.
- **Emergency Planning:**
  - ✧ The facility should have a regularly updated emergency plan that provides guidelines on how to react to emergencies
  - ✧ The emergency plan should also indicate what reporting and monitoring is required for specific instances. This plan should be communicated with local emergency response authorities.
- **Occupational Health and Safety (Best practices to ensure worker safety):**

- ◇ The facility must comply with all applicable health and safety regulations. The facility must ensure occupational health and safety of employees by:
  - a) Providing continuous health and safety training of personnel,
  - b) Providing ergonomic work areas with safe and effective tools,
  - c) Avoiding heavy lifting where possible, and train employees to lift in a safe manner. In some cases lifting tools may be required.
  - d) Making available and enforcing the use of personal protection equipment,
  - e) Labeling of all hazardous materials,
  - f) Safeguarding of dangerous mechanical processes,
  - g) Avoiding exposure to unacceptable occupational risk, such as airborne dust and fume, through process dust collection systems.
  - h) Performing periodic air monitoring to monitor elements of risk, including but not limited to lead, cadmium and beryllium.
  - i) Providing process fire suppression equipment and systems where appropriate,
  - j) Considering policies that prohibit eating food or smoking in process areas.
- ◇ In certain work conditions, personal protective equipment (PPE) must be worn to ensure employee safety.
- **Personal Protective Equipment:**
  - ◇ Protection for eye, head, skin, foot, hearing, respiratory, etc.
- **Training:**
  - ◇ The training should address safe work practises, required safety precautions and required personal protective equipment. Employees should be trained in the proper identification and handling of any hazardous material that may be present in incoming waste material. Training should be documented, recorded and updated as conditions merit.
- **Financial Assurance:**
  - ◇ A financial instrument should be maintained that will assure that the facility is properly cleaned up in the case of:
    - Major pollutant releases or gross mismanagement of end-of-life electronics equipment, components, and scrap, and
    - Closure of the facility.

## ESM Criteria of PACE

### Background for the Preparation of ESM Criteria by PACE

Under the PACE established in accordance with COP decision IX/9 of the Basel Convention regarding used and end-of-life computing equipment, the PACE Working Group is responsible for the overall operation of the partnership while also functioning as a forum for information sharing. On May 5, 2009, the Ad Interim Project Group was formally established following a decision by the Working Group for the purpose of providing the recommended ESM criteria for other PACE project groups (refurbish, recycle and pilot projects).

The purposes of the activities assigned to the PACE Working Group include the following.

- (1) Identification of the existing relevant ESM guidances which have been prepared by international, national, industrial, NGO or other entities and which may be used to assist other groups established by the PACE Working Group
- (2) Proposal of recommended matters for ESM criteria which can be used for the preparation of guidelines and the start-up of projects by PACE project groups

The Ad Interim Project Group has submitted documents recommending the basic principles for country-specific and facility-specified ESM criteria.

### ESM components in PACE's criteria

- **Country-specific Recommendations**

- ✧ Countries should review measures in place to implement obligations under the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal and to support applicable recommendations contained within the Basel Convention's Guidance Document on the Preparation of Technical Guidelines for the Environmentally Sound Management of Wastes Subject to the Basel Convention (see Annex A).
- ✧ OECD-member countries should review measures in place to support applicable recommendations contained within the OECD Council Recommendation C(2004)100 on the Environmentally Sound Management of Waste (see Annex B) and the OECD Technical Guidance for the Environmentally Sound Management of Specific Waste Streams: Used and Scrap Personal Computers (ENV/EPOC/WPWP(2001)3/FINAL).
- ✧ In the event that domestic Environmental Management Systems (EMS) are employed as part of a national approach to ESM, special consideration should be given to provide specifically tailored EMS systems for SMEs. Whatever EMS system will be selected, it is recommended that the government or large companies have a programme in place to provide support for SMEs in terms of information and know-how sharing.
- ✧ Domestic policies and/or programmes implemented in accordance with Basel PACE technical guidance shall facilitate the ability to meet applicable international agreements and protocols and domestic legal requirements concerning the management of such wastes.

- **Facility-specific Recommendations**

- ✧ Facilities should ensure measures are in place to demonstrate conformity with the following ESM criteria:
  1. Top Management Commitment to a Systematic Approach: Demonstrate commitment of top management to integrate a systematic approach to achieve ESM in all aspects of facility operations, which often includes an environmental health and safety management system.
  2. Risk Assessment: Identify actual and/or potential hazards and risks to public and worker health and safety, and the environment that are associated with activities, products and services.
  3. Risk Prevention and Minimization: Eliminate where possible and in all cases strive to minimize actual and/or potential hazards and risks to public and worker health and safety, and the environment that are associated with activities, products and services.
  4. Legal Requirements: Identify, access and strive to fulfill applicable legal requirements, including for example: legislation, statutes and regulations; decrees and directives; permits, licenses and certificates of approval, or other forms of authorization; orders issued by regulatory agencies; and/or judgments of courts or administrative tribunals. Facilities should also take into consideration customary or indigenous law and treaties, conventions and protocols.
  5. Awareness, Competency and Training: Ensure employees have an appropriate level of awareness, competency and training with respect to the effective management of occupational risks.
  6. Record-keeping and Performance Measurement: Maintain records, monitor, track and evaluate facility performance at achieving ESM.
  7. Corrective Action: Take appropriate action to address significant actual and/or potential risks to public and worker health and safety, and the environment and correct identified deficiencies in achieving ESM.
  8. Transparency and Verification: Provisions to support transparency and verification

throughout each of the above building blocks, subject to appropriate protection for confidential business information, can help facilities to provide public assurances that operations and activities are compatible with ESM. Such provisions may include for example participating in third party audits and inspections.

- ✧ Facilities should review measures in place to support applicable recommendations contained within the Basel Convention's Guidance Document on the Preparation of Technical Guidelines for the Environmentally Sound Management of Wastes Subject to the Basel Convention (see Annex A).
- ✧ Facilities should review measures in place to support applicable recommendations contained within PACE guidance documents and other applicable guidance under the Basel Convention.
- ✧ Facilities located in OECD-member countries should also review measures in place to support applicable recommendations contained within the OECD Council Recommendation C(2004)100 on the Environmentally Sound Management of Waste (see Annex B) and OECD Technical Guidance for the Environmentally Sound Management of Specific Waste Streams: Used and Scrap Personal Computers (ENV/EPOC/WPWPR(2001)3/FINAL).

## e-steward of BAN

### Overview of e-Stewards

The E-steward is project of certifying responsible recyclers and/or refurbishers of electrical and electronic equipment, which is initiated by Basel Action Network (BAN). In the project, BAN developed, with leaders in the recycling industry, the e-Steward Standards for Responsible Recycling and Reuse of Electronic Equipment. The purpose of the standard is to provide appropriately rigorous, yet practical operational criteria for globally responsible recycling and refurbishing of electronic equipment.

The standard builds on ISO 14001-2004 as a platform, and also integrates the following concepts.

- ✧ Occupational health and safety
- ✧ Social accountability
- ✧ Media sanitization
- ✧ Export and disposal restriction
- ✧ Chain of custody accountability
- ✧ Reporting criteria

### ESM components in the BAN's e-steward

One of the most important criteria of the entire e-Stewards standard is “*accountability for downstream recycling chain*”, which is holding e-Stewards accountable for controlling, tracking, and restricting the downstream destinations of all hazardous E-waste until the materials have successfully reached end processors and final disposition in conformance with the standard, including export option. ESM components described in the Appendix A are as follows;

#### General Requirement

- Environmental management system (ESM) shall include health and safety, and all other industry specific performance requirement in this standard

#### Environmental Policy

- Accountability of hazardous E-waste throughout recycling chain<sup>2</sup>
- Prohibition of exports of hazardous E-waste throughout the recycling chain which violate the Basel

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<sup>2</sup> The e-stewards are required to be accountable for the entire downstream flow of E-waste through their facility to final disposition.

Convention and its Decisions, and domestic laws in countries involved in trade

- Social accountability in environmental policy<sup>3</sup>
- Prohibition of prison labor for processing hazardous E-waste throughout the recycling chain

### Planning

- Legal and other requirement
- Conformance with export laws and regulations
- Data security and privacy requirement
- Competence, training and awareness

### Operational control

- Health and safety in the workplace
  - ◇ Fully implement local regulation
  - ◇ Qualified personnel or staffs<sup>4</sup>
  - ◇ Ascertain hazards<sup>5</sup>
  - ◇ Non-conforming materials<sup>6</sup>
  - ◇ Qualified professional Ergonomist
- Using potentially hazardous processing technology
  - ◇ Determine hazards in managed material<sup>7</sup>
  - ◇ Air monitoring
  - ◇ Tests and limits for fiberglass and brominated flame retardants (BFRs)
  - ◇ Injury and illness prevention program
  - ◇ On-going identification of occupational hazards and risk
  - ◇ Engineering, administrative, and personal protective equipment control
  - ◇ Provide a training program for workers
  - ◇ Workplace cleaning and hygiene procedures
  - ◇ Responding to emergencies
  - ◇ Develop and implement a Medical Surveillance Program
- Reuse and refurbishment of electronic equipment
  - ◇ Label or list identifying records
  - ◇ Package refurbished equipment and components to protect them from damage in transit
  - ◇ Evidence of downstream reuse<sup>8</sup>
  - ◇ Mass balance accounting<sup>9</sup>.
  - ◇ Optional take-back service
- Managing hazardous E-waste and problematic components and materials
  - ◇ Safely remove toxic components so they are not shredded, heated, crushed, etc.

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<sup>3</sup> The e-stewards must not only ensure that their own operations are in complete conformance with the principles of the global SA 8000 standard for social accountability, but they should do everything reasonably possible to ensure downstream recyclers are also operating in conformance with the standard.

<sup>4</sup> This includes certified industrial hygienists, environmental health and safety specialist, safety engineers, etc

<sup>5</sup> To review incoming products and product label specification indicating chemical composition, such as MSDSs, mill and lab test result, etc

<sup>6</sup> Because recyclers receive unusual items which are not prepared to manage safely, it is important to have a process for dealing with “non-conforming” materials

<sup>7</sup> In addition to providing detailed information about the extent of specific toxins present in the material flows, the process will provide valuable information about expected volumes of output for each material, and can increase the tracking and downstream accountability as a result.

<sup>8</sup> The e-steward must provide evidence of refurbished equipment and components moving into legitimate reuse markets, by maintaining verifiable records for all equipment and parts that go for reuse.

<sup>9</sup> All electronic equipment refurbished for reuse, and resulting scrap must be included in a mass balance system accounting Formula is,  $A+X-Y=B$  where:

A = beginning unprocessed inventory, X = incoming inventory over the period, Y = outgoing inventory over the period, B = end unprocessed inventory.



- ◇ Manage consolidated toxic components
- Accountability for downstream recycling chain
  - ◇ Perform initial due diligence on potential downstream recyclers
  - ◇ Assure on-going downstream recycler conformance to this standard
  - ◇ Site evaluation (for non-steward downstream)
- Materials recovery and final disposition
- Export of hazardous electronic waste
- Site closure plans
- Insurance requirements

## Summary

### Identification of recommended ESM components

The recommended ESM components identified through the review of the existing guidelines or documents are summarized as follows. Please note that some components are not independent but can be related each other (for instance, monitoring, recording and reporting are not independent but also the part of legal requirement).

Table 1 Summary of general ESM components of the relevant documents

Component	ESM criteria on facilities	Example of requirement on facilities
Compliance with legal requirements	Comply with conditions or standards (environmental and emission standards ) required by the country, region, international treaty etc.	➤ Implementation of pollution prevention measures to ensure legal compliance
	Obtain approvals, licenses, etc. from appropriate competent authorities to the national or local government	<ul style="list-style-type: none"> <li>➤ Implementation of required actions to obtain the license (e.g. environmental impact assessment (EIA))</li> <li>➤ Continuous implementation of the action above required for periodical renewal of license</li> </ul>
Introduction of Environmental Management System (EMS)	Establish policy or goals of environmental management on voluntary basis, introduce systems in facility for its achievement, and manage operation based on the system	<ul style="list-style-type: none"> <li>➤ -Acquisition of ISO14001 or other ESM certification by the third organization, or introduction of similar management system and its continuous implementation.</li> <li>➤ -Ensuring of commitment from top management</li> </ul>
Identification of hazards or risk	Identify hazards or risks on the environment	➤ Utilization of Material Safety Data Sheet (MSDS) or laboratory results Identification of risks or hazards in facility (rebell on hazardous substances or appropriate packaging, etc).
Occupational safety and health	Avoid exposures to unrespectable occupational risk in working environment	➤ Ensuring occupational health and safety of employees (providing personal protecting equipment, cleaning of working place and sanitary management, periodical medical check, etc.)
Awareness and competency of staffs	Enable workers to understand hazards or risks of hazardous wastes and handle it in appropriate manner	<ul style="list-style-type: none"> <li>➤ Awareness raising and capacity development of employees (through seminar or in-house training, etc).</li> <li>-Recruiting of certified experts (in the field of occupational safety or mechanical engineer</li> </ul>

Component	ESM criteria on facilities	Example of requirement on facilities
Monitoring, recording, reporting	Collect and keep record of information such as material flow or emission status (exhaust gas or effluent) and report it to the appropriate authority.	<ul style="list-style-type: none"> <li>➤ Development of procedure for monitoring and allocate staffs and equipments for its implementation</li> <li>Development of procedure for record-keeping and its implementation.</li> <li>➤ -Periodical reporting to the competent authority</li> </ul>
Emergency response	Have a capability to deal with unexpectable situation which can create negative effect on the environment	<ul style="list-style-type: none"> <li>➤ Development of emergency response plan</li> <li>➤ Sharing of the above plan among facility employees and local authority.</li> </ul>
Secure financial resource	Financially stable which can accommodate unexpectable situation (such as accident or closure of the facility).	<ul style="list-style-type: none"> <li>➤ Ensuring financial resource or having financial instruments (e.g. insurance)</li> </ul>
Ensure ESM in downstream	Ensure ESM in downstream recycling chain or destined country	<ul style="list-style-type: none"> <li>➤ Keeping the contract with recyclers in downstream chain</li> <li>➤ (Export case) keeping contract with exporter and all the shipping documents.</li> </ul>

It should be noted that some documents mention that for application of those ESM components to the actual waste management facility should be flexible with taking into account the reality of operation of the waste management facility, such as size of the enterprise, especially the situation of SMEs (small and medium-sized enterprise) or the type and amount of waste, etc.

#### Comparison of ESM component recommended in each document

The following is the summary recommended ESM components described in the reviewed documents or guidelines.

Table 2 Summary of ESM components recommended in the existing document and guideline

	Basel guideline	OECD guidance manual	BCRC-SEA guideline	MPPI guideline	PACE criteria	e-Stewards
Compliance with legal requirements	X		X	X	X	X
Introduction of Environmental Management System (EMS)		X		X	X	X
Identification of hazardousness and risk			X	X	X	X
Occupational safety and health		X	X	X	X	X
Awareness and competency of staffs	X	X	X	X	X	X
Monitoring, recording, reporting	X	X	X	X	X	X
Emergency response	X	X	X	X	X	X
Secure financial resource			X	X		X
Ensure ESM in downstream				X	X	X

The “Guidance Document on the Preparation of Technical Guidelines for the Environmentally Sound Management of Wastes Subject to the Basel Convention (1994)” was the oldest document that was reviewed in this study. At that time, the discussion on ESM components was limited. Following the Basel Convention Guidance Document, various guidelines were published in parallel with further discussions on ESM. Recently published documents cover many of the ESM components listed in the above Table.

MPPI and PACE have covered in their guidelines the overall lifecycle of used mobile phones and computers (in case of MPPI, refurbishment, collection, material recovery/recycle, awareness raising at the designing stage and its TBM) in collaboration with the experts from industry under the Basel Convention Partnership (consisting mainly of manufacturing companies of the developed countries). On the other hand, BCRC-SEA in their guideline focuses on repairing and refurbishment to better reflect the realities in the developing countries where secondhand electric and electronic equipments are often reused. It was observed that the levels of requirements on ESM differ among guidelines even if the same ESM components are recommended.

”The e-Stewards Standard for Responsible Recycling and Reuse of Electronic Equipment” developed by BAN are not guidelines but are standards for certifying “responsible recyclers”. The standards are comparatively more strict than the standards in other guidelines; certification of SA 8000 (global social accountability standard) in addition to compliance of environmental laws/regulations and standards are required not only for the facility to be certified but also for its recyclers and refurbishers in the downstream of the recycling chain.

## Chapter 3 Study on Criteria and Requirement for ensuring ESM of Imported or Exported Hazardous Wastes in Asian Countries

The chapter summarizes criteria and/or requirement imposed on waste management facility by the government in Asian region for ensuring ESM of imported/exported hazardous wastes and other wastes. The information was collected through questionnaire survey addressed to the following countries.

- Japan (for export case)
- Republic of Korea
- Philippines
- Singapore

### Criteria and Requirement for Hazardous Wastes Export in Japan

#### Hazardous waste export from Japan

Japan is exporting waste lead acid batteries and other hazardous wastes to Republic of Korea and other OECD countries for the purpose of recovery. Since 1997, Japan has not approved the export of such wastes to non-OECD countries but has exported 2,400 tons of scrapped electronic parts to Singapore for the purpose of recycling based on the relevant provision of the Basel Convention.

Table 3 Export of hazardous wastes and other wastes under the Basel Convention in Japan (2004 - 2006)

Year	Y code	Waste stream	Export (ton)	Importing country	D code	R code
2006	Y23		54	United States		R4
	Y31		418	Belgium		R4
	Y31		320	Belgium		R4
	Y31		2,350	Republic of Korea		R4
	Y27, Y31		2,442	Republic of Korea		R4
	Y31, Y34		10663	Republic of Korea		R4
	Y24, Y27, Y31		352	Republic of Korea		R4
	Y27, Y31, Y34		758	Republic of Korea		R4
2005	Y31	Lead ash	100	Republic of Korea		R4
	Y31	Lead scrap	126	Republic of Korea		R4
	Y31	Solder ball	107	Belgium		R4
	Y27, Y31	Lead scrap	903	Republic of Korea		R4
	Y27, Y31	Lead scrap	189	Republic of Korea		R4
	Y31	Solder ball	311	Belgium		R4
	Y23	Nickel Sludge	54	United States		R4
	Y24, Y27, Y31	Lead ash	1,084	Republic of Korea		R4
	Y31	Solder ball	433	Belgium		R4
	Y31	Lead scrap	160	Republic of Korea		R4
	Y31	Lead scrap	615	Republic of Korea		R4
	Y31	Lead scrap	310	Republic of Korea		R4
	Y31	Lead scrap	240	Republic of Korea		R4
	Y31	Lead scrap	378	Republic of Korea		R4
	Y24, Y27, Y31	Lead ash	338	Republic of Korea		R4
	Y31	Lead ash	212	Republic of Korea		R4
	Y27, Y31	Lead scrap	882	Republic of Korea		R4
	Y27, Y31	Lead scrap	120	Republic of Korea		R4
	Y22, Y23, Y31	Copper and Leadscrap	104	Belgium		R4
Y31, Y34	Lead scrap	100	Republic of Korea		R4	
2004	Y25, Y31	Solder ball	100	Belgium		R4
	Y31	Lead scrap	2,126	Republic of Korea		R4

Year	Y code	Waste stream	Export (ton)	Importing country	D code	R code
	Y31	Lead scrap	947	Republic of Korea		R4
	Y31	Lead scrap	500	Republic of Korea		R4
	Y31	Solder ball	315	Belgium		R4
	Y31	Lead scrap	1,327	Republic of Korea		R4
	Y30	Potassium nitrate	20	Canada		R4
	Y31	Lead ash	1,200	Republic of Korea		R4
	Y31	Lead scrap	2,819	Republic of Korea		R4
	Y31	Lead scrap	1,072	Republic of Korea		R4
	Y31	Solder ball	390	Belgium		R4
	Y24, Y27, Y31	Lead ash	550	Republic of Korea		R4
	Y27, Y31	Lead scrap	2,229	Republic of Korea		R4
	Y27, Y31	Lead scrap	462	Republic of Korea		R4

Source: Basel Convention Country Fact Sheet

### Overview of legal framework

Pursuant to the provision of Article 3 of the Act for the Control of Export, Import and Others of Specified Hazardous Wastes and Other Wastes (hereinafter referred to as “the Japanese Basel Act”), specified hereunder are matters necessary to ensure accurate and smooth implementation of the Convention and the bilateral, multilateral or regional agreements and arrangements specified in Article 11 of the Convention.

### Requirement on exporter of hazardous wastes

The following is the basic matters concerning measures to be taken to prevent damage to human health or the living environment that is likely to occur in association with the export, import, transportation and disposal of specified hazardous wastes, etc.

Table 4: Japan’s criteria for export of specified hazardous wastes and other wastes

Act for the Control of Export, Import and Others of Specified Hazardous Wastes and Other Wastes (Basel Act)	
Basel Act (Article 4 (3))	Matters listed in Article 3, items (i) to (iv) of the Act for the Control of Export, Import and Others of Specified Hazardous Wastes and Other Wastes pursuant to the provision of Article 3 of the same Act (No.1 2(1) (a))
The Minister of the Environment shall, when the written application is sent to the Minister pursuant to the provision of the preceding paragraph, confirm whether necessary measures to prevent environmental pollution are taken in regard to the disposal of specified hazardous wastes, etc. pertaining to the written application and notify the Minister of Economy, Trade and	(a) such export shall fall under any of the following cases:
	i) where Japan does not have the technical capacity or the necessary facilities, or the disposal capacity or suitable disposal sites to dispose, in an environmentally sound and efficient manner, of specified hazardous wastes, etc. to be exported;
	ii) where specified hazardous wastes, etc. to be exported are required as raw materials for recycling or recovery industries in the State of import; or
	iii) where specified hazardous wastes, etc. to be exported are exported, imported, transported and disposed of by the Parties of the Convention (hereinafter referred to as “the Parties”) as a whole in accordance with the criteria decided as provided in Article 4-9 (c) of the Convention;
	(b) such export shall not be made to non- Parties;
(c) such export shall not be made to the area south of 60 degrees south latitude;	
(d) such export shall not be the export of specified hazardous wastes, etc. prohibited by the State of import;	

Industry of the confirmation result.	(e) consent for such export shall have been obtained in writing from the State of import and the Party of transit; provided, however, that this shall not apply to the consent of the Party of transit if the Party of transit in question does not require written consent and when Japan does not obtain any response from the Party of transit in question within sixty days after the day the Party of transit in question has received notification from Japan;	
	(f) confirmation shall have been received from the State of import that a contract between the exporter and the disposer is concluded that clarifies, in regard to the specified hazardous wastes, etc. to be exported, that transportation and disposal shall be implemented in an environmentally sound manner;	
	(g) it shall be found that the transporter and disposer have the capacity to transport and dispose of specified hazardous wastes, etc. in an environmentally sound manner, and that their transportation and disposal are ensured to be implemented in a manner that falls neither below the level required from an environmental conservation viewpoint applicable in Japan, nor below the criteria to be decided on by the Parties at their meeting, as provided in Article 4-2 (e) of the Convention;	(g) -1 the transporter and disposer have the capacity to transport and dispose of specified hazardous wastes, etc. in an environmentally sound manner
		(g) -2 transportation and disposal are ensured to be implemented in a manner that falls below the level required from an environmental conservation viewpoint applicable in Japan
		(g) -3 transportation and disposal are ensured to be implemented in a manner that falls below the criteria to be decided on by the Parties at their meeting, as provided in Article 4-2 (e) of the Convention
	(h) necessary measures shall have been taken when the State of import or the Party of transit requires insurance, a bond or some other guarantee for the import, transportation or disposal of specified hazardous wastes, etc., or the exporter, transporter and disposer shall have a sufficient financial base and technical capacity to ensure export, transportation and disposal, respectively, of specified hazardous wastes, etc.;	(h) -1 necessary measures shall have been taken when the State of import or the Party of transit requires insurance, a bond or some other guarantee for the import, transportation or disposal of specified hazardous wastes, etc.,
(h) -2 the exporter, transporter and disposer shall have a sufficient financial base and technical capacity to ensure export, transportation and disposal, respectively, of specified hazardous wastes, etc.;		
(i) such export shall be consistent with other necessary matters for the accurate and smooth implementation of the Convention.		

Table 5 Acts relevant to the export screening criteria in Japan

Relevant Acts	Screening criterion
Air Pollution Control Act	The discharge standards for smoke, volatile organic compounds and facilities producing dust are not exceeded.
Water Quality Pollution Control Act	The effluent from specified facilities does not exceed the relevant standards.
Offensive Odor Control Act	The standard for offensive odor is not exceeded in the control area.
Noise Regulation Act	The environmental standard concerning noise is not exceeded in the designated area.
Vibration Regulation Act	The standard concerning vibration is not exceeded in the area where specified facilities are regulated.
Wastes Disposal and Public Cleansing Act	The waste treatment standards are not exceeded when the residual produced by disposal facilities is treated. In addition, the storage method of the residual is appropriate.

## Criteria and Requirement for Hazardous Wastes Import in Republic of Korea

### Hazardous waste import in Republic of Korea

Republic of Korea imports lead as well as nickel-cadmium batteries from many countries, including those outside Asia, for the purpose of recovery.

Table 6 Import of hazardous wastes and other wastes under the Basel Convention  
in Republic of Korea (2004 - 2006)

Year	Y code	Waste stream	Import (ton)	Exporting country	D code	R code
2006	Y22	Copper Sludge	2,260	Philippines		R4
	Y46	Glass waste from Cathode-Ray Tubes	138	Philippines		R5
	Y17	Glass waste from Cathode-Ray Tubes	8,000	United States		R3
	Y31	Lead ash	2,400	Japan		R4
	Y26	Nicard Batteries	1,480	China		R4
	Y26	Nicard Batteries	150	Malaysia		R4
	Y26	Nicard Batteries	50	China		R4
	Y26	Nicard Batteries	150	Australia		R4
	Y26	Nicard Batteries	60	Hong Kong SAR		R4
	Y26	Nicard Batteries	100	New Zealand		R4
	Y31	Scrap Battery	1200	Japan		R4
	Y18	Silver Sludge	150	Philippines		R4
	Y17	Tin Sludge	480	Thailand		R4
	Y31	Waste Batteries	13,200	Australia		R4
	Y31	Waste Batteries	18,400	Australia		R4
	Y31	Waste Batteries	3,000	Bulgaria		R4
	Y31	Waste Batteries	2,400	Cameroon		R4
	Y31	Waste Batteries	5,000	Chile		R4
	Y31	Waste Batteries	6,000	China		R4
	Y31	Waste Batteries	2,400	Ghana		R4
	Y31	Waste Batteries	5,000	Jamaica		R4
	Y31	Waste Batteries	74,500	Japan		R4
	Y31	Waste Batteries	11,600	Japan		R4
	Y31	Waste Batteries	26,000	Kuwait		R4
	Y31	Waste Batteries	2,000	Malta		R4
	Y31	Waste Batteries	12,000	Mexico		R4
	Y31	Waste Batteries	2,000	New Zealand		R4
	Y31	Waste Batteries	3,000	Philippines		R4
	Y31	Waste Batteries	2,000	South Africa		R4
	Y31	Waste Batteries	5,000	South Africa		R4
	Y31	Waste Batteries	12,000	Singapore		R4
	Y31	Waste Batteries	6,000	Sri Lanka		R4
	Y31	Waste Batteries	1,500	Turkey		R4
Y31	Waste Batteries	3,000	Turkey		R4	
Y31	Waste Batteries	12,000	United States		R4	
Y31	Waste Batteries	34,000	United States		R4	
Y31	Waste Batteries	12,000	United Kingdom		R4	
Y31	Waste Batteries	5,000	United Kingdom		R4	
2005	Y18	Sludge	1,450	Philippines		R4
	Y18	Sludge	480	Thailand		R4
	Y31	Lead scraps	11,000	Japan		R4
	Y31	Lead scraps	1,500	Malta		R4

Year	Y code	Waste stream	Import (ton)	Exporting country	D code	R code
	Y26	Nicard Batteries	300	Taiwan		R4
	Y26	Nicard Batteries	100	China		R4
	Y31	Waste Batteries	600	Taiwan		R4
	Y31	Waste Batteries	47,000	United States		R4
	Y31	Waste Batteries	18,500	Sri Lanka		R4
	Y31	Waste Batteries	53,000	Japan		R4
	Y31	Waste Batteries	7,000	Singapore		R4
	Y31	Waste Batteries	11,000	Chile		R4
	Y31	Waste Batteries	500	Kenya		R4
	Y31	Waste Batteries	3,000	Philippines		R4
	Y31	Waste Batteries	13,000	Kuwait		R4

(Note) No data is reported in 2004

Source: Basel Convention Country Fact Sheet

### Overview of legal framework

In Republic of Korea, the Waste Control Act prescribes the definition of hazardous wastes and the general framework for their control. The general regulations and procedures for the import and export of hazardous wastes are prescribed by the Act on Control of Transboundary Movement of Hazardous Wastes and Their Disposal (Korean Basel Act) and the Guideline for Imported Wastes for Registration and Approval.

The Act on Resource Recycling of Electrical and Electronic Equipment and Vehicles prescribes the E-waste reporting system and recycling method.

There are two sets of ESM standards. One set of standards governs the recycling and treatment of electronic parts or packaging materials etc under the extended producer responsibility (EPR) prescribed in the Act on Resource Recycling of Electrical and Electronic Equipment and Vehicles. The other set of standards based on the Waste Control Act is applied to other hazardous wastes (waste lead acid batteries, waste oil, waste plastics and others) which are not covered by the EPR regime.

### Requirement on importer and recycler of hazardous wastes

The criteria and requirement for import of hazardous waste import in Republic of Korea are collected through questionnaire survey sent to the Korea Environment Corporation. The information can be summarized as follows;

Table 7 Criteria / requirement on waste management facility in Republic of Korea

(ESM standard for operation of waste management facility)

ESM component	Overview of requirement / criteria
Introduction of EMS	The requirements are clarified in the relevant laws. Each operator may have ISO 9000 or 14001 for the assurance of ESM. The ISO certificate is voluntary option for the operator and not mandated for recycling operation.
Occupational safety and health	The health and environmental condition of the facility is defined under the relevant laws in regards with labor and health. The Waste Management Act also follows the relevant regulation enacted in the labor laws for their safety and health measures.
Monitoring, recording, reporting	The conditions for regular reporting are also regulated in the Waste Management Act.
Awareness and competency of staffs	The training and safety instruction are also regulated in the Waste Management Act.



ESM component	Overview of requirement / criteria
Emergency response	The emergency plan is also regulated in the Waste Management Act.
Secure financial resource	Not required
Ensure ESM in downstream	The decision of the downstream recycling chain should be made under the relevant laws which regulate the general condition for the recycler or operator. For the imported wastes, the importer should clarify the use and the recycling chain of the wastes, especially, under the control of Basel Convention. For general hazardous waste, the domestic standards are adopted for their treatment.

Technical requirement on facility which recycles the items targeted under EPR system, technical design or system of facility should meet the standards clarified in the Act on Resource Recycling of Electrical and Electronic Equipment and Vehicles. The law defines not only responsibility of the involved party, but also detailed recycling method.

### Criteria and Requirement for Hazardous Wastes Import in the Philippines

#### Hazardous waste import in the Philippines

The Philippines mainly imports the used lead-acid batteries (ULAB) for the purpose of recovery in recent years as seen from the table below.

Table 8 Import of hazardous wastes and other wastes in the Philippines (2004 - 2006)

Year	Y code	Waste stream	Import (ton)	Exporting country	D code	R code
2005	Y31	Lead Solder dross	870	Thailand		R4
	Y31	Used lead acid batteries	1,600	New Zealand		R4
	Y31	Used lead acid batteries	120	Papua New Guinea		R4
	Y31	Used lead acid batteries	5,000	Bulgaria		R4
	Y31	Used lead acid batteries	10,000	Singapore		R4
	Y31	Used lead acid batteries	12,000	Sri Lanka		R4
2004	Y31	Drained Whole Batteries (Rains)	23,016	Singapore		R4
	Y31	Drained Whole Lead Acid Battery <sup>10</sup> Scrap	12,000	Sri Lanka		R4
	Y31	Lead Solder Dross/Tin Alloy	1,020	Thailand		R4

(Note) No data is reported in 2006

Source: Basel Convention Country Fact Sheet

#### Overview of legal framework

In the Philippines, facilities that treat, recycle, reprocess, store and dispose of hazardous wastes are required to register as Treatment, Storage and Disposal (TSD) facilities under Republic Act 6969 (Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990). The above-mentioned criteria are requirements for TSD registration and are stipulated in DENR Administrative Order (DAO) 36, Series of 2004 (Procedural Manual for Hazardous Waste Management). The TSD Registration Certificate must be secured from the Environmental Management Bureau (EMB) before the facility can operate and handle hazardous wastes<sup>11</sup>. (\*copy of RA 6969 and DAO 04-36 can be downloaded from our website.)

ESM is not specifically defined in RA 6969, DAO 92-29. However, under Section 2 (Declaration of Policy) of the DAO, it is stated that “it is the policy of the State to regulate, restrict or prohibit the importation, manufacture, processing, sale, distribution, use and disposal of chemical substances and mixtures that

<sup>10</sup> Department of Environment and Natural Resources

<sup>11</sup> The copy can be downloadable from the website of EMB (www.emb.gov.ph)

present unreasonable risk and/or injury to health or the environment.”

The EMB has prepared a list of registered and certified TSD facilities and disclosed it on its own website.<sup>12</sup> Individual business operators discharging hazardous wastes can select and negotiate with a TSD facility by their own preference. Some enterprises audit such facilities themselves to verify the environmentally sound treatment and recycling of wastes. In short, each enterprise selects a facility based on its own criteria (ISO14001 certification, etc.)

### Requirement on importer and recycler of hazardous wastes

ESM Criteria/requirement on TSD facilities are summarized as follows. Information was collected through questionnaire survey for the Competent Authority to the Basel Convention in EMB.

Table 9 Criteria / requirement on waste management facility in the Philippines  
(ESM standard for operation of the TSD facilities in the Philippines)

ESM component	Overview of requirement / criteria	Relevant law / regulation
Introduction of EMS	<ul style="list-style-type: none"> <li>Not required</li> </ul>	—
Occupational safety and health	<ul style="list-style-type: none"> <li>As part of the Environmental Impact Assessment (EIA) , prior to issuance of Environmental Compliance Certificate (ECC), measures to address occupational, environmental and health and safety are already identified</li> <li>Facility has accredited pollution control officer (PCO)</li> <li>Facility practices good housekeeping</li> </ul>	<ul style="list-style-type: none"> <li>PD 1586 (EIA) and its IRR (DAO 03-30)</li> <li>RA 6969 and one of its IRR (DAO 04-36)</li> </ul>
Monitoring, recording, reporting	<ul style="list-style-type: none"> <li>Facility submits quarterly Self-Monitoring Reports (SMR)</li> </ul>	- DAO 04-36
Awareness and competency of staffs	<ul style="list-style-type: none"> <li>Facility train its personnel and staff on the implementation of the emergency contingency plan and the hazard posed by improper handling, transport, and use of chemical substances and their containers</li> </ul>	- DAO 04-36
Emergency response	<ul style="list-style-type: none"> <li>Facility submits an emergency contingency plan as part of the requirement for TSD registration</li> <li>Facility submits abandonment plan as part of the requirement for ECC and TSD registration</li> </ul>	<ul style="list-style-type: none"> <li>- DAO 04-36</li> <li>- DAO 03-30</li> </ul>
Secure financial resource	<ul style="list-style-type: none"> <li>Facility submits financial resources (i.e. letter of credit, surety bond, trust fund) to conduct proper hazardous waste treatment continuously and to cover liability for accidents.</li> </ul>	- DAO 04-36
Ensure ESM in downstream	<ul style="list-style-type: none"> <li>Facility submits residuals management plan and long-term plan for the recycled/reprocessed/ end-product as part of the requirement for TSD registration</li> </ul>	- DAO 04-36
Others	<ul style="list-style-type: none"> <li>Facility submits copy of ECC and their Environmental Impact Assessment or Initial Environmental Examination as part of the requirement for TSD registration</li> <li>Facility submits valid Permit to Operate Air Pollution Control Installations and/or Discharge Permit as part of the requirement for TSD registration</li> </ul>	<ul style="list-style-type: none"> <li>- DAO 04-36</li> <li>- DAO 03-30</li> <li>- DAO 04-36</li> <li>- RA 8749 (Clean Air Act) and its IRR (DAO 00-81)</li> <li>- RA 9275 (Clean Water Act) and its IRR (DAO 05-10)</li> </ul>

<sup>12</sup> Website of Environmental Management Bureau (www.emb.gov.ph)

The following technical requirements must be met for the registration of a TSD facility.

- Submission of the process flows for treatment, recycling and disposal, including the overall material balance specifying all by-products, end-products and residuals, and detailed description of the technologies used
- Submission of a storage and management plan for raw materials, residuals, by-products and end-products

## Criteria and Requirement for Hazardous Wastes Import in Singapore

### Hazardous waste import in Singapore

The following table summarizes import of hazardous waste into Singapore in recent years.

Table 10 Import of hazardous wastes and other wastes in Singapore (2004 - 2006)

Year	Y code	Waste stream	Import (ton)	Exporting country	D code	R code
2006	Y34	Empty Drums containing Residual Ammonia Hydroxide	11	Malaysia		R3
	Y34	Empty Drums containing Residual Sulphuric Acid	19	Malaysia		R3
	Y34	Empty Drums containing Residual Isopropyl Alcohol	6	Malaysia		R3
	Y23, Y31	Solder Dross	26	Thailand		R4
	Y31	Printed Circuit Boards	125	Thailand		R4
	Y6	Used N-Methyl-2-Pyrrolidone (NMP)	10	Philippines		R2
	Y18	Electrical And Electronic Parts And Accessories	8	Australia		R4
2005	11b	Empty Drums containing Residual Ammonia Hydroxide. Considered as art.1(1)b waste by MY.	7	Malaysia		R3
	11b	Empty Drums containing Residual Sulphuric Acid. Considered as art.1(1)b waste by MY.	13	Malaysia		R3
	11b	Empty Drums containing Residual Isopropyl Alcohol. Considered as art.1(1)b waste by MY.	7	Malaysia		R3
	11b	Printed Circuit Boards. Considered as art.1(1)b waste by MY.	15	Thailand		R4
	Y23, Y31	Solder Dross	100	Thailand		R4
	Y23, Y31	Solder Dross (Lead Oxide)	20	Thailand		R4

(Note) No data is reported in 2004

Source: Basel Convention Country Fact Sheet

### Overview of legal framework

Singapore adheres to the Basel Convention principle that wastes should be disposed of at a location as close as possible to the source of generation of the wastes. Singapore generally does not allow the import of wastes meant for the purpose of disposal and allows wastes to be imported for the purpose of recycling and recovery on a case-by-case basis.

Section 8 of the Hazardous Waste (Control of Export, Import & Transit) Act refers ESM as *taking all practicable steps to ensure that the waste is managed in a manner that will protect human health and the environment against the adverse effects that may result from the waste.*

Section 40 of the Hazardous Waste (Control of Export, Import & Transit) Act states that the Director may issue a written certificate stating that engaging, or failing to engage, in specified conduct in relation to specified hazardous or other waste is, or is not, ESM of that waste for the purposes of this Act.

Electronic wastes that contain hazardous components are classified as hazardous wastes in Singapore. Prior to import of hazardous E-waste, the importer shall obtain a Basel Import Permit from the Pollution Control

Department (PCD) under National Environmental Agency (NEA). Every import shipment shall be declared through the Singapore Custom's TradeNet system and clearance granted by PCD. .

### Requirement on importer of hazardous wastes

Singapore has set forth the requirements for the importation of used EEE by purpose of import as shown below.

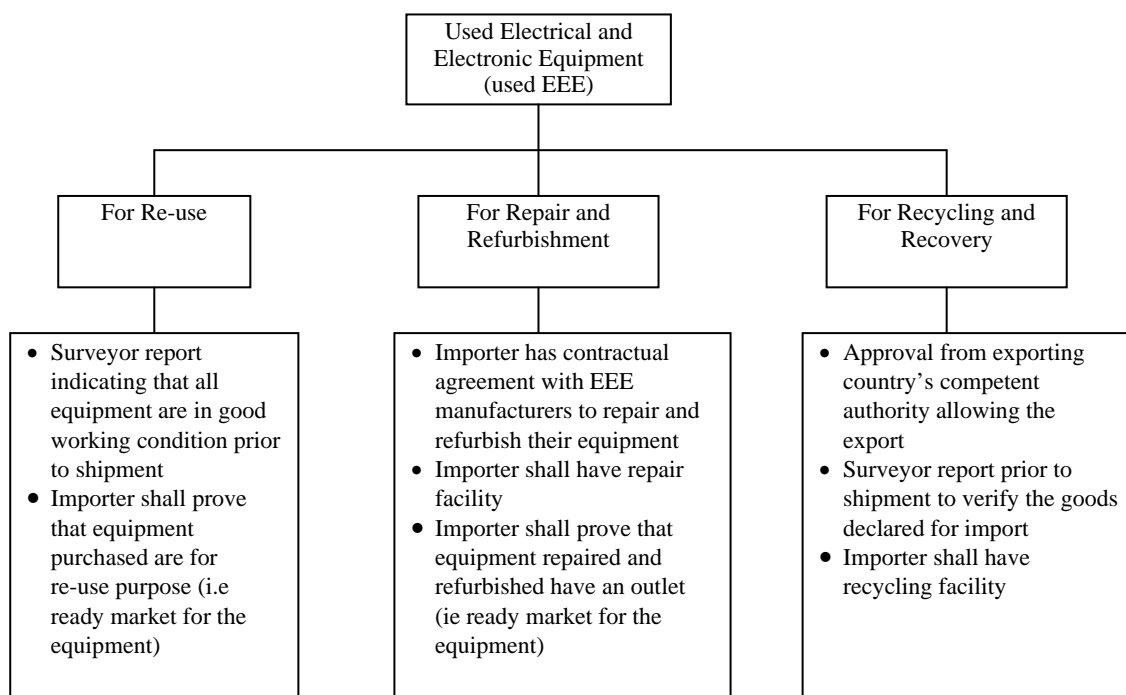


Fig. 1 Requirement on import and export of E-waste and used electronic equipment in Singapore<sup>13</sup>

Additionally, the following is summary of the requirement on waste management facility which information was collected through the questionnaire survey and interview to the competent authority to the Basel Convention in Singapore (NEA).

Table 11 Criteria / requirement on waste management facility in Singapore  
(ESM standard for operation of waste management facilities)

ESM component	Overview of requirement / criteria	Relevant law / regulation
Introduction of EMS	<ul style="list-style-type: none"> <li>• Not required</li> </ul>	—
Occupational safety and health	<ul style="list-style-type: none"> <li>• Ensure that the workplace safety complies with the Ministry of Manpower's requirements on occupational safety and health.</li> </ul>	- Workplace Safety and Health Act <sup>14</sup>
Monitoring, recording, reporting	<ul style="list-style-type: none"> <li>• The toxic industry is required to submit a monthly report on the quantity of hazardous wastes received for treatment to the government. This report must include the quantity of wastes (post-treatment wastes) shipped out after the treatment of the received wastes, including shipping to</li> </ul>	—

<sup>13</sup> <http://app2.nea.gov.sg/data/cmsresource/20090316463428699802.pdf>

<sup>14</sup> <http://agcvldb.agc.gov.sg/html/homepage.html>

ESM component	Overview of requirement / criteria	Relevant law / regulation
	secondary treatment facilities. <ul style="list-style-type: none"> <li>The recycling facility shall submit to PCD monthly records on quantity of e-wastes imported, resold, recycled and disposed.</li> </ul>	
Awareness and competency of staffs	<ul style="list-style-type: none"> <li>Persons licensed to handle Hazardous Substances and Hazardous Wastes are required to undergo training on safe use and handling of hazardous substances.</li> </ul>	- Environmental Protection and Management Act - Environmental Protection and Management (Hazardous Substances) Regulations
Emergency response	<ul style="list-style-type: none"> <li>It is a requirement for facilities using Hazardous Substances or dealing Hazardous Wastes to prepare and keep up to date an emergency action plan to deal with incidents of spills, leaks.</li> <li>In the case of a business operator handling toxic industrial wastes, the provision of an emergency response plan to deal with accidents is a mandatory requirement.</li> <li>For closure plan, tenants are required to perform Environmental Baseline Study (EBS) as a condition to assign or transfer the lease<sup>15</sup></li> </ul>	- Environmental Public Health (Toxic Industrial Wastes) Regulations - Environmental Protection and Management Act - Environmental Protection and Management (Hazardous Substances) Regulations
Secure financial resource	<ul style="list-style-type: none"> <li>A Banker's Guarantee of \$100,000 and \$30,000 is required for the issuance of Basel Import/Export and Transit Permit respectively.</li> <li>Not a requirement for import of non-hazardous E-wastes<sup>16</sup>.</li> </ul>	- Hazardous Waste (Control of Export, Import & Transit) Act and its Regulation
Ensure ESM in downstream	<ul style="list-style-type: none"> <li>The recycling facility shall submit to our department monthly records on quantity of e-wastes imported, resold, recycled and disposed.</li> </ul>	- Hazardous Waste (Control of Export, Import & Transit) Act and its Regulation

- Technical Requirements for Facility

- An importer of e-waste must own a recycling facility approved by the PCD.
- Prior to the construction and operation of a facility, an enterprise must submit a construction plan featuring, among others, the recycling process, use of hazardous materials, installation of atmospheric pollution control equipment, consumption volumes of resources (water, electricity and fuel) and quantity of waste to be generated for approval.
- No technical requirements to be met by a facility are specified. However, the recovery of precious metals is basically encouraged rather than incineration because precious metals remain in the exhaust gas from incineration.
- As a first step, a facility must be approved for industrial allocation and then must undergo risk assessment at the planning stage of EIA. In the case of a facility handling hazardous wastes, a plant is experimentally operated for analysis of the substances constituting the environmental load discharged by the plant.
- In the case of a facility treating e-waste, there is no check of individual equipment. The subject for checking is whether or not metals are recovered as indicated in the process flow without causing pollution. For recycling, the criterion is the achievement of 98% of the planned value. The basic requirement is to report on the hazardous wastes to be handled, pollution prevention system and

<sup>15</sup> The more detail information can be found at the website of Jurong Town Corporation (<http://www.jtc.gov.sg/aboutjtc/policies/LeaseManagement/AssignmentOfLease/EBS/Pages/index.aspx>)

<sup>16</sup> The more detail information can be found at the website of PCD ([http://app2.nea.gov.sg/baselcon\\_application.aspx](http://app2.nea.gov.sg/baselcon_application.aspx))

recycling details (to be confirmed by the Resources Conservation Department: RCD).

- When wastes are to be incinerated, an emission report must be submitted.
  - In the case of e-waste, there are no provisions concerning its transportation or storage. However, a facility transporting hazardous substances and/or hazardous wastes must, in principle, obtain a transportation permit from the NEA. Meanwhile, a consignor must satisfy all of the requirements for transportation set forth by the relevant laws and regulations. The same applies to storage.
- Others
- It is uncertain what criteria are used by large enterprises to select the discharge destinations for their waste. Mobile phone manufacturers (Nokia, etc.) are operating a voluntary scheme to collect used mobile phones. In the case of Nokia, the collected used mobile phones are passed on to TES-AMM for the recovery of useful materials.
  - Any business operator handling hazardous substances and/or hazardous wastes is required to refer to the national standards for the management of hazardous chemical wastes (Singapore Standard for Hazard Communication for Hazardous Chemicals and Dangerous Goods (SS586) and others.

### Comparison of ESM Criteria/Requirement

The following is summary of the ESM criteria which can be identified in screening criteria on export of hazardous waste or requirement in licensing system or EIA on waste management facility in Asian countries.

Table 12 Summary of ESM criteria introduced in the Asian countries

Major ESM components in each country's criteria for ensuring ESM of exported/imported wastes	Japan (export case)	Republic of Korea	Philippines	Singapore
	Japanese Basel Act	Korean Basel Act, Waste Management Law	DENR Administrative Order 92 - 29, 2004 - 36	Hazardous Waste (Control of Export, Import and Transit) Act
Compliance with the legal requirement	X	X	X	X
Introduction of EMS				
Occupational safety and health	X	X	X	X
Monitoring, recording, reporting	X	X	X	X
Awareness and competency of staffs	X	X	X	X
Emergency response	In Basic Matter	X	X	X
Secure financial resource	X		X	X
Ensure ESM in downstream		X	X	X

## Summary

The study in this Chapter can be summarized as follows;

- In countries that allow import of hazardous waste for the purpose of environmentally sound recycling (e.g. Republic of Korea, Philippines, Singapore), there are various mechanisms in place that ensure the ESM of waste management facilities, which also function to ensure the ESM of imported hazardous wastes.
- As seen in Japan, exporting countries are introducing screening criteria for exports in order to ensure ESM in the importing countries.
- Some waste generating companies have made their own standards to select only waste management facilities that implement environmental management system (EMS). However, in many cases, waste generators do not have such standards, and facilities are implementing EMS only on a voluntary basis.
- The target of this study was countries with high level of economic development, but the levels of institutional development differed among countries. In countries such as Cambodia with relatively low economic development<sup>17</sup>, it is hoped that the institutions will further develop, as facilities are currently inadequate and the concept of ESM is still not widespread.

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<sup>17</sup> Information is based on the interview survey with the Competent Authority to the Basel Convention in Cambodia regarding ESM standard and its operation status in the country.

## **Chapter 4 Trend and Situation of Transboundary Movement of Hazardous Wastes and other Wastes in Asia**

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At the past CLI meetings, it was confirmed based on analysis of the data contained in annual reprints under the Basel Convention that much TBM between non-OECD countries was for recycling purposes. In this chapter, the following points are clarified based on the paper titled "Analysis of Transboundary Movements of Hazardous Wastes and Other Wastes in Asia" which was submitted by Japan at the 2nd CLI meeting<sup>18</sup>.

- Economic level and import record of hazardous wastes and other wastes in Asia
- Situation of TBM of individual types of hazardous wastes and situation of their treatment in importing countries
  - Situation of TBM of waste lead-acid batteries and E-waste

### **Relationship Between Economic Level and Import of Hazardous Wastes in Asia**

Using the data contained in the national reporting under the Basel Convention, the import for a five year period (2001 - 2006) is compiled in Table 13 along with the economic level (GDP per capita) and situation of facility development in the relevant Asian countries. In general, Asian countries which import hazardous wastes and other wastes are those where the economic level is comparatively high and recycling and treatment facilities are likely to be sufficiently in place.

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<sup>18</sup> The paper can be downloadable from the website of the Basel Convention  
(<http://www.basel.int/convention/cli/wildhaus-meeting/TBM%20Analysis%20in%20Asia.pdf>)



Table 13 Summary table of import of hazardous wastes compared with the country's economic status and development of recycling and treatment facilities

	Import of hazardous wastes		GDP per capita (US dollar, PPP in 2008)	Development of recycling and treatment facilities
	Average amount of annual import (2001 to 2006)	Main types of wastes imported		
Malaysia	213,215	Blast furnace slag, copper slag, waste catalysts	14,081	<ul style="list-style-type: none"> <li>✓ 104 recycling facilities were reported in the national reporting (2006).</li> <li>✓ A list of contractors authorized to recover, transport, storage and treat scheduled wastes onsite or offsite is publicized on the website of the Department of Environment (DOE). Regarding E-waste, 16 contractors are registered for full recovery and 117 are registered for partial recovery.</li> </ul>
Republic of Korea	107,953	Waste lead-acid batteries and other wastes containing lead, waste nickel-cadmium rechargeable batteries	27,692	<ul style="list-style-type: none"> <li>✓ A large number of facilities capable of advanced recycling and treatment have been established.</li> </ul>
Indonesia	47,759	Waste lead-acid batteries ( <i>Since the total import ban of waste lead-acid batteries in 2002, there have been no import</i> )	3,980	<ul style="list-style-type: none"> <li>✓ 25 recycling facilities were reported in the national reporting (2006).</li> <li>✓ In 2004, the Ministry of Environment (KLH) issued 225 permits for B3 waste management, including 6 permits for treatment and disposal of B3 wastes. As of 2004, 30 permits were issued for effective use of hazardous wastes.</li> </ul>
Philippines	21,468	Waste lead-acid batteries and other wastes containing lead, waste oil, other metallic hazardous wastes	3,515	<ul style="list-style-type: none"> <li>✓ A list of registered treatment/storage/disposal (TSD) facilities is publicized on the website of the Environmental Management Bureau (EMB) of the Department of Environment and Natural Resources (DENR).</li> <li>✓ As of October 31, 2009, 114 TSD facilities were registered with the EMB.</li> </ul>
Japan	4,225	CRT glass, E-waste, precious metals, rare-earth metals (e.g. silver sludge), difficult-to-treat wastes (e.g. waste fluorescent lamps)	34,116	<ul style="list-style-type: none"> <li>✓ A large number of facilities capable of advanced recycling and treatment have been established.</li> <li>✓ As of April 2006, the number of facilities permitted by the Government reached 19,164 for recycling and treatment and 2,335 for final disposal.</li> </ul>
Thailand	327	CRT glass, waste OA equipment	8,239	<ul style="list-style-type: none"> <li>✓ As of February 2009, 1,356 waste treatment and recycling facilities were registered with the Department of Industrial Works (DIW) of the Ministry of Industry. Details are: facilities for landfill or incineration: 139; separation: 962; recycling: 255.</li> </ul>
Singapore	62	E-waste, etc.	51,226	<ul style="list-style-type: none"> <li>✓ 8 recycling facilities were reported in the national reporting (2006).</li> <li>✓ As of April 2009, 49 recycling facilities were listed on the website of the National Environment Agency (NEA).</li> </ul>

	Import of hazardous wastes		GDP per capita (US dollar, PPP in 2008)	Development of recycling and treatment facilities
	Average amount of annual import (2001 to 2006)	Main types of wastes imported		
China	0	No record of any import	5,970	<ul style="list-style-type: none"> <li>✓ As of the end of 2006, 6 recycling facilities with permit issued by Ministry of Environmental Protection (MEP) are reported in the national reporting (2006). In addition, provincial environmental protection bureaus issued permits for 741 hazardous waste recovery facilities.</li> <li>✓ Treatment of imported waste requires permission from the Government, particularly the import and processing of mixed metal (Type 7 waste) is strictly controlled. Every year a list of permitted importers of Type 7 waste is released, and in 2009, 589 companies were listed in China.</li> </ul>
Vietnam	0	No record of any import	2,794	<ul style="list-style-type: none"> <li>✓ Urban Environment Company (URENCO) is the leading company in waste treatment, while the number of other companies capable of recycling and treatment of hazardous wastes is limited.</li> <li>✓ Most of hazardous wastes are considered to be treated in informal sectors or disposed at landfill sites with other solid wastes.</li> </ul>
Cambodia	0	No record of any import	2,082	<ul style="list-style-type: none"> <li>✓ There is only one landfill site for special industrial waste within the country; the site is normally used for waste generated from clothing factories.</li> <li>✓ In general, there are very few facilities for intermediate treatment and recycling of hazardous wastes.</li> </ul>

\* In the table, surveyed countries are arranged in the order of their average amount of annual import of hazardous wastes (six years from 2001 to 2006). Brunei is not included in the table since insufficient data is available to assess the development status of recycling and treatment facilities of hazardous wastes.

References:

Institute of Developing Economies Japan External Trade Organization: "Fiscal Year 2005 Report of Information Provision Projects Concerning Industrial Wastes and Recycling Policies in Asian Countries" (2007)

EX Corporation: "Fiscal Year 2007 Report of the Project on the Examination of Policies for Promoting Appropriate Treatment of Wastes in Asian Countries" (2007)

Recycle One, Inc.: "Fiscal Year 2008 Report of an Examination Concerning the Validity Evaluation of the Basel Convention Including 1995 Amendment and Review of the Strategic Plan" (2008)

EX Corporation: "Fiscal Year 2008 Report of a Strategic Examination Concerning Policies for Promoting Resource Recycling in Asia" (2008)

## Transboundary Movements of Individual Type of Hazardous Waste

### Transboundary Movement of Waste Lead Acid Batteries in Asia

- From 1998 to 2002, Indonesia was the major importer of waste lead-acid batteries. After import ban in 2002<sup>19</sup>, the amount of import to Republic of Korea increased from 2004 onward<sup>20</sup> (Fig. 2).
- The constant amount of import to the Philippines is observed, presumably for deliveries to registered recycling facilities (Fig. 2).
- Republic of Korea imports and recycles lead-acid batteries from all over the world. This would imply the fact that facilities capable of recycling waste lead-acid batteries in an environmentally sound manner have been established in the country. (Figs. 4 and 5).

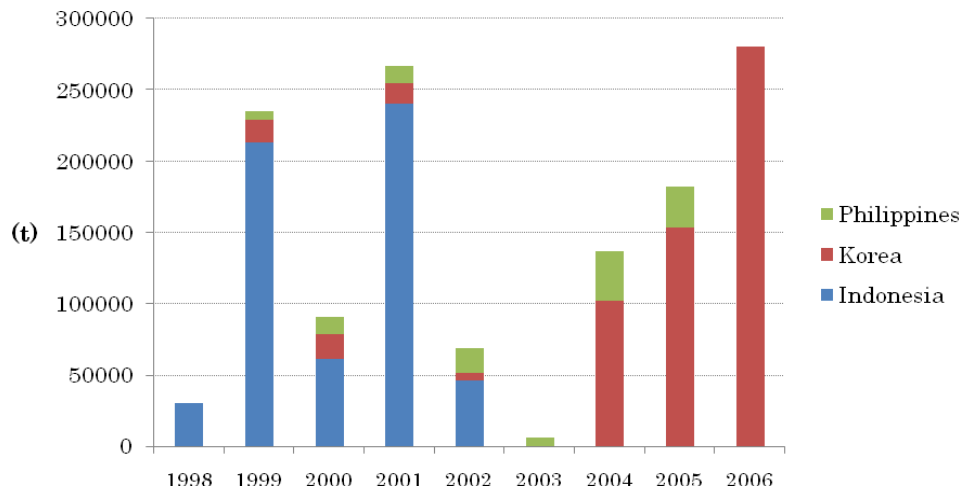


Fig. 2 Import of waste lead-acid batteries (1998 to 2006)

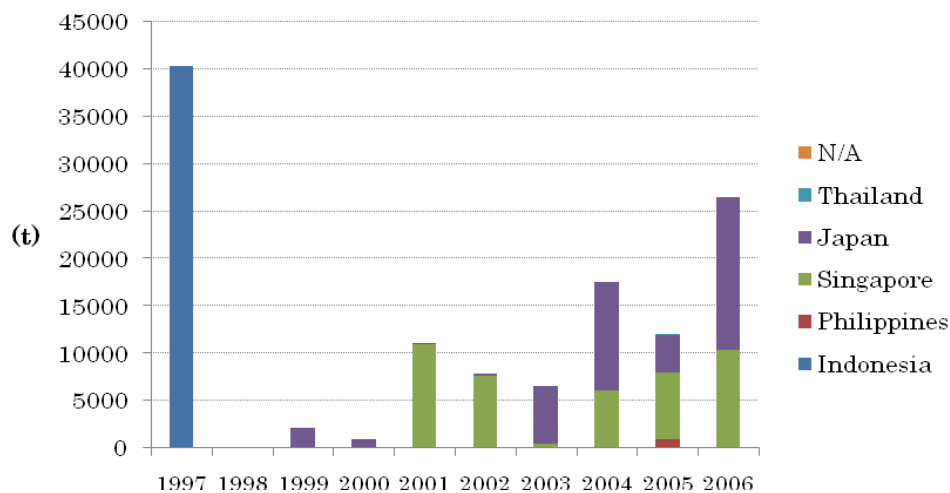


Fig. 3 Export of waste lead-acid batteries (1997 to 2006)

<sup>19</sup> In 1997 Indonesia incorporated provisions that banned the import of hazardous wastes in Article 21 of the Law Concerning Environmental Management; however only lead-acid batteries were given a grace period until total ban of import came into effect from September 2002.

<sup>20</sup> The major waste lead-acid battery exporters to Indonesia before 2002 were Singapore and Middle East countries such as Jordan, United Arab Emirates, and Yemen. On the other hand, the largest waste LAB exporters to Republic of Korea in 2006 is Japan (accounts for roughly 31% of total import), followed by the United States, Australia, Kuwaiti, and United Kingdom.

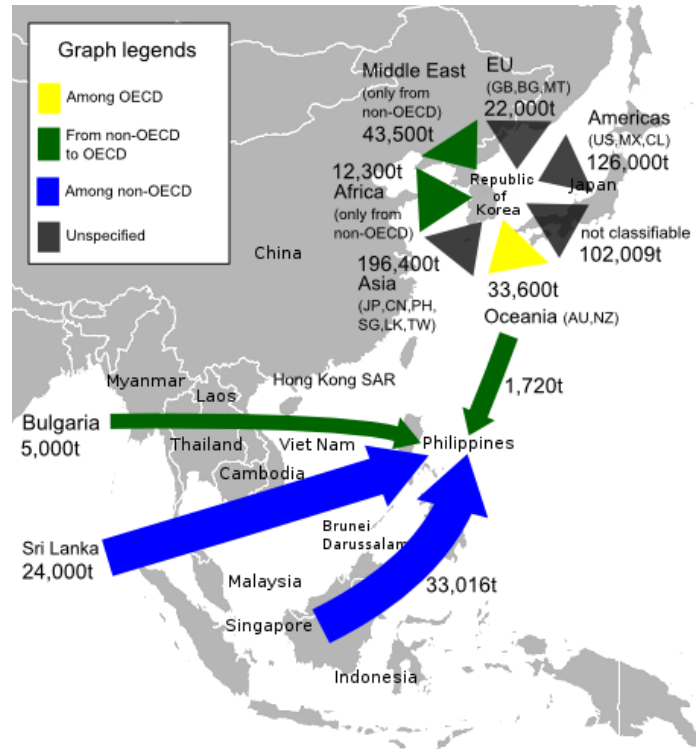


Fig. 4 TBM of waste lead-acid batteries (Import statistics: 2004 to 2006)<sup>21</sup>

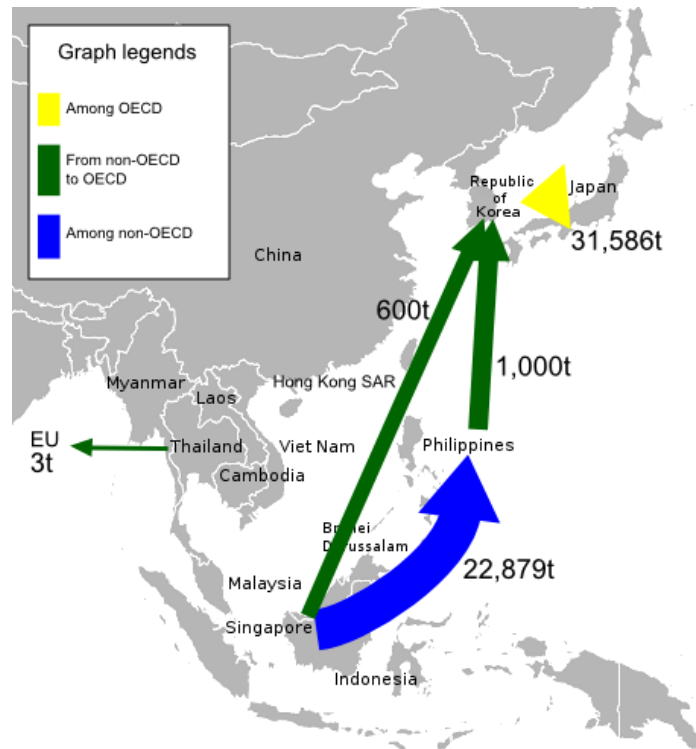


Fig. 5 TBM of waste lead-acid batteries (Export statistics: 2004 to 2006)

<sup>21</sup> More than two importing or exporting countries/regions are sometime covered in one notification. For example, Republic of Korea imported roughly 90,000 tons of waste lead-acid batteries in 2004 from Japan, Philippines, Kuwait, Hong Kong SAR, Bulgaria, and United States. In this case it is difficult to find out the ratio each country accounts for. Thus this case was categorized into “not classifiable”.

### Transboundary Movement of E-waste in Asia

- The major importer of E-waste is Japan. Japan has imported waste printed-circuit boards from the Philippines and electronic scrap from Thailand, Singapore, and the Philippines (Figs. 6, 8, and 9).
- The major exporters of E-waste are the Philippines and Thailand. The Philippines mainly exports waste printed-circuit boards to Japan. Thailand also exports E-waste mainly to Japan (Figs. 9, 10, and 11).
- In 2006 Malaysia and Singapore exported E-waste and the main importer was Thailand (Figs. 7 and 9).

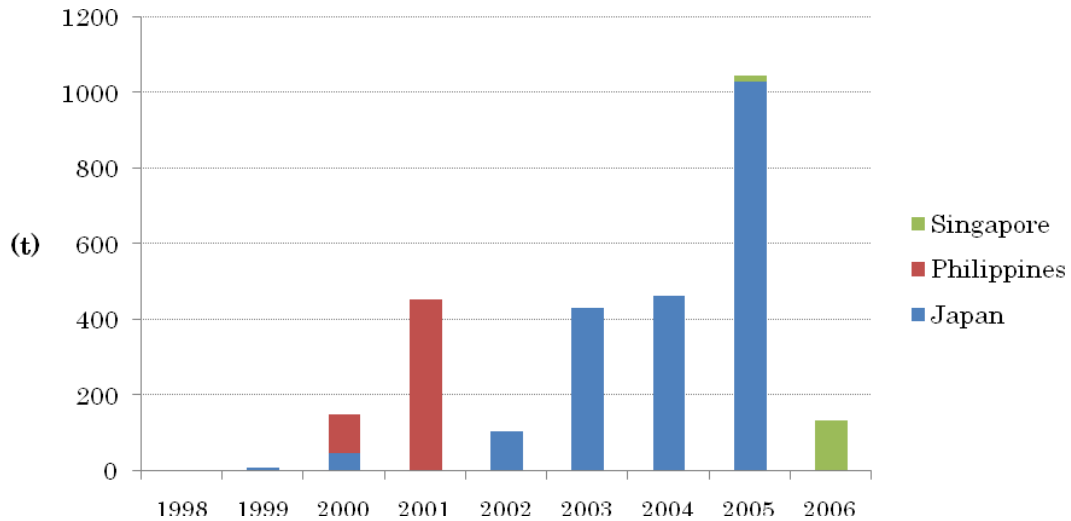


Fig. 6 Import of E-waste (1998 to 2006)

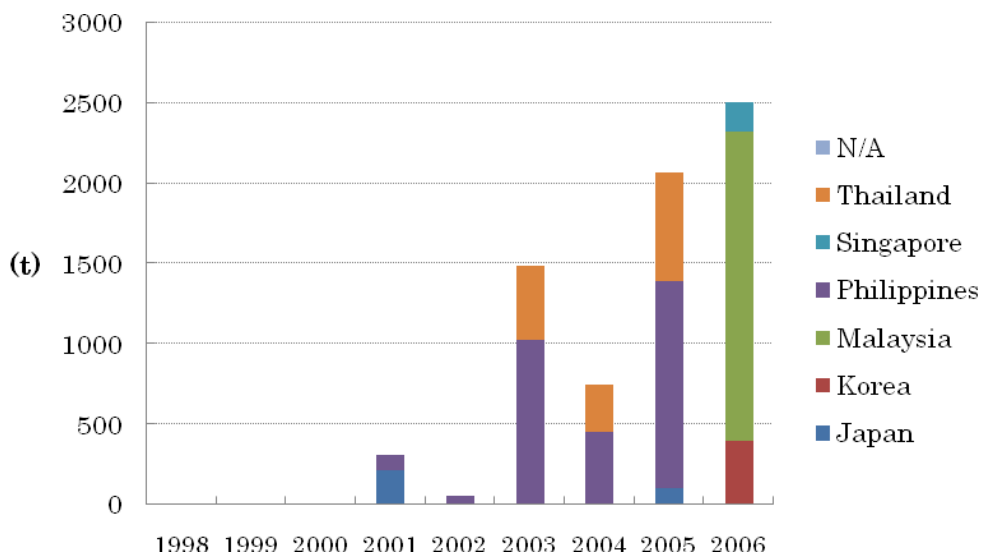


Fig. 7 Export of E-waste (1998 to 2006)

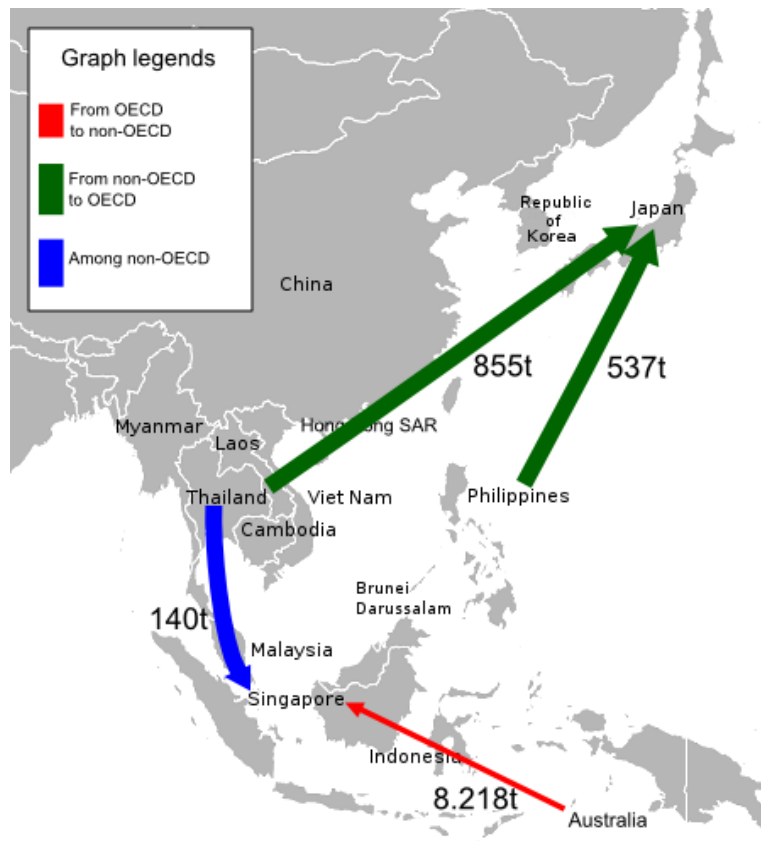


Fig. 8 TBM of E-waste (Import statistics: 2004 to 2006)

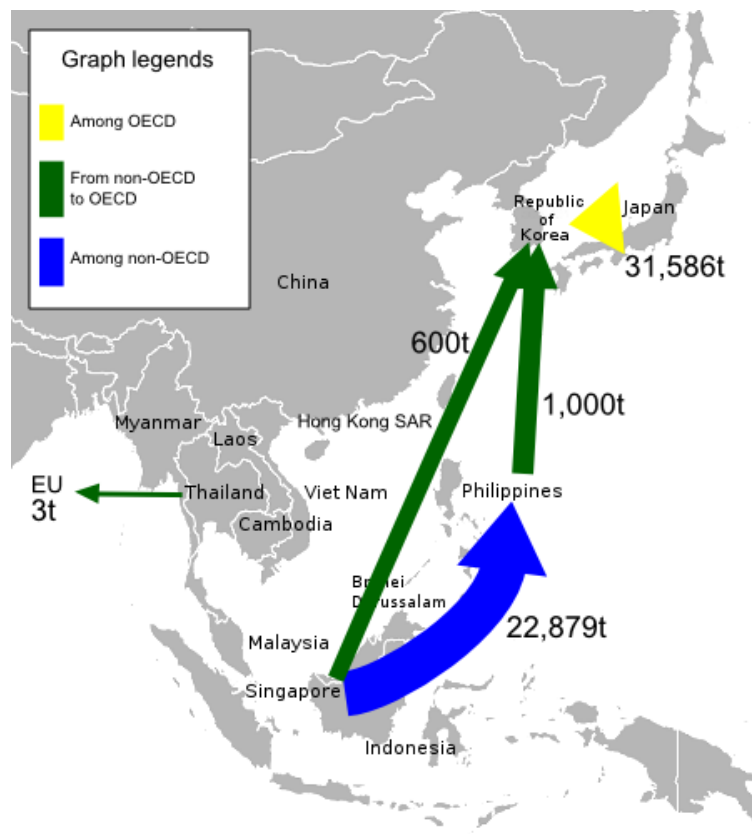


Fig. 9 TBM of E-waste (Export statistics: 2004 to 2006)

## Summary

This Chapter can be summarized as follows;

- Asian countries which import hazardous wastes and other wastes tend to be those where the economic level is comparatively high and recycling and treatment facilities are believed to be sufficiently in place.
- However, there are countries, such as Malaysia and Indonesia, which prohibit the import of hazardous wastes and other wastes regardless of the purpose based on the national policy even though their economic level is comparatively high and facilities have been developed.
- Countries permitting the import of hazardous wastes and other wastes based on the Basel Convention have domestic facilities capable of conducting advanced treatment operations. As already explained in Chapter 2, these countries have been introducing a range of domestic measures to ensure ESM of imported wastes (e.g., ESM standards and requirements on importers and recyclers). Meanwhile, some other countries such as Cambodia with no import of hazardous wastes so far is now at the stage of developing facilities or systems that can ensure ESM.

## Chapter 5 Consideration on Measures for ensuring Appropriate Resource Circulation in Asia

Taking into account the current situation of TBM and the recent development of waste management facilities in Asia, this Chapter addresses the following issues:

- The possible effect of ESM standards on TBM of hazardous wastes in Asia
- Measures that should be taken for prevention of illegal traffic and facilitating appropriate resource circulation (the measures taken in parallel with introduction of ESM standards).
- Resources circulation mechanism in Asia

Based on the results of the above analysis, appropriate ESM standards and measures to ensure their proper functioning will be identified to form the basis for recommendations to the CLI.

### Expected Effects of Introducing ESM Standards System in Asia

The followings are the expected effects of introducing ESM standards in Asia.

- TBM of hazardous wastes for the purpose of ESM will be ensured.
- The Basel Convention competent authorities and customs authorities have clear mapping of the ESM facilities located in the region.
- For some recyclers in the non-OECD countries, recycling business only with domestically collected wastes cannot ensure sustainable profitability. Therefore some of them have demand for continuous import of wastes. If the ESM standards can enable the continuation of TBM of hazardous wastes from OECD countries to non-OECD countries (i.e. if it can be the alternative measure of the Ban Amendment), introduction of ESM standards may be beneficial for those countries that wish to keep the future option of importing wastes.
- It may provide incentives to the waste generating companies and the waste management facilities that are planning to expand the business of recycling imported wastes to build their capacities regarding ESM practices.
- ESM standards may be able to simplify and accelerate the import/export procedures under the Basel Convention which is currently time consuming. Establishment of the ESM standards system may require some time, but once it is introduced, it may promote appropriate resource circulation which can ensure ESM.

### Measures to Prevent Illegal Traffic and to Ensure ESM in Resource Circulation

As reviewed in the previous section, introduction of ESM standards in Asia may have a number of beneficial impacts. However, the following issues are remaining challenges for enforcement of the Basel Convention.

1. Illegal TBM (due to lack of strict border control)
2. Illicit TBM (due to different interpretations of gray area of the Convention, such as waste/non-waste, hazardous/non-hazardous, etc)
3. Lack of ESM capacity in each country

In consideration of the issues above, the following measures need to be addressed in parallel with discussion on ESM standards.



### **Strict border control through better cooperation among relevant authorities**

Introducing standards alone is not sufficient to prevent illegal TBM. The following measures are needed in order to strengthen border control.

- ✧ Measures to strengthen cooperation between competent authorities and customs in each country (e.g. implementation of joint inspections, implementation of risk profiling such as identification of the HS codes at high risk for deliberate disguised declaration, etc.)
- ✧ Various measures to be implemented in through collaboration between the Basel Convention and the World Customs Organization (WCO)

### **Promotion of information sharing**

In order to prevent illicit TBM, implementation of the following measures may be effective

- ✧ Promotion of information sharing among Basel Convention competent authorities through the existing regional networks (e.g. Asian Network, IMPEL-TFS)
- ✧ Awareness raising of importers and exporters regarding regulations of the other countries
- ✧ Notification of national definitions of hazardous waste as provided in Article 3 of the Basel Convention
- ✧ Notification of export prohibition of import of hazardous wastes as provided in Article 4 of the Basel Convention (if introduction of the ESM standards becomes the alternative measure of the BAN Amendment, it is important to respect the countries that wish to prohibit the import of hazardous wastes and to ensure that hazardous wastes are not exported to such countries)

### **Reinforcement of existing mechanisms under the Basel Convention**

The Basel Convention provides various regulatory provisions in order to ensure ESM when subject to TBM. However, not all provisions are being effectively implemented. The following existing mechanisms among others may effectively complement the ESM standards.

- ✧ Take back obligations (waste is taken back to the State of export when it is found that the purpose of its TBM was not destined for ESM facilities as provided in Article 8 and 9 in the Basel Convention)
- ✧ Reporting on completion of disposal (disposer inform both the exporter and the competent authority in the State of export the completion of disposal as specified in the notification as provided in Article 6(9) of the Basel Convention).
- ✧ Notification procedures as provided in Article 3 and 4

The reasons why these existing tools are not effectively functioning, the challenges in their implementation and the ways to overcome those challenges must be investigated.

### **Support in establishing and introducing ESM standards**

As situation is different for each country, support should be provided to countries that face difficulties in establishing or introducing ESM standards for economic or technical reasons.

**Appropriate ESM Standards in View of the Situation of Treatment and Recycling in Asia**

In Asia, many countries have been achieving rapid economic development but their economic and technical levels still considerably vary from one country to another. As shown in Fig. 10, progress of the economic level generally increases the resource demand. The product manufacturing process as well as the treatment and recycling of wastes become more advanced and complex while the required ESM techniques and legal requirements become comparatively more stringent.

In the case of E-waste for example, the central issue in countries like Vietnam and Cambodia where the national economy is relatively at the stage of developing is to minimize any adverse impacts on the environment and human health resulting from repair or refurbishment operations for the purpose of reuse. In contrast, the countries like Japan has been conducting the appropriate treatment of such difficult items to treat as waste fluorescent lamps, etc. and to recover rare-earth metals from E-waste, indicating that much higher technical levels are met.

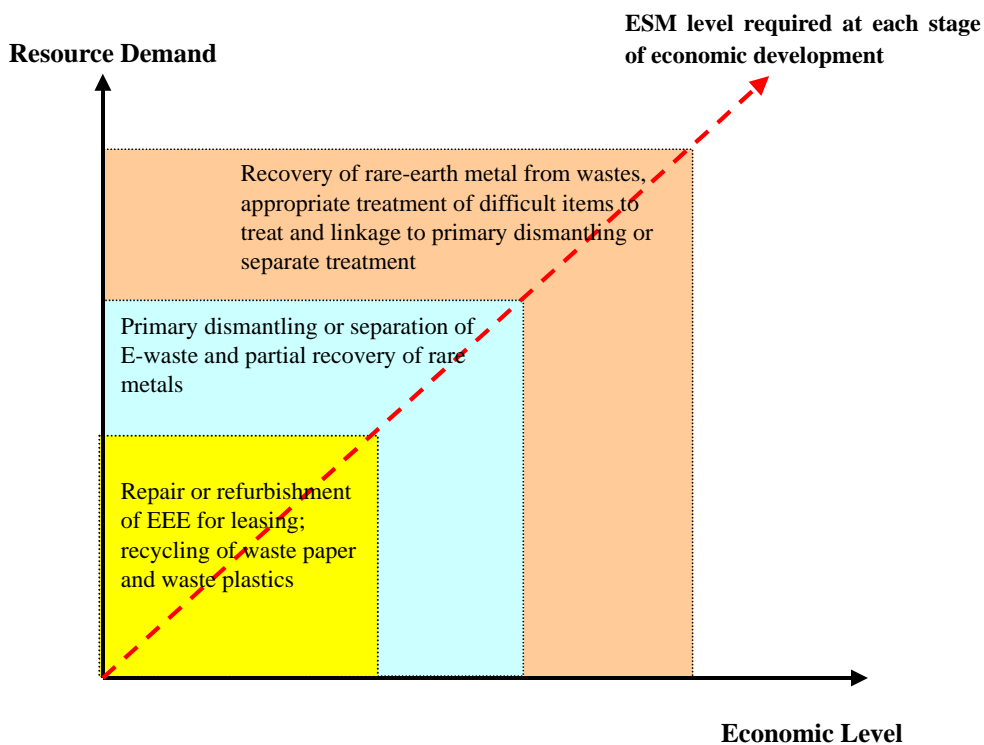


Fig. 10 Concept of the relationship among the economic level, resources demand and ESM standards

While it is important for each country to be able to ensure ESM at the highest level in Fig. 10 in the long-term, it is not achievable for many countries at present. What is more important in the short-term is that wastes subject to treatment and recycling properly flow to facilities which are capable of conducting the ESM of the said facilities at a suitable level and are properly treated there. It is more desirable to ensure appropriate treatment and recycling of wastes under the regime of an international specialization rather than establishment of the uniform international standards. For this reason, ESM standards should be flexible enough not to cause negative impact on recycling market, particularly in developing countries.

## Measures to Facilitate Appropriate Resources Circulation Under the ESM Standards System

The development of certified facilities in Asia capable of meeting the ESM standards means increased opportunities to ensure ESM in the region. At the same time, it becomes important to facilitate the development of regional ESM facilities to accelerate appropriate resources recycling under the ESM standards system.

For facilities to achieve ESM, it is not enough to construct and improve facilities. Certain social conditions must be met. These are, for example, the availability of a national system (regarding criteria, facility requirements and other relevant matters) and the capacity building of human resources to ensure proper enforcement of the system. Accordingly, the development of ESM facilities practically means not only the transfer of technology to facilities but also institutional development and human resources development through the transfer of technology and training. What is really required is to ensure the progress of all aspects of ESM as a package through efforts to level up ESM in individual countries to the level of the ESM standards utilising the framework for partnership under the Basel Convention and other international cooperation schemes.

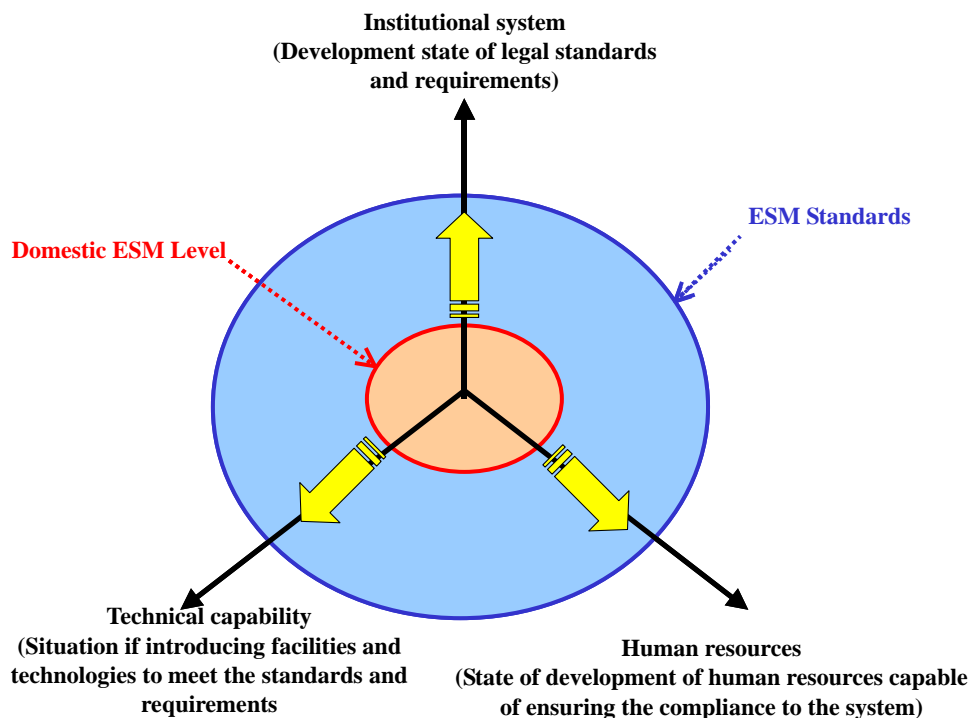


Fig. 11 Concept of appropriate approaches to achieve the ESM standards

Many developing countries have so far adopted US or EU standards without modification. Meanwhile, some countries have established treatment standards and guidelines at comparable levels to those of developed countries even though the development of treatment facilities has not made much progress. Such examples suggest that national ESM levels cannot be simply compared based on the state of institutional development. What is essential is to determine which approaches are likely to be the most effective based on an accurate understanding of the situation of individual countries.

## Chapter 6 Recommendations

### Identification of Recommendable ESM Standards

The basic components of ESM that have been identified through reviewing existing guidelines and relevant documents are incorporated in requirement on waste management facility or import/export criteria in Asian countries. These basic components of ESM can be classified into three major types; operation of recycling/treatment facilities of hazardous wastes, competency of workers and the management structure.

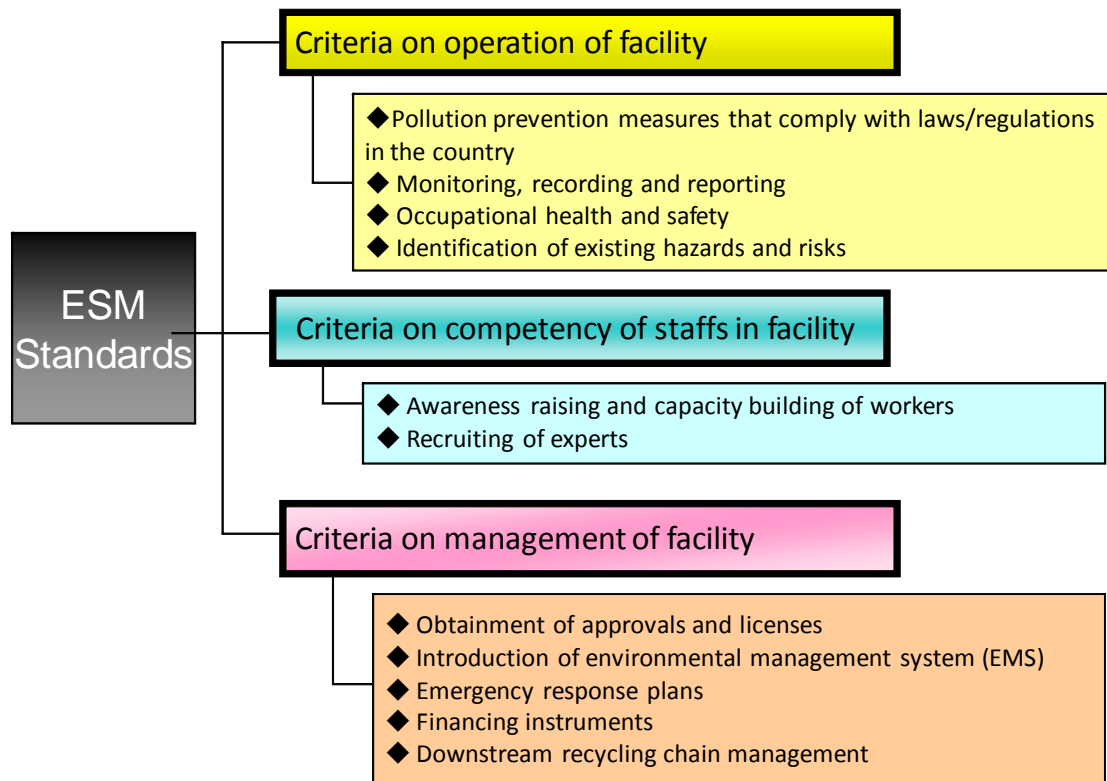


Fig. 12 Concept of Recommended ESM Standards

However, in Asian countries levels of economic development and technology as well as type of target wastes (i.e. the target of ESM) differ greatly among countries. Considering the existing gaps among countries, in order to introduce the ESM standards as international standards, the following issues need to be discussed.

- Should regulations concerning environment and sanitary/safety conditions be applied at levels adapt to each country or should they be applied at the uniform level for all Asian countries?
- With regard to pollution prevention measures, should there be standards with regard to the outputs (i.e. should the focus be to ensure that the level of pollution does not exceed the permitted level) or should there be standards with regard to technical specification such as facility design or processes?
- Considering the operational characteristics of facilities will change depending on types of wastes they handle, should different ESM standards be applied for different types of facilities or wastes?
- Should the level of standards be as high as those of OECD countries or should it change depending on the economic level of countries, also taking into account the technical capacity of the developing countries?

- Should the system be designed so that small and medium enterprises (SMEs) can also be certified? (requirement on financial stability may be satisfied only by enterprises with abundant capital)
- Is it feasible in Asia to satisfy standards such as those under e-Stewards of BAN which require that sound usage and treatment is ensured in the downstream of the recycling chain?

### Issues that should be Reviewed for ESM Standards System

The following issues must be reviewed in preparation for the establishment and operation of ESM standards system.

- How would shared understanding and coordination be ensured within each country as components of ESM standards involve not only authorities in the environment sector but also those in other sectors (e.g. authorities of workplace safety),?
- How should the ESM procedures be incorporated into the existing Basel Convention procedures in a manner that does not create overburden or prevent the current resource circulation?
- Which entity will certify the ESM of facilities? Can BCRCs be assigned such a role?
- What kind of an evaluation process would be conducted in order to certify the ESM facilities? If on-site visit of the certifying entity is required, how will the cost be covered?
- How often should ESM certificates be renewed?
- How should information regarding ESM certified facilities be shared? Should there be access restrictions when disclosing information on such facilities?

### Additional Issues to be Studied

This study reviewed existing guidelines and actual ESM policies in some of the Asian countries in order to provide information necessary to facilitate the discussions with regard to ESM standards. However, the following issues need to be studied further.

- This study reviewed the general requirements to ensure the ESM of hazardous wastes. For detailed discussions, studies must be conducted on more technical aspect of recycling and/or treatment of different type of wastes (e.g. lead-acid battery, etc.).
- The target of the questionnaire survey was only four Asian countries. In order to discuss policy options that are more realistic and feasible, studies in additional countries is desirable.