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## **Environmentally Sound Management (ESM) Criteria Recommendations**

Prepared by the

**Ad Interim Project Group on ESM Criteria**

for the

**Partnership for Action on Computing Equipment  
(PACE)**

Approved by the PACE Working Group

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## **Acknowledgements**

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In addition, special thanks is extended to Co-chairs of the Ad Interim Project Group, Mr. Michael VanderPol from Environment Canada and Mr. Ross Bartley from the Bureau of International Recycling (BIR), for their leadership in finalizing the report and for ensuring that all comments have been reviewed and incorporated in the report where appropriate.

# Contents

<b>AD INTERIM PROJECT GROUP PARTICIPANT LIST .....</b>	<b>4</b>
<b>EXECUTIVE SUMMARY .....</b>	<b>5</b>
<b>1 INTRODUCTION.....</b>	<b>7</b>
<b>2 DEFINITIONS .....</b>	<b>9</b>
2.1 ESM CRITERIA DEFINED .....	9
2.2 COMPUTING EQUIPMENT DEFINED .....	10
<b>3 PURPOSE &amp; SCOPE .....</b>	<b>11</b>
3.1 ESM PROVISIONS FOR COUNTRIES.....	12
3.2 ESM PROVISIONS FOR FACILITIES.....	12
<b>4 BENEFITS OF ESM TO FACILITIES.....</b>	<b>13</b>
<b>5 METHODOLOGY.....</b>	<b>14</b>
5.1 TASK 1: IDENTIFY RELEVANT EXISTING INTERNATIONAL, COUNTRY-SPECIFIC, INDUSTRY, NGO AND OTHER ESM GUIDANCE MATERIAL THAT MAY BE USED TO SUPPORT THE WORK OF OTHER PACE PROJECT GROUPS .....	14
5.2 TASK 2: IDENTIFY BUILDING BLOCKS FOR ESM WHICH CONSIDERS THE ABOVE GUIDANCE MATERIAL AND IS RESPONSIVE TO THE NEEDS OF DEVELOPING COUNTRIES AND COUNTRIES WITH ECONOMIES IN TRANSITION.....	15
5.3 TASK 3: ESTABLISH ESM CRITERIA RECOMMENDATIONS FOR USE BY PACE PROJECT GROUPS IN DEVISING TECHNICAL GUIDANCE AND PILOT PROJECTS .....	18
<b>6 ESM CRITERIA RECOMMENDATIONS.....</b>	<b>23</b>
6.1 COUNTRY-SPECIFIC RECOMMENDATIONS.....	23
6.2 FACILITY-SPECIFIC RECOMMENDATIONS.....	24
6.3 RECOMMENDATIONS TO PACE PROJECT GROUPS.....	25
<b>ANNEX A: ESM RECOMMENDATIONS IDENTIFIED UNDER THE WORK OF THE         BASEL CONVENTION .....</b>	<b>27</b>
<b>ANNEX B: ESM RECOMMENDATIONS IDENTIFIED UNDER THE WORK OF THE OECD ...</b>	<b>28</b>
<b>ANNEX C: PRELIMINARY SCAN OF ESM DOCUMENTS THAT MAY BE USEFUL TO         PACE .....</b>	<b>30</b>
<b>ANNEX D: COMPILATIONS OF SOURCE MATERIAL .....</b>	<b>33</b>
<b>ANNEX E: EXAMPLES OF FACILITY MEASURES TO DEMONSTRATE CONFORMITY         WITH ESM CRITERIA .....</b>	<b>34</b>
<b>ANNEX F: EXAMPLE OF A TIERED CHECKLIST OF FACILITY MEASURES TO         DEMONSTRATE CONFORMITY WITH ESM CRITERIA.....</b>	<b>39</b>
<b>ANNEX G: EXAMPLES OF SPECIFIC ACTIONS THAT OPERATORS IN FACILITIES         MAY CARRY OUT TO SUPPORT ESM .....</b>	<b>40</b>
<b>ANNEX H: EXAMPLES OF INCENTIVES AND/OR RELIEF MEASURES FOR FACILITIES         THAT PROJECT GROUPS MAY CONSIDER FOR INCLUSION IN TECHNICAL         GUIDANCE AND PILOT PROJECTS .....</b>	<b>44</b>
<b>ANNEX I: GLOSSARY OF TERMS.....</b>	<b>46</b>

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## Executive Summary

This guidance document was developed by the Ad Interim Project Group on Environmentally Sound Management (ESM) Criteria under the Partnership for Action on Computing Equipment (PACE), a public private partnership under the work of the *Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal*. The Partnership is intended to increase the environmentally sound management of used and end-of-life computing equipment, taking into account, amongst other things, social responsibility, the concept of sustainable development, and information-sharing on life cycle thinking.

The purpose of this document is specifically to identify recommendations for ESM criteria for use by other PACE Project Groups in devising guidance material to assist all countries in implementing the principle of environmentally sound management for computing equipment, and for PACE pilot projects in developing countries and countries with economies in transition. The document may also be used by country governments and facilities as an information resource for general guidance on ESM. For the purpose of this work, ESM was defined as *taking all practicable steps to ensure that used and/or end-of-life products and wastes are managed in a manner which will protect human health and the environment*.

ESM criteria recommendations were modelled after existing and relevant guidance of international, country government, industry, and non-government organizations to the fullest extent possible as a measure to avoid duplication and support compatibility with existing approaches. Compatibility with ESM criteria and “core performance elements” under the work of the Basel Convention and Organization of Economic Cooperation and Development was an important consideration in preparing the ESM criteria recommendations. Identifying the needs of developing countries and countries with economies in transition was also an important aspect of this work. These needs not only include best management practices at the facility but often include the need for effective legal systems and infrastructure to protect workers, communities, and the environment, that individual facilities need to use and rely on to achieve ESM.

Sections 1 - 3 of the guidance document pertain to the introduction, definitions, and purpose and scope of this work respectively. Section 4 discusses the benefits of ESM to facilities, and Section 5 describes the methodology used to identify ESM criteria recommendations. ESM criteria recommendations for countries, facilities, and PACE Project Groups are identified in Section 6. Annexes to this document include useful tools and examples that help to clarify and put into practice various aspects of the ESM criteria recommendations.

It is recognized that ESM capacity varies greatly from country to country, often dependent upon political, social and economic considerations beyond the scope of PACE. As such, development of new recommendations for national governments would require broad consultation with and approval of organizations outside of the Basel Convention's public-private PACE partnership. Consequently, ESM criteria recommendations for national governments identified in this document simply recap pre-existing and pre-approved recommendations under the work of the Basel Convention and Organization for Economic Cooperation and Development.

While not diminishing the importance of broad government and societal ESM criteria, efforts focused on identifying facility-specific recommendations, which include ensuring that 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 fulfil 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.

Lastly, among other recommendations, it was recommended that PACE Project Groups should take into consideration all recommendations contained within this document during the design and implementation of their technical guidance and pilot projects.

# 1 Introduction

Within the past three decades, citizens in countries around the world have rapidly gained access to computer technology, representing important progress in the achievement of the United Nations Millennium Development Goal of making available the benefits of new technologies, especially those related to information and communications. As markets continue to expand and more communities gain access to information technology, many countries, especially developing countries and countries with economies in transition, face new challenges in managing used and end-of-life electronic products.

All stakeholders have a role in promoting environmentally sound management of these devices. The technology and skills are available to promote environmentally sound management, including proper repair and refurbishment that can extend use, provide employment, and make valuable equipment available to the poor. Furthermore, those products which cannot be reused can be directed to environmentally sound material recovery and recycling, perhaps in other countries, which can reclaim base and precious metals, adequately treat problematic substances and conserve resources and energy.

The Partnership for Action on Computing Equipment (PACE) was launched by the ninth meeting of the Conference of the Parties to the *Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal*, which took place in Indonesia in June 2008. PACE is a multi-stakeholder partnership under the umbrella of the Basel Convention that provides a forum for representatives of personal computer manufacturers, recyclers, international organizations, academia, environmental groups and governments to tackle the environmentally sound management, refurbishment, recycling and disposal of used and end-of-life computing equipment. The Partnership is intended to increase the environmentally sound management of used and end-of-life computing equipment, taking into account, amongst other things, social responsibility, the concept of sustainable development, and information-sharing on life cycle thinking.

The Partnership on used and end-of-life computing equipment aims to provide new and innovative approaches for addressing emerging issues. It also aims to:

- Promote sustainable development for the continued use, repair and refurbishment of used personal computers in developing countries and countries with economies in transition;
- Find incentives and methods to divert end-of-life personal computers from land disposal and burning into environmentally sound commercial material recovery/recycling operations;
- Develop technical guidelines for proper repair, refurbishing and material recovery/recycling, including criteria for testing, labeling of refurbished used

equipment and certification of environmentally sound repair, refurbishing and recycling facilities;

- End shipments of used and end-of-life computing equipment to countries, in particular developing countries and countries with economies in transition, which are illegal to import under their domestic laws.

PACE actions also include pilot demonstration projects to assist developing countries and countries with economies in transition in assessing and improving the current situation of used and end of life computing equipment in their countries, and to achieve partnership and Basel Convention objectives.

The working group on the Partnership, established by the Conference of the Parties in its decision IX/9, is the operating mechanism for the Partnership and organizational matters, and serves as a forum for information sharing. Membership of the working group includes Parties or signatories to the Basel Convention, intergovernmental and non-governmental organizations, all stakeholders, including manufacturers, recyclers, refurbishers and academia, and, Basel Convention Regional and Coordinating Centres for Capacity Building and Technology Transfer (BCRCs) which have specific expertise and experience required for the activities of this group.

The Ad Interim Project Group was formally established by a decision of the PACE Working Group on 5 May 2009, with it being envisioned that this group operate for a limited time to meet its assigned objectives, project tasks and deliverables. The key purpose of the Ad Interim Project Group is to provide recommendations on ESM criteria for use by other PACE Project Groups (i.e. refurbishing, recycling, pilot projects) in devising guidance material and pilot projects.

Assigned objectives of the Ad Interim Project Group were to:

- (1) Identify relevant existing international, country-specific, industry, NGO and other ESM guidance material that may be used to support other Project Groups which have been established under the PACE Working Group; and
- (2) Propose recommendations for ESM criteria for use by PACE Project Groups when developing guidelines or launching pilot projects. A sub-set of criteria for specific operations may also be developed by the Project Group where required.

The Key deliverables identified for this Ad Interim Project Group include the following:

- (1) An inventory of existing ESM guidance material and other reference materials that may be applicable to the work of other PACE Project Groups; and
- (2) A document that recommends and provides rationale for ESM criteria for use by PACE Project Groups.

## 2 Definitions

### 2.1 ESM Criteria Defined

ESM may be defined as *taking all practicable steps to ensure that used and/or end-of-life products and wastes are managed in a manner which will protect human health and the environment.*

This definition is consistent with the definitions of ESM as agreed upon through the Basel Convention and the Basel Mobile Phone Partnership Initiative and compatible with the Organization for Economic Cooperation and Development (OECD) working definition (see Box 1).

#### **Box 1: Definitions for Environmentally Sound Management:**

##### **Basel Convention Text (Article 2, Definitions):**

*Environmentally sound management of hazardous wastes or other wastes 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*

##### **Basel MPPI Glossary of Terms (approved March 2009):**

*Taking all practicable steps to ensure that used and/or end-of-life products or wastes are managed in a manner which will protect human health and the environment.*

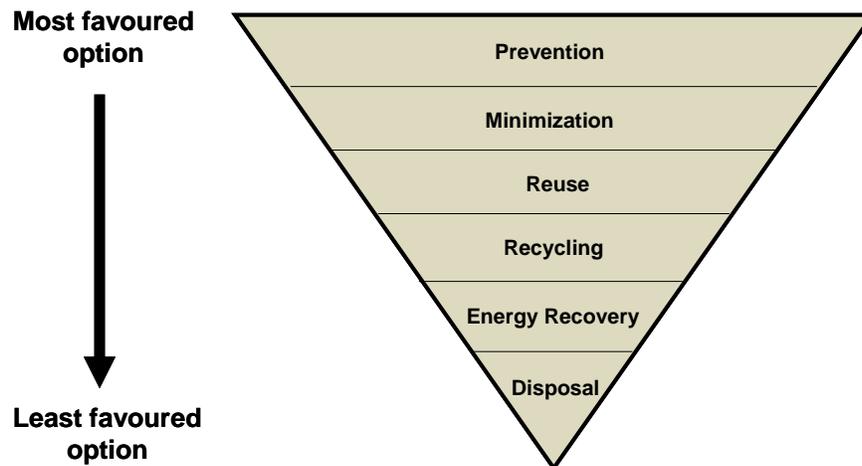
##### **OECD Guidance Manual on ESM of Waste (Working Definition):**

*A scheme for ensuring that wastes 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.*

In the context of this work, criteria are defined as *characteristics, attributes or traits deemed important to achieve a desired principle*, in this case ESM.

Environmentally sound refurbishing and environmentally sound material recycling are generally considered to be preferred options for managing used and end-of-life computing equipment respectively because they help to extend the useful life of products and/or help to conserve natural resources. It is generally acknowledged that waste management should follow a hierarchy, an example of which is illustrated in the following diagram.

## Waste Management Hierarchy Example



PACE Project Groups should consider inclusion of a waste management hierarchy in the development of technical guidance documents and pilot projects. The hierarchy is proposed as follows in descending order of preference: prevention; minimization; reuse; recycling, energy recovery; and disposal. Ideally, all feasible opportunities for waste management will be undertaken at higher levels of this hierarchy. This does not preclude possible consideration of additional issues linked to the various stages of the product life cycle, and impacts from facility operations such as the generation and release of hazardous waste and opportunities to reduce and/or avoid greenhouse gas emissions.

## **2.2 Computing Equipment Defined**

For the purpose of the Basel public-private Partnership on Action for Computing Equipment (PACE), computing equipment is defined as:

*personal computers (PCs) and associated displays, printers and peripherals, personal desk top computers, including the central processing unit and all other parts contained in the computer; personal notebooks and laptop computer, including the docking station, central processing unit and all other parts contained in the computer; computer monitors, including the following types of computer monitors: (a) cathode ray tube (b) liquid crystal display (c) plasma; computer keyboard, mouse, and cables; computer printer: (a) including the following types of computer printer: (i) dot matrix; (ii) ink jet; (iii) laser; (iv) thermal; and (b) including any computer printer with scanning or facsimile capabilities, or both.*

### 3 Purpose & Scope

The purpose of this document is specifically to identify recommendations for ESM criteria for use by other PACE Project Groups in devising guidance material to assist all countries in implementing the principle of environmentally sound management for computing equipment, and for PACE pilot projects in developing countries and countries with economies in transition.

These PACE Project Groups currently include:

- (1) Project Group 1.1: Environmentally Sound Refurbishment/Repair of Used Computing Equipment
- (2) Project Group 2.1: Environmentally Sound Material Recovery/Recycling of End-of-Life Computing Equipment
- (3) Project Group 3.1: Collection and Management of End of Life Computing Equipment from Informal Sectors
- (4) Project Group 4.1: Awareness Raising and Training

The document may also be used by country governments and facilities as an information resource for general guidance on ESM.

The Ad Interim Project Group recognizes that a plethora of international, country government, industry, NGO and other guidance exists to support implementation of the principle of environmentally sound management, albeit somewhat variable in nature. In light of this, it was agreed that ESM criteria selection be modelled after existing and relevant guidance to the fullest extent possible as a measure to avoid duplication and support compatibility with existing approaches.

It is also recognized that ESM criteria and “core performance elements” have been agreed upon by country governments respectively under the work of the Basel Convention (Annex A) and Organization of Economic Cooperation and Development (Annex B). Compatibility with such international guidance was an important consideration in preparing the ESM criteria recommendations for PACE.

Identifying the needs of developing countries and countries with economies in transition was also an important aspect of this work. These needs not only include best management practices at the facility but often include the need for effective legal systems and infrastructure to protect workers, communities, and the environment, that individual facilities need to use and rely on to achieve ESM. In the absence of such effective systems and infrastructure, it is recognized that ESM may not be readily available in some countries and facilities. Therefore the strengthening of institutional and legal infrastructure may be required in some countries.

It was recognised that PACE Project Groups should set down specific actions that operators in facilities should carry out to achieve Environmentally Sound Management of computing equipment, its components and materials as part of their technical guidance and pilot projects.

### **3.1 *ESM Provisions for Countries***

The Ad Interim Project Group recognizes that ESM capacity varies greatly from country to country, often dependent upon political, social and economic considerations beyond the scope of PACE. As such, development of new recommendations for national governments would require broad consultation with and approval of organizations outside of the Basel Convention's public-private PACE partnership. The Ad Interim Project Group was not well positioned to undertake this broad activity, especially given its time-limited mandate. PACE members therefore agreed that any ESM criteria recommendations for national governments identified in this document simply recap pre-existing and pre-approved recommendations under the work of the Basel Convention and OECD (see Annexes A and B respectively).

However, the Ad Interim Project Group recognizes and emphasizes the importance of such ESM recommendations to governments. An industrial facility does not carry out ESM in isolation, but relies upon other environmentally sound facilities both upstream and downstream, as well as government resources and infrastructure, legal provisions and enforcement, monitoring and assistance. Therefore, while the Ad Interim Project Group does not have specific new recommendations for governments beyond those previously approved in broader contexts, it allies itself with, strongly endorses, and supports such recommendations.

### **3.2 *ESM Provisions for Facilities***

Considering the above, while not diminishing the importance of broad government and societal ESM criteria, the Ad Interim Project Group focused its efforts on identifying recommendations for facility-specific ESM criteria. This decision was based on the following rationale:

1. Activities of most of the PACE Project Groups focus on facility operations (e.g., refurbishment, material recovery, some pilot projects) and facility operations are an important aspect of ensuring ESM anywhere in the world.
2. ESM criteria for facilities that were identified from existing and relevant ESM guidance documents appeared to vary on a case-by-case basis, and the Ad Interim Project Group believes that its recommendations for facility-specific ESM criteria will help to ensure a more coordinated and consistent approach to integrating ESM criteria within the guidance material or pilot projects of other PACE Project Groups.

3. Facility-specific ESM criteria will be useful to governments in any case, especially in some developing countries and countries with economies in transition, to understand what is necessary to support best practices from a national context.

## 4 Benefits of ESM to Facilities

From a facility perspective, and dependent on the activity of the facility, the benefits of integrating provisions to support ESM may include, but are not limited to:

1. **Reduction of risks to the environment and public health:** Reduced chemical exposure, less risk of spills and releases, and reduced environmental and public health risks associated with waste treatment, land disposal and incineration.
2. **Economic benefits of increased plant efficiency:** Raw material savings; reduction in chemical use; reduction in waste stream generation; reduction in waste disposal costs; reduction in costs associated with hazardous waste disposal liability including banking and insurance charges; more efficient and streamlined waste reporting and tracking, and raw material and waste handling. Some reference an operational cost reduction of 10% on average after implementing a quality and environmental management system.
3. **Trade benefits:** Compliance with legal requirements and ESM facilitates legal shipments, and prevents illegal traffic and associated penalties and problems. Enhanced communication throughout the supply chain and among governments, also facilitates a more efficient and profitable flow of materials.
4. **Due Diligence or Duty of Care:** A demonstrated commitment, and in some countries a legal requirement, that a facility takes all reasonable steps to avoid harm to other persons or their property.
5. **Improved safety:** Improved employee safety leading to better morale and productivity. Improved community safety through reduced environmental and public health risks in facility's local setting.
6. **Improved relationships with regulators and the public:** Recognition by regulators and the public of a facility's commitment to lawful conduct, worker safety, and protecting human health and the environment through its day-to-day business activities.
7. **Improved business relationships:** Recognition by partners in the supply chain of a facility's environmentally sound management of materials and wastes, and reliability as a source of services and supplies.
8. **Protection of stockholder and stakeholder interests:** Through protection of facility investment and ongoing business value from costs of upsets and liabilities.

Whilst these identified benefits may give advantage to the facility, they may also provide ancillary benefits to society as a whole by supporting principles of sustainability and resource efficiency.

## 5 Methodology

The Ad Interim Project Group completed the following project tasks to identify recommendations for ESM criteria:

- (1) Identify relevant existing international, country-specific, industry, NGO and other ESM guidance material that may be used to support the work of other PACE Project Groups.
- (2) Identify building blocks for ESM which considers the above guidance material and is responsive to the needs of developing countries and countries with economies in transition.
- (3) Establish ESM Criteria Recommendations for use by PACE Project Groups in devising technical guidance and pilot projects.

Each project task is described in greater detail in the following sub-sections.

### ***5.1 Task 1: Identify relevant existing international, country-specific, industry, NGO and other ESM guidance material that may be used to support the work of other PACE Project Groups***

This project task involved three sub-components:

- (1) Inventory existing ESM guidance material
- (2) Identify key references for literature review
- (3) Undertake literature review

The Ad Interim Project Group identified a short list of international, country-specific, industry, NGO and other resource material that may be relevant to PACE Project Group deliberations, and specifically the development of ESM guidelines. This shortlist of documents is identified as the “Preliminary Scan of ESM Documents that may be useful to PACE” (see Annex C) and built in part from various compilations of ESM source documents (see Annex D). From the preliminary scan, the Ad Interim Project Group identified key references for literature review. The purpose of the literature review was to identify ESM criteria contained within the resource material for consideration and use in devising recommendations to the PACE community. Several members of the Project Group volunteered to carry out reviews of the pre-selected references using a template that was devised to structure responses and facilitate the collation and

analysis of the Project Group's observations. ESM criteria were not found in all resource material that underwent literature review.

## **5.2 Task 2: Identify building blocks for ESM which considers the above guidance material and is responsive to the needs of developing countries and countries with economies in transition**

This project task involved four sub-components:

- (1) Identify ESM criteria from existing guidance and other reference materials that may be applicable to the work of all PACE Project Groups
- (2) Identify needs of developing countries and countries with economies in transition
- (3) Define parameters for ESM criteria
- (4) Establish ESM criteria for consideration by PACE

The ESM criteria identified from the literature review exercise were loosely organized into the following "building blocks" for Environmentally Sound Management:

- 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 fulfil 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. This may extend to any other environmental commitments to which the facility has subscribed. Such provisions may include for example participating in third party audits and inspections.

A questionnaire was subsequently prepared and distributed to participants of the Ad Interim Project Group to gather input concerning the following:

- (a) whether the above building blocks are considered reasonable and flexible enough to be used as ESM criteria recommendations for facilities;
- (b) what allowances or special considerations should be taken into account for small and medium-sized enterprises; and
- (c) what types of measures are considered reasonable for facilities to have in place to demonstrate that they conform to or meet each of the building blocks for ESM.

In general, participants agreed that the building blocks described above were appropriate and flexible enough for use as ESM criteria recommendations for facilities. While these building blocks are compatible with pre-existing and pre-approved recommendations under the work of the Basel Convention and OECD, it is recognized that facilities located in OECD-member countries should aspire to achieve the facility-specific core performance elements as identified in the OECD *Council Recommendation C(2004)100 on the Environmentally Sound Management of Waste* (see Annex B).

It was recognised that in some cases, incentives and/or relief measures for small and medium size enterprises (SMEs) may be appropriate. With this in mind, the following aspects were identified:

- PACE Project Groups should take into account the size of the enterprise, especially the situation of SMEs, the type and amount of waste, the nature of the operation and their domestic legislation when developing technical guidance and pilot projects.
- Procedures for achieving any certification/registration and reporting requirements under PACE Project Group technical guidance and pilot projects may be simplified for SMEs in comparison with large facilities; In the event that domestic Environmental Management Systems (EMS) are employed as part of a national approach to ESM, special consideration may 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.

- Project Group technical guidance and pilot projects may consider the inclusion of incentives and/or relief measures for facilities that fulfil PACE technical guidance. Examples are provided in Annex H.
- PACE Project Groups may take into account the differences between hazardous and non-hazardous waste, and between dangerous and non-dangerous processes, in formulating their technical guidance and pilot projects.
- 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.
- PACE Project Groups should ensure that their technical guidance and pilot projects do not discourage refurbishing or recycling recognising, in particular, the flexibility appropriate for each country to increase the rates of environmentally sound recovery of low risk waste.
- PACE Project Groups should take into account those operations that present little or no risk would need a significantly more limited emergency plan within their technical guidance and pilot projects.

Participants agreed that it would be useful for PACE Project Groups to specify how facilities could demonstrate conformity to each of the ESM criteria. Types of facility measures or specific actions, including any appropriate verification, that operators in facilities may carry out for use in demonstrating conformity to each of the ESM criteria are identified in Annex E and Annex G. Furthermore, participants agreed that it would be useful for PACE Project Groups to develop “tiered checklists” of facility measures for each of the eight ESM criteria for inclusion in their respective guidance documents. A tiered approach recognizes that facility achievements with respect to implementing ESM criteria vary substantially within the global community. For example, facility undertakings may range from few or no measures in place to protect public and worker health and safety, and the environment (as with many informal sector operations) to fairly advanced, systematic and well defined measures to assure ESM. A tiered checklist can support the continual improvement of ESM by enabling facilities to readily identify what types of measures they should have in place in order to graduate from lower to higher tiers of Environmentally Sound Management. To illustrate this concept, the Ad Interim Project Group devised a sample tiered checklist of facility measures for consideration by PACE Project Groups (see Annex F).

While there was general agreement that the building blocks for ESM criteria are flexible enough to meet the needs of developing countries and countries with economies in transition, it was also recognized that these regions would benefit from guidance related to the following issues, which are not ESM criteria *per se*,

but none-the-less important from the perspective of supporting its widespread adoption:

- The need to identify realistic options and potential resources available to integrate the informal sector operations within local, regional and national programs of developing countries and countries with economies in transition, with the ultimate goal of facilitating the transition of these operations into the formal sector.
- The need to identify self-sustainable and economically-viable solutions to support the long-term implementation of PACE pilot project activities designed to collect, refurbish and recycle used and end-of-life computing equipment in a manner that is consistent with the ESM criteria.

In its literature review, the Ad Interim Project Group found that some reference documents also included the following topics:

- Data destruction
- Product design
- Choice of materials
- Energy consumption in product use

The Ad Interim Project Group considers these topics to be important, but beyond the immediate scope of this document. Project Group 1.1 on the Environmentally Sound Refurbishment/Repair of Used Computing Equipment addresses data sanitization in their Technical Guidelines.

Considering the above: the ESM criteria; incentives and/or relief measures for small and medium-sized enterprises; identified needs of developing countries and countries with economies in transition; and other special considerations are proposed as ESM criteria for consideration by PACE.

### ***5.3 Task 3: Establish ESM Criteria Recommendations for use by PACE Project Groups in devising technical guidance and pilot projects***

This project task involved three sub-components:

- (1) Identifying rationale for each ESM criterion
- (2) Identifying rationale for other special considerations
- (3) Establishing Recommendations on ESM Criteria

Eight "building blocks" for Environmentally Sound Management have been identified. Rationale for each is discussed below:

- 1. Top Management Commitment to a Systematic Approach:** The commitment of top management is considered necessary within any facility to ensure that appropriate policies, programmes, resources (i.e. human, financial, etc.) and other facility measures are in place to achieve environmentally sound management. The term systematic approach encompasses the need to develop and implement plans, monitor their results and review their effectiveness, and take corrective action where necessary to support continually improvement. Without the ongoing commitment of top management to ESM, it is unlikely that a facility will consistently and increasingly perform its operations in ways that minimize its impacts on human health and the environment. Environmental management systems (EMS) are often used by facilities to support a systematic approach which provides an overall framework for top management to identify the priority environmental impacts of all facility activities and operations, and then plan, operate, measure and improve environmental performance on an on-going basis.
- 2. Risk Assessment:** The identification of actual and potential risks to public and worker health and safety, and the environment that are associated with facility activities, products and services is an important aspect of ESM. This includes consideration of both normal and abnormal operating conditions, including for example facility start-up and shut-down routines; equipment use, repair and maintenance; emergency situations and accidents; facility emissions and releases; and material and waste handling practices.
- 3. Risk Prevention and Minimization:** Most accidents in the workplace are preventable and usually occur because actual and/or potential hazards and risks are not identified, or are ignored or underestimated. Hazards and risks have many dimensions (e.g. health, safety, environment, financial, community trust, etc.), and the importance of each dimension may vary amongst interested parties (e.g. workers, investors, clients, regulators, public, etc.). Consequently, the inclusion of measures to prevent or minimize hazards and risks is considered to be an important aspect of environmentally sound management. Fundamentally, such provisions enable facilities to identify the types of hazards and risks; assess the scope, magnitude and likelihood of these hazards and risks; and ensure that all reasonable care is taken to prevent, minimize or otherwise address identified hazards and risks. These may include for example insurance policies and other financial guarantees to ensure that a means of adequate financial compensation or resourcing is in place to respond to specified damages, losses, or injuries related to workplace activities.

- 4. Legal Requirements:** Compliance with applicable legal requirements that pertain to the jurisdiction in which a facility is located is a prerequisite for bona-fide companies doing business, and therefore an essential requirement for environmentally sound management. Failure to comply with legal requirements can be very costly to an organization. Working with legally compliant suppliers and service providers is also an important consideration from the perspective of forging strong business relationships with environmentally sound organizations, and establishing or maintaining a good facility reputation with investors, regulators and the general public. Consulting regulatory agencies (e.g. national, regional, local), government publications and news releases, legal advisors, legal journals and commercial databases, and industry member associations can help to identify legal requirements applicable to facility activities. Identifying and ensuring conformity with applicable legal requirements will likely represent a particular challenge for facilities engaged in informal sector activities.
- 5. Awareness, Competency and Training:** This is necessary to ensure employees are aware of risks identified within the workplace, and that they are trained and competent to ensure public and worker health and safety, and contribute to the protection of the environment through their activities. This includes the ability to identify, prevent and/or minimize hazards and risks, and effectively respond to emergency situations.
- 6. Record-keeping and Performance Measurement:** Record-keeping and performance measurement enables an organization to make informed decisions regarding whether programmes, investments, and acquisitions are achieving desired results or if it is necessary to implement corrective actions. In some cases, record-keeping and performance measurement may be identified as a legal obligation and/or used to demonstrate facility compliance with legal requirements.
- 7. Corrective Action:** Corrective action is necessary to remedy weaknesses that are identified with respect to achieving ESM. It also helps to ensure that facility approaches to ESM undergo continual improvement.
- 8. Transparency and Verification:** Transparency and Verification are considered important to provide public assurances that facility operations and activities demonstrate conformity with each of the identified ESM Criteria.

In addition, a number of other special considerations were taken into account by the Ad Interim Project Group. Rationale for these is identified below:

- 1. Waste management hierarchy:** This is an important aspect of any approach to achieve environmentally sound management for product-focused wastes, including computing equipment. The purpose of the hierarchy is to help identify and prioritize options that collectively work to minimize the generation and disposal of waste. The waste management hierarchy is consistent with the principles of “pollution prevention”, which aims to reduce waste at its source, and “waste minimization”, which aims to reduce the amount of waste that is generated.
- 2. Incentives and/or relief measures for small and medium-sized enterprises:** Incentives and/or relief measures are needed for small and medium-sized enterprises because these facilities typically have reduced capacity and resourcing to establish and implement management system approaches that are as comprehensive as those of larger enterprises. It is also important to note that a great majority of facilities located in developing countries and countries with economies in transition are SMEs. Considering the above, and given the fact that the OECD also recognizes the need to adopt flexible approaches that consider the needs of SMEs, it was deemed important to include similar incentives and/or relief measures for SMEs as part of the recommendations of this document. However, such incentives and/or relief measures should not compromise suitable and effective protection of public and worker health and safety, and the environment as part of the facility’s approach to achieving environmentally sound management. Consequently, it was recognized that it would not be appropriate to allow less complicated and fewer facility audits for SME facilities in non-OECD countries.
- 3. Facility measures to demonstrate conformity with ESM criteria:** The eight ESM criteria provide guidance concerning the major aspects needed to assure environmentally sound management within a facility setting. However, it is important for other PACE Project Groups to establish in their guidance and pilot projects the types of facility measures that should be in place and/or specific actions that operators in facilities may carry out to demonstrate conformity with these criteria. Examples of each are provided in Annex E and G respectively. It was also recognized that a “tiered checklist” could support the continual improvement of ESM by enabling facilities to readily identify what types of measures they should have in place in order to graduate from lower to higher tiers of Environmentally Sound Management. An example of a tiered checklist is provided in Annex F.
- 4. Facilitating the transition of informal activities to the formal sector:** Informal sector operations that import, collect, repair, refurbish and/or recycle used and end-of-life computing equipment may exist in some developing

countries and countries with economies in transition. While informal sector operations provide a unique economic development opportunity to low-income, poverty stricken areas, they do not comply with applicable legal requirements and workers often lack the education, training, and equipment needed to identify and mitigate hazards and risks to both public and worker health and safety, and the environment. Moreover, informal sector operations do not substantially contribute to the tax base of local economies, which may have a sizeable impact on the amount of government revenue available to support domestic ESM improvements, such as upgrading facility operations and infrastructures, increasing regulatory enforcement activities, and modernizing waste shipment and facility permitting processes. These issues are only made worse by the fact that most informal operations continuously seek to purchase used and end-of-life computing equipment on the global or local marketplace to ensure a steady feedstock for their refurbishing and recycling operations. Consequently, subsequent guidance from PACE Project Groups should include options that can be used to help transition informal activities to the formal sector where practicable. Such options may include for example: encouraging informal sector operations to undertake activities that involve reduced risks (e.g. non-destructive manual disassembly) and to work with businesses in the formal sector to forge mutually beneficial relationships; adopting national programs to recover computing equipment which provide consumers with a direct financial incentive to return computing equipment to the formal sector for ESM; raising the level of public awareness concerning the importance of proper use, refurbishing and recycling of computing equipment; and raising the level of the informal sector's awareness to comply with applicable, local, national and international laws.

- 5. Self-sustainable and economically-viable collection programmes:** Used and end-of-life computing equipment that are improperly managed through final disposal operations (i.e. identified in Annex IV, Section A of the Basel Convention) are likely to pose substantial risks to human health and the environment, particularly due to their hazardous constituents which may be released into the environment. They are also very expensive to redirect into legitimate and environmentally sound waste management programs. To address this problem, many countries have established recovery or “take-back” programs for a number of product-focused waste streams, including computing equipment. A critical element that often defines the overall success of these programs typically requires the involvement of consumers, manufacturers, first importers, retailers and governments to facilitate the take-back of used and end-of-life computing equipment. However to advance beyond pilot projects, it is necessary to identify economically-viable and sustainable options to ensure the long-term success of these programs. To this end, the principle of extended producer responsibility has become increasingly popular in many countries. Extended producer responsibility and product take-back programs may employ a variety of economic instruments and incentives to encourage consumers, retailers, manufacturers, and

governments to return end-of-life computing equipment and/or to ensure that sufficient revenue is generated to cover program expenditures. Examples may include deposit-refund schemes, purchase discount schemes, waived charge schemes; advance recycling fees; extended producer responsibility schemes; and tax-base funded schemes. Although instrument selection (and their associated program design) may vary on a case-by-case basis, it is important to carefully evaluate and compare the potential environmental, social and economic costs and benefits of all proposed options before making a final selection. For example, inconsistently applied or variable incentives / disincentives within the same geographic region may also lead to market place distortions for product purchasing and return (particularly under voluntary approaches).

Recommendations on ESM Criteria established by the Ad Interim Project Group are presented in the following section.

## **6 ESM Criteria Recommendations**

### **6.1 Country-specific Recommendations**

- 6.1.1 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).
- 6.1.2 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/WPWR(2001)3/FINAL).
- 6.1.3 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.
- 6.1.4 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.

## **6.2 Facility-specific Recommendations**

- 6.2.1 Facilities should ensure measures are in place to demonstrate conformity with the following ESM criteria:
- i. 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.
  - ii. 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.
  - iii. 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.
  - iv. Legal Requirements:** Identify, access and strive to fulfil 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.
  - v. Awareness, Competency and Training:** Ensure employees have an appropriate level of awareness, competency and training with respect to the effective management of occupational risks.
  - vi. Record-keeping and Performance Measurement:** Maintain records, monitor, track and evaluate facility performance at achieving ESM.
  - vii. 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.
  - viii. 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.

- 6.2.2 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).
- 6.2.3 Facilities should review measures in place to support applicable recommendations contained within PACE guidance documents and other applicable guidance under the Basel Convention.
- 6.2.4 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).

### **6.3 Recommendations to PACE Project Groups**

- 6.3.1 Project Groups should take into consideration all recommendations contained within this document during the design and implementation of their technical guidance and pilot projects.
- 6.3.2 Project Groups should consider inclusion of a waste management hierarchy in the development of technical guidance documents and pilot projects. The hierarchy is proposed as follows in descending order of preference: prevention; minimization; reuse; recycling, energy recovery; and disposal. Ideally, all feasible opportunities for waste management will be taken at higher levels of this hierarchy. This does not preclude possible consideration of additional issues linked to the various stages of the product life cycle, and impacts from facility operations such as the generation and potential release of hazardous waste and opportunities to reduce and/or avoid greenhouse gas emissions.
- 6.3.3 Project Groups should take into account the differences between hazardous and non-hazardous waste, and between dangerous and non-dangerous processes, in formulating their technical guidance and pilot projects.
- 6.3.4 Project Groups should ensure that their technical guidance and pilot projects do not discourage refurbishing or recycling recognising, in particular, the flexibility appropriate for each country to increase the rates of environmentally sound recovery of low risk waste.

- 6.3.5 Project Groups should identify facility measures or specific actions including any appropriate verification that operators in facilities may carry out for use in demonstrating conformity to each of the ESM criteria. Examples of each are provided in Annex E and Annex G respectively.
- 6.3.6 Project Groups should develop “tiered checklists” of facility measures for each of the eight ESM criteria. A tiered checklist can support the continual improvement of ESM by enabling facilities to readily identify what types of measures that they should have in place in order to graduate from lower to higher tiers of Environmentally Sound Management. An example of a tiered checklist is provided in Annex F.
- 6.3.7 Project Groups should identify realistic options and potential resources available to integrate the informal sector operations within local, regional and national programs of developing countries and countries with economies in transition, with the ultimate goal of facilitating the transition of these operations into the formal sector.
- 6.3.8 Project Groups should identify self-sustainable and economically-viable solutions to support the long-term implementation of PACE pilot project activities designed to collect, refurbish and recycle used and end-of-life computing equipment in a manner that is consistent with the ESM criteria.
- 6.3.9 Project Group technical guidance and pilot projects may consider the inclusion of incentives and/or relief measures for facilities that fulfil PACE technical guidance. Examples are provided in Annex H.
- 6.3.10 Project Groups should take into account the size of the enterprise, especially the situation of small and medium-sized enterprises (SMEs), the type and amount of waste, the nature of the operation and their domestic legislation when developing technical guidance and pilot projects.
- 6.3.11 Procedures for achieving any certification/registration and reporting requirements under Project Group technical guidance and pilot projects may be simplified for SMEs in comparison with large facilities. Also the environment, health and safety report could be made publicly available every three years (an annual requirement for large facilities). However, such incentives and/or relief measures should not compromise suitable and effective protection of public and worker health and safety, and the environment as part of the facility’s approach to achieving environmentally sound management. Consequently, it was recognized that it would not be appropriate to allow less complicated and fewer facility audits for SME facilities in non-OECD countries.
- 6.3.12 Project Groups should take into account that SMEs whose operation presents little or no risk would need a significantly more limited emergency plan within their technical guidance and pilot projects.

## **Annex A: ESM Recommendations Identified Under the Work of the Basel Convention**

The Basel Guidance Document on the Preparation of Technical Guidelines for the Environmentally Sound Management of Wastes Subject to the Basel Convention identifies the following recommendations for ESM:

### **General:**

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

### **Country-specific:**

6. Take steps to identify and quantify the types of waste being produced nationally;
7. Use best practice to avoid or minimize the generation of hazardous waste, such as the use of clean methods;
8. Provide sites or facilities authorized as environmentally sound to manage its wastes, in particular hazardous wastes.
9. In addition, enforcement and monitoring could be enhanced through international cooperation.

## **Annex B: ESM Recommendations Identified Under the Work of the OECD**

The OECD *Council Recommendation C(2004)100 on the Environmentally Sound Management of Waste* identify the following as recommendations for ESM\*:

### **Facility-specific Core Performance Elements:**

1. Have an Applicable Environmental Management System (EMS) in Place;
2. Take Sufficient Measures to Safeguard Occupational and Environmental Health and Safety;
3. Have an Adequate Monitoring, Recording and Reporting Programme;
4. Have an Appropriate and Adequate Training Programme for the Personnel;
5. Have an Adequate Emergency Plan; and
6. Have an Adequate Plan for Closure and After-care.

### **Recommendations to OECD Member Countries:**

1. Have an adequate regulatory and enforcement infrastructure at an appropriate governmental level, consisting of legal requirements such as authorizations/licences/permits, or standards;
2. Develop and implement practices and instruments that facilitate the efforts of competent authorities to monitor the implementation of the CPEs listed in Annex I to this Recommendation and control compliance of waste management activities with applicable national and international rules and regulations. In case of non-compliance with existing rules, prompt, adequate and effective actions should be undertaken;
3. Ensure that waste management facilities are operating according to best available techniques while taking into consideration the technical, operational and economic feasibility of doing so, and work towards continually improving environmental performance;
4. Encourage, through appropriate measures, information exchange between producers, waste generators, waste managers and authorities, including participation in sectoral trade or industry association activities addressing these issues, in order to foster waste prevention, optimize recovery operations and minimize quantities as well as potential risk of waste destined for disposal or recovery;
5. Integrate into national policies and/or programmes the core performance elements listed in Annex I to this Recommendation, which constitute the basic requirements to ensure environmentally sound management of waste;
6. Consider incentives and/or relief measures for facilities that fulfill the core performance elements listed in Annex I to this Recommendation;

7. Implement the technical guidance for environmentally sound management of waste that has been developed by the OECD and, where appropriate, work towards the implementation of other ESM guidance referred to in Annex III to this Recommendation;
8. Move towards internalization of environmental and human health costs in waste management, taking into account the differences between hazardous and nonhazardous waste;
9. Provide incentives to take part in environmentally sound recycling schemes;
10. Encourage the development and implementation of an environmental liability regime for facilities that carry out risky or potentially risky activities to ensure adequate measures upon definite cessation of activities and to prevent environmental damage; and
11. Ensure that the implementation of the core performance elements listed in Annex I to this Recommendation does not discourage recycling in Member countries, recognizing, in particular, the flexibility appropriate for each Member country to increase the rates of environmentally sound recovery of low risk waste.

\* Note: Refer to OECD *Council Recommendation C(2004)100 on the Environmentally Sound Management of Waste* for complete text including Annexes I and III of this Recommendation.

## Annex C: Preliminary Scan of ESM Documents that may be useful to PACE

Literature Review	Standard / Guideline / Document*	Type of Guidance	Document
1. UNITED NATIONS (UN)			
Yes	1. Guideline on the Refurbishment of Used Mobile Phones (Revised and Approved Draft). Basel Mobile Phone Partnership Initiative Project 1.1. (March 25, 2009).	Refurbishing	<a href="http://www.basel.int/industry/mppiwp/guid-info/guidrefurb.pdf">http://www.basel.int/industry/mppiwp/guid-info/guidrefurb.pdf</a>
Yes	2. Guideline on the Collection of Used Mobile Phones (Approved Draft). Basel Mobile Phone Partnership Initiative Project 2.1. (March 25, 2009).	Collection	<a href="http://www.basel.int/industry/mppiwp/guid-info/guidcoll.pdf">http://www.basel.int/industry/mppiwp/guid-info/guidcoll.pdf</a>
Yes	3. Guideline on Material Recovery and Recycling of End-of-Life Mobile Phones (Approved Draft). Basel Mobile Phone Partnership Initiative Project 3.1. (March 25, 2009).	Recycling	<a href="http://www.basel.int/industry/mppiwp/guid-info/guidmaterial.pdf">http://www.basel.int/industry/mppiwp/guid-info/guidmaterial.pdf</a>
	4. Guideline on the Awareness Raising-Design Considerations (Revised and Approved Draft). Basel Mobile Phone Partnership Initiative Project 4.1. (March 25, 2009).	Awareness Raising	<a href="http://www.basel.int/industry/mppiwp/guid-info/guiddesign.pdf">http://www.basel.int/industry/mppiwp/guid-info/guiddesign.pdf</a>
	5. Guideline for the Transboundary Movement of Collected Mobile Phones (Approved Final Draft). Basel Mobile Phone Partnership Initiative Project 2.1. (March 25, 2009).	Transboundary Movement	<a href="http://www.basel.int/industry/mppiwp/guid-info/guidTBM.pdf">http://www.basel.int/industry/mppiwp/guid-info/guidTBM.pdf</a>
Yes	6. Guidance document on the environmentally sound management of used and end-of-life mobile phones. Basel Mobile Phone Partnership Initiative (Sep 15, 2008)	Refurbishing & Recycling (summary & consolidation of MPPI guidelines)	<a href="http://www.basel.int/industry/mppi/MPPI%20Guidance%20Document.pdf">http://www.basel.int/industry/mppi/MPPI%20Guidance%20Document.pdf</a>
Yes	7. Guidance Document on the Preparation of Technical Guidelines for the Environmentally Sound Management of Wastes Subject to the Basel Convention.	General Basel guidance	<a href="http://www.basel.int/meetings/sbc/workdoc/framework.doc">http://www.basel.int/meetings/sbc/workdoc/framework.doc</a>
Yes	8. Draft technical guidelines on the environmentally sound recycling/reclamation of metals and metal compounds (R4). Basel Convention.	Recycling (Metals)	<a href="http://www.basel.int/meetings/cop/cop7/docs/08a3e.pdf">http://www.basel.int/meetings/cop/cop7/docs/08a3e.pdf</a>
Yes	9. One Global Understanding of Re-Use - Common Definitions. Solving the E-waste Problem (StEP). (March 5, 2009).	Reuse	<a href="http://www.step-initiative.org/pdf/white-papers/StEP_TF3_WPCommonDefinitions.pdf">http://www.step-initiative.org/pdf/white-papers/StEP_TF3_WPCommonDefinitions.pdf</a>
	10. E-waste Take-back System Design and Policy Approaches. Solving the E-waste Problem (StEP). (January 28, 2009).	Take-back	<a href="http://www.step-initiative.org/pdf/white-papers/StEP_TF1_WPTakeBackSystems.pdf">http://www.step-initiative.org/pdf/white-papers/StEP_TF1_WPTakeBackSystems.pdf</a>
	11. Social and Environmental Responsibility in Metals Supply to the Electronic Industry. Global e-Sustainability Initiative (GeSI). (June 20, 2008).	Recycling	<a href="http://www.gesi.org/files/20080620_ghgm_ser_metalstoelectronics.pdf">http://www.gesi.org/files/20080620_ghgm_ser_metalstoelectronics.pdf</a>
	12. The Entrepreneur's Guide to Computer Recycling. United Nations Educational, Scientific and Cultural Organization (UNESCO).	Recycling	<a href="http://www.ticethic.com/guide">http://www.ticethic.com/guide</a>

Literature Review	Standard / Guideline / Document*	Type of Guidance	Document
<b>2. ORGANIZATION FOR ECONOMIC COOPERATION AND DEVELOPMENT (OECD)</b>			
Yes	13. Council Recommendation C(2004)100 on the Environmentally Sound Management of Waste (9 Jun 2004)	End-of-life (General ESM)	<a href="http://webdomino1.oecd.org/horizontal/oecdacts.nsf/linkto/C(2004)100">http://webdomino1.oecd.org/horizontal/oecdacts.nsf/linkto/C(2004)100</a>
Yes	14. Guidance Manual for the Implementation of the Council Recommendation C(2004)100 on the Environmentally Sound Management of Waste. (2007).	End-of-life (General ESM)	<a href="http://www.oecd.org/dataoecd/23/31/39559085.pdf">http://www.oecd.org/dataoecd/23/31/39559085.pdf</a>
Yes	15. Technical Guidance for the Environmentally Sound Management of Specific Waste Streams: Used and Scrap Personal Computers (18 Feb 2003).	Recycling	<a href="http://www.ois.oecd.org/olis/2001doc.nsf/LinkTo/NT000009E2/\$FILE/JT00139462.PDF">http://www.ois.oecd.org/olis/2001doc.nsf/LinkTo/NT000009E2/\$FILE/JT00139462.PDF</a>
<b>3. DEVELOPING COUNTRIES / COUNTRIES WITH ECONOMIES IN TRANSITION</b>			
<b>3.A INDIA</b>			
Yes	16. Guidelines for Environmentally Sound Management of E-waste. India Central Pollution Control Board (CPCB) and Ministry of Environment & Forests (March 12, 2008).	Recycling (Chapter 5) Reuse (Chapter 5)	<a href="http://www.cpcb.nic.in/e_Waste.php">http://www.cpcb.nic.in/e_Waste.php</a>
<b>3.B KENYA</b>			
Yes	17. E-waste Management in Kenya. Hewlett Packard, DSF, Empa. (July 2008).	Assessment	<a href="http://ewasteguide.info/system/files/Waema_2008_KICTANet.pdf">http://ewasteguide.info/system/files/Waema_2008_KICTANet.pdf</a>  <a href="http://ewasteguide.info/Waema_2008_KICTANet">http://ewasteguide.info/Waema_2008_KICTANet</a>
<b>3.C MOROCCO</b>			
Yes	18. Technical report on the assessment of e-waste management in Morocco. Hewlett Packard, DSF, Empa. (August 2008).	Assessment	<a href="http://ewasteguide.info/system/files/Laissaoui_2008_CMPP.pdf">http://ewasteguide.info/system/files/Laissaoui_2008_CMPP.pdf</a>  <a href="http://ewasteguide.info/Laissaoui_2008_CMPP">http://ewasteguide.info/Laissaoui_2008_CMPP</a>
<b>3.D SOUTH AFRICA</b>			
Yes	19. E-waste Assessment South Africa. Hewlett Packard, DSF, Empa. (November 2008).	Assessment	<a href="http://ewasteguide.info/system/files/Finlay_2008_eWASA.pdf">http://ewasteguide.info/system/files/Finlay_2008_eWASA.pdf</a>  <a href="http://ewasteguide.info/Finlay_2008_eWASA">http://ewasteguide.info/Finlay_2008_eWASA</a>
<b>3.E UGANDA</b>			
	20. E-waste assessment in Uganda: A situational analysis of e-waste management and generation with special emphasis on personal computers. UNIDO, Microsoft. (2008).	Assessment	<a href="http://ewasteguide.info/system/files/Finlay_2008_eWASA.pdf">http://ewasteguide.info/system/files/Finlay_2008_eWASA.pdf</a>  <a href="http://ewasteguide.info/Wasswa_2008_UCPC-Empa">http://ewasteguide.info/Wasswa_2008_UCPC-Empa</a>
<b>4. NORTH AMERICA</b>			
<b>4.A CANADA</b>			
Yes	21. Implementation Guide for Information Technology Equipment Disassembly and Sorting Centres. Centre québécois de développement.	Refurbishing	<a href="http://www.nrcan-rncan.gc.ca/mms-smm/busi-indu/rad-rad/pdf/cfe-imp-eng.pdf">http://www.nrcan-rncan.gc.ca/mms-smm/busi-indu/rad-rad/pdf/cfe-imp-eng.pdf</a>
Yes	22. Waste Diversion Ontario's Draft Waste Electrical and Electronic Equipment Diversion Standard (Oct 2007)	Recycling (ANNEX 9) Refurbishing (ANNEX 10)	<a href="http://www.ene.gov.on.ca/envision/land/WDA/electronics/finalWEEPProgramPlan-appendices.pdf">http://www.ene.gov.on.ca/envision/land/WDA/electronics/finalWEEPProgramPlan-appendices.pdf</a>
Yes	23. Recycler Vendor Qualification Standard. Electronic Product Stewardship Canada (Mar 2006)	Recycling	<a href="http://www.epsc.ca/pdfs/March2006_RVQP_standard.pdf">http://www.epsc.ca/pdfs/March2006_RVQP_standard.pdf</a>

Literature Review	Standard / Guideline / Document*	Type of Guidance	Document
Yes	24. Recycling Vendor Qualification Guidance Document. Electronic Product Stewardship Canada (Mar 2006)	Recycling	<a href="http://www.epsc.ca/pdfs/March2006_RVQ_P_GD.pdf">http://www.epsc.ca/pdfs/March2006_RVQ_P_GD.pdf</a>
Yes	25. Recycling Vendor Qualification Process. Electronic Product Stewardship Canada (Mar 2006)	Recycling	<a href="http://www.epsc.ca/pdfs/March_2006_FIN_AL_Recycler_Qualification_Proce_ss.pdf">http://www.epsc.ca/pdfs/March_2006_FIN_AL_Recycler_Qualification_Proce_ss.pdf</a>
	4.B USA		
	26. Plug-In To eCycling: Guidelines for Materials Management. USEPA (May 2004)	Recycling	<a href="http://www.epa.gov/epawaste/partnerships/plugin/pdf/guide.pdf">http://www.epa.gov/epawaste/partnerships/plugin/pdf/guide.pdf</a>
Yes	27. Responsible Recycling "R2" Practices for use in Accredited Certification Programs for Electronics Recyclers (October 30, 2008).	Recycling	<a href="http://www.decideagree.com/R2%20Document.pdf">http://www.decideagree.com/R2%20Document.pdf</a>
	28. Recycling Industry Operating Standard (RIOS), Institute of Scrap Recycling Industries (ISRI)	Recycling	<a href="http://www.firstenvironment.com/html/environmental_management_syste7.html">http://www.firstenvironment.com/html/environmental_management_syste7.html</a>
	29. Closing the Loop Electronics Design to Enhance Reuse/Recycling Value. Green Electronics Council (January 2009).	Design for Reuse/Recycling	<a href="http://www.greenelectronicscouncil.org/documents/0000/0007/Design_for_End_of_Life_Final_Report_090208.pdf">http://www.greenelectronicscouncil.org/documents/0000/0007/Design_for_End_of_Life_Final_Report_090208.pdf</a>
Yes	30. Best Management Practices for Electronic Waste. California Integrated Waste Management Board (April 2004).	End-of-life	<a href="http://www.ciwmb.ca.gov/Publications/electronics/63004005.pdf">http://www.ciwmb.ca.gov/Publications/electronics/63004005.pdf</a>
Yes	31. Dell's Recovery and Waste Disposition Channels Environmental Guidelines (December 2005)	Recycling	<a href="http://www.dell.com/downloads/global/corporate/environ/Disposal_Guidelines.pdf">http://www.dell.com/downloads/global/corporate/environ/Disposal_Guidelines.pdf</a>
Yes	32. Hewlett-Packard Standard 007-2 Vendor Requirements for Hardware Recycling (October 13, 2008)	Recycling	<a href="http://www.hp.com/hpinfo/globalcitizenship/environment/recycle/finalrecstds.pdf">http://www.hp.com/hpinfo/globalcitizenship/environment/recycle/finalrecstds.pdf</a>
	33. Basel Action Network (BAN) Electronics Recycler's Pledge of True Stewardship	Recycling	<a href="http://www.ban.org/Pledge/electronics_recycler_pledge.pdf">http://www.ban.org/Pledge/electronics_recycler_pledge.pdf</a>
	34. e-Stewards Standard for Responsible Recycling and Reuse of Electronic Equipment	Reuse/Recycling	<a href="http://www.e-stewards.org/documents/e-StewardStandard_ExcerptedVersion.pdf">http://www.e-stewards.org/documents/e-StewardStandard_ExcerptedVersion.pdf</a> (free version without ISO14001 language)
	5. EUROPE		
Yes	35. Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003 on waste electrical and electronic equipment (WEEE). Consolidated version.	Recycling (various Articles)	<a href="http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:2002L0096:20080321:EN:PDF">http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:2002L0096:20080321:EN:PDF</a>
Yes	36. Tools for Environmentally Sound Management, Bureau of International Recycling (BIR) (EN 2006 / ES 2008 / FR 2009)	End-of-life (General ESM)	<a href="http://www.bir.org/pdf/GuideESM.pdf">http://www.bir.org/pdf/GuideESM.pdf</a> (English) <a href="http://www.bir.org/pdf/GuideESM_FR.pdf">http://www.bir.org/pdf/GuideESM_FR.pdf</a> (French) <a href="http://www.bir.org/pdf/GuideESM_ES.pdf">http://www.bir.org/pdf/GuideESM_ES.pdf</a> (Spanish)
	6. OTHER		
Yes	37. ISO 14001 Environmental Management Systems - Requirements with Guidance for Use (second edition 2004-11-15).	Environmental Management Systems	International Organization for Standardization <a href="http://www.iso.org">http://www.iso.org</a>
Yes	38. ISO 14004 Environmental Management Systems - General Guidelines on Principles, Systems and Support Techniques (second edition 2004-11-15).	Environmental Management Systems	International Organization for Standardization <a href="http://www.iso.org">http://www.iso.org</a>
Yes	39. Occupational Health and Safety Management Systems – Specification (BSI - OHSAS 18001: 1999)	Occupational Health and Safety Management Systems	

\* Note: These documents were considered during the working period of the Ad Interim Project Group. Some of these documents may have undergone update, revision or substitution since this period.

## **Annex D: Compilations of Source Material**

1. Basis for the elaboration of a Mapping Document. UNEP/CHW.9/INF/10 of 29 May 2008 (see: [www.basel.int/meetings/cop/cop9/docs/i10e.pdf](http://www.basel.int/meetings/cop/cop9/docs/i10e.pdf)).
2. Guidelines and Standards for End-of-Life Operations on e-Waste. Summary and Evaluation of Legislation, Guidelines, and Standards. 29 June 2009. United Nations University.
3. Table of existing Guidelines, Ministry for the Environment (New Zealand) working document.
4. United Nations University study supporting the 2008 Review of the Waste Electrical and Electronic Equipment (WEEE) Directive (see: [http://ec.europa.eu/environment/waste/weee/pdf/final\\_rep\\_unu.pdf](http://ec.europa.eu/environment/waste/weee/pdf/final_rep_unu.pdf)).

## Annex E: Examples of Facility Measures to Demonstrate Conformity with ESM Criteria

The example below is provided for illustrative purposes. The following facility measures are based on guidance from existing standards, including *ISO 14001:2004: Environmental management systems -- Requirements with guidance for use*; *ISO 14004:2004: Environmental management systems -- General guidelines on principles, systems and support techniques*; and *BS OHSAS 18001 Occupational Health and Safety*. The facility measures are loosely organized into each of the eight ESM criteria.

THEME / CATEGORY	EXAMPLES OF MEASURES
<b>ESM CRITERION 1: TOP MANAGEMENT COMMITMENT TO A SYSTEMATIC APPROACH</b>	
<b>Facility Environment, Health &amp; Safety (EHS) Policy</b>  <i>NB: Policy is appropriate to nature, scale &amp; negative EHS impacts of activities, products &amp; services</i>	<input type="checkbox"/> Top management commitment to health & safety <input type="checkbox"/> Top management commitment to comply with applicable legal requirements <input type="checkbox"/> Top management commitment to pollution prevention <input type="checkbox"/> Top management commitment to continual improvement <input type="checkbox"/> Policy is documented and implemented <input type="checkbox"/> Policy is communicated to all personnel, sub-contractors and visitors that access the workplace <input type="checkbox"/> Policy is reviewed periodically for relevancy to organization
<b>Allocate Resources</b>	<input type="checkbox"/> Adequate financial resources, human resources, specialized skills, organizational infrastructures, and technologies are made available to design, implement, maintain and improve the ESM system
<b>Roles, Responsibilities &amp; Authorities</b>	<input type="checkbox"/> Define, document & communicate roles, responsibilities & authorities for each component of the ESM system <input type="checkbox"/> Specific management representative(s) appointed to oversee the design, implementation and maintenance of the ESM system, including the EHS programme(s), and report on ESM performance to top management for review
<b>ESM CRITERION 2: RISK ASSESSMENT</b>	
<b>Assess Hazards to Environment, Health &amp; Safety (EHS)</b>	<input type="checkbox"/> Procedure to identify and prioritize EHS hazards associated with new, existing and planned activities, products & services <input type="checkbox"/> EHS hazard information is documented and kept current
<b>Emergency Preparedness &amp; Response</b>	<input type="checkbox"/> Procedure to identify potential emergency situations and accidents and how to respond to them <input type="checkbox"/> Prevent and mitigate EHS impacts during responses <input type="checkbox"/> Review emergency preparedness and response procedures, especially after the occurrence of accidents or emergency situations <input type="checkbox"/> Periodically test procedures where practicable
<b>Facility Closure Plan</b>	<input type="checkbox"/> Site decommissioning plan <input type="checkbox"/> Site remediation <input type="checkbox"/> Financial guarantees

THEME / CATEGORY	EXAMPLES OF MEASURES
<b>ESM CRITERION 3: RISK PREVENTION AND MINIMIZATION</b>	
<b>Objectives &amp; Targets</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Compatible with policy commitments</li> <li><input type="checkbox"/> Address significant EHS hazards</li> <li><input type="checkbox"/> Address applicable legal requirements</li> <li><input type="checkbox"/> Consider technological options, financial, operational and business requirements</li> <li><input type="checkbox"/> Consider new developments, new or modified activities, products and services</li> <li><input type="checkbox"/> Consider views of interested parties</li> <li><input type="checkbox"/> Established for relevant functions and levels of the organization</li> <li><input type="checkbox"/> SMART objectives and targets (i.e. specific, measurable, achievable, realistic, and timely)</li> <li><input type="checkbox"/> Allocated periods of time to achieve objectives and targets</li> <li><input type="checkbox"/> Performance indicators to identify whether objectives and targets are being met</li> </ul>
<b>Environment, Health &amp; Safety (EHS) Programme(s)</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Programme(s) designed to achieve objectives &amp; targets</li> <li><input type="checkbox"/> Programme(s) identify roles, responsibilities and authorities to meet objectives &amp; targets at each relevant function and level of the organization</li> <li><input type="checkbox"/> Programme(s) documented, implemented and maintained</li> </ul>
<b>Operational Control</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Establish and maintain documented procedures for operations and activities associated with significant EHS hazards where their absence could lead to deviation from the ESM policy, objectives and targets</li> <li><input type="checkbox"/> Establish and maintain documented procedures pertaining to the identified EHS hazards of goods, equipment and services purchased and/or used by the organization and communicate these procedures and requirements to suppliers and contractors</li> <li><input type="checkbox"/> Establish and maintain documented procedures for the design of workplace, process, installations, machinery, operating procedures and work organization to eliminate or reduce EHS hazards at their source</li> </ul>
<b>ESM CRITERION 4: LEGAL REQUIREMENTS</b>	
<b>Compliance With Legal Requirements</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Procedure to identify &amp; access legal requirements applicable to new, existing and planned activities, products and services</li> <li><input type="checkbox"/> Applicable legal requirements are documented and kept current</li> </ul>
<b>Evaluate Legal Compliance</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Procedures to monitor compliance with applicable legal requirements</li> <li><input type="checkbox"/> Periodically evaluate compliance and keep records of results</li> </ul>
<b>ESM CRITERION 5: AWARENESS, COMPETENCY AND TRAINING</b>	
<b>Awareness, Training &amp; Competence</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Document, implement and maintain procedures to identify employee training needs</li> <li><input type="checkbox"/> Raise awareness amongst employees concerning the actual and/or potential EHS hazards linked to job tasks, and provide employees with appropriate training on how to mitigate risks associated with these hazards</li> <li><input type="checkbox"/> Ensure job tasks that are or may be associated with significant EHS hazards are undertaken by employees that</li> </ul>

THEME / CATEGORY	EXAMPLES OF MEASURES
	<p>are competent to perform these duties on the basis of education, training and/or experience</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Make employees aware of the importance of adhering to operating procedures and the consequences of failing to do so</li> <li><input type="checkbox"/> Raise awareness amongst employees concerning the importance of the organization's ESM policy, objectives and targets, EHS programme(s), and other ESM system requirements</li> <li><input type="checkbox"/> Communicate employee roles and responsibilities in support of achieving the organization's ESM system requirements</li> <li><input type="checkbox"/> Maintain up-to-date training records for employees</li> </ul>
<b>Communication</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Procedures established and maintained for internal communication about significant EHS hazards and ESM system</li> <li><input type="checkbox"/> Procedures established and maintained for receiving, documenting and responding to relevant communication from external interested parties, as it relates to significant EHS hazards and the ESM system</li> <li><input type="checkbox"/> Consultation with employees regarding any changes that may affect workplace EHS hazards</li> </ul>
<b>ESM CRITERION 6: RECORD-KEEPING AND PERFORMANCE MEASUREMENT</b>	
<b>Documentation</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Information supporting core elements of the ESM system is established and maintained (e.g. policy, EHS programme(s), procedures, records, audits, etc.)</li> <li><input type="checkbox"/> Links to related documents</li> </ul>
<b>Control of Documents</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Procedures are established and maintained to provide guidance on document approval prior to use, and processes for reviewing, updating and re-approving documents</li> <li><input type="checkbox"/> Current versions of documents are available in proper locations</li> <li><input type="checkbox"/> Obsolete documents are promptly removed from all areas using these documents</li> <li><input type="checkbox"/> Obsolete documents retained for legal or knowledge preservation purposes are marked accordingly</li> <li><input type="checkbox"/> Documents are legible, dated and readily identifiable</li> <li><input type="checkbox"/> Documents prepared by external sources which are used internally are periodically reviewed for updated versions</li> </ul>
<b>Monitoring &amp; Measurement</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Procedures to monitor operations linked to significant EHS hazards</li> <li><input type="checkbox"/> Proactive measures of performance to monitor compliance with objectives and targets, EHS programme(s), operational criteria and legal requirements</li> <li><input type="checkbox"/> Reactive measures of performance to monitor accidents, ill health, incidents, near misses, and other historical evidence of deficient EHS performance</li> <li><input type="checkbox"/> Calibration of monitoring and measurement equipment</li> <li><input type="checkbox"/> Recording of data and results of monitoring and measurement to facilitate corrective and preventive action analysis</li> </ul>
<b>Control of Records</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Procedures to identify, store, protect, retrieve, retain, and dispose of records</li> <li><input type="checkbox"/> Retention history of records is documented</li> <li><input type="checkbox"/> EHS records are easily retrievable and protected from damage, loss and deterioration</li> </ul>

THEME / CATEGORY	EXAMPLES OF MEASURES
	<ul style="list-style-type: none"> <li><input type="checkbox"/> Records include training records, equipment servicing and maintenance records, monitoring records, accident and safety records, records of audit results, records of management reviews</li> <li><input type="checkbox"/> Records are legible, identifiable, and traceable to the activity, product or service involved</li> </ul>
<b>Internal Audit</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Establish and maintain a programme and procedures to ensure the ESM system undergoes periodic audits</li> <li><input type="checkbox"/> Responsibilities for planning and conducting audits and retaining associated records have been identified</li> <li><input type="checkbox"/> Audit determines whether or not the ESM system conforms to specified requirements, and whether or not it has been properly implemented and maintained</li> <li><input type="checkbox"/> Audit evaluates whether ESM system is effective at meeting the organization's policy and objectives</li> <li><input type="checkbox"/> Audit identifies recommendations or opportunities for corrective and preventive actions</li> <li><input type="checkbox"/> Audit identifies the status of follow-up action items and recommendations from previous audits and management reviews</li> <li><input type="checkbox"/> Audits are conducted by personnel independent of those having direct responsibility for the activity being examined to ensure objectivity and impartiality of the audit process</li> </ul>
<b>ESM CRITERION 7: CORRECTIVE ACTION</b>	
<b>Nonconformity, Corrective Action &amp; Preventative Action</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Procedures for addressing actual and potential nonconformity</li> <li><input type="checkbox"/> Identify and correct nonconformities to mitigate impacts</li> <li><input type="checkbox"/> Investigate nonconformities and causes, and take action to avoid recurrence</li> <li><input type="checkbox"/> Evaluate need for actions to prevent nonconformities and implementing appropriate actions to avoid occurrence</li> <li><input type="checkbox"/> Corrective or preventive actions are appropriate for the magnitude of actual and/or potential EHS hazards that has or could occur from nonconformance</li> <li><input type="checkbox"/> Record results of corrective actions and preventative actions</li> <li><input type="checkbox"/> Review effectiveness of corrective actions and preventative actions</li> </ul>
<b>Review of ESM system</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Audit results are presented to top management for review at planned intervals</li> <li><input type="checkbox"/> Necessary information is collected and provided to allow top management to carry out the evaluation</li> <li><input type="checkbox"/> Top management assessed the need for changes in environmental policy, objectives and targets, and other elements of the ESM system based on audit findings, changing circumstances, and the commitment for continual improvement</li> <li><input type="checkbox"/> Top management approved recommendations for corrective action and continual improvement, specifically issues pertaining to non-conformity with applicable legal requirements</li> </ul>
<b>ESM CRITERION 8: TRANSPARENCY AND VERIFICATION*</b>	
<b>Transparency</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Facility Environment, Health &amp; Safety (EHS) policy is available to public.</li> <li><input type="checkbox"/> Records of facility health and safety performance are made</li> </ul>

THEME / CATEGORY	EXAMPLES OF MEASURES
	<p>available to the public (e.g. accident and injury indicator boards are made available at facility entrance).</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Company reports are made available to shareholders and society, which include information pertaining to its performance with respect to environmental, health and safety issues.</li> <li><input type="checkbox"/> Provide information to clients as necessary to demonstrate due diligence or duty of care with respect to facility activities and operations.</li> </ul>
<b>Verification</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Planning, operating, checking and corrective actions for Environmentally Sound Management verifiable to demonstrate compliance with applicable guidelines under the Basel Convention and OECD.</li> <li><input type="checkbox"/> Provide public assurances that operations and activities are compatible with ESM. Such provisions may include for example participating in third party audits and inspections.</li> </ul>

\* Note: Provisions to support transparency and verification are subject to appropriate protection for confidential business information

## Annex F: Example of a Tiered Checklist of Facility Measures to Demonstrate Conformity with ESM Criteria

The example below is provided for illustrative purposes. Similar checklists could be established for each of the eight ESM criteria. It is anticipated that the use of tiered checklists of facility measures will facilitate continual improvement with respect to ESM, especially with respect to the transition of informal sector operations to formal sector operations.

<b>CRITERION 1: TOP MANAGEMENT COMMITMENT TO A SYSTEMATIC APPROACH</b>		
<b>BASIC MEASURES</b>	<b>INTERMEDIATE MEASURES</b>	<b>ADVANCED MEASURES</b>
<ul style="list-style-type: none"> <li><input type="checkbox"/> Visual evidence of commitment to:               <ul style="list-style-type: none"> <li>o public health</li> <li>o employee safety</li> <li>o environmental protection</li> <li>o legal compliance</li> <li>o pollution prevention</li> <li>o continual improvement</li> </ul> </li> <li><input type="checkbox"/> Allocation of “ad hoc” resources (e.g. human, financial, specialized skills, technology) to support commitments identified above</li> <li><input type="checkbox"/> Planning, operating, checking and corrective actions for Environmentally Sound Management verifiable to demonstrate compliance with the appropriate Basel Convention Guidelines</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Adoption of “basic measures” (see left column)</li> <li><input type="checkbox"/> Environmental, health and safety (EHS) policies exist and:               <ul style="list-style-type: none"> <li>o are documented</li> <li>o include commitments for public health, employee safety, environmental protection, legal compliance, pollution prevention and continual improvement</li> <li>o made publicly available</li> <li>o communicated to employees and visitors</li> </ul> </li> <li><input type="checkbox"/> Annual budgets include allocation of adequate resourcing to support facility engagement on ESM criteria</li> <li><input type="checkbox"/> Employee roles and responsibilities are:               <ul style="list-style-type: none"> <li>o assigned to support facility engagement on ESM criteria and are well documented</li> <li>o communicated to employees</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Adoption of “intermediate measures” (see left column)</li> <li><input type="checkbox"/> EHS policies are signed by top-level management</li> <li><input type="checkbox"/> EHS policies are periodically reviewed for relevancy</li> <li><input type="checkbox"/> Employee awareness and understanding of EHS policies and their related roles and responsibilities is assessed periodically</li> <li><input type="checkbox"/> Management representative(s) report on facility ESM performance to top management</li> </ul>

## **Annex G: Examples of Specific Actions That Operators in Facilities May Carry Out To Support ESM**

### ***(a) Selective treatment for materials and components of waste electrical and electronic equipment***

*Excerpt from Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003 on waste electrical and electronic equipment (WEEE)*

#### ANNEX II

Selective treatment for materials and components of waste electrical and electronic equipment in accordance with Article 6(1)

1. As a minimum the following substances, preparations and components have to be removed from any separately collected WEEE:
  - polychlorinated biphenyls (PCB) containing capacitors in accordance with Council Directive 96/59/EC of 16 September 1996 on the disposal of polychlorinated biphenyls and polychlorinated terphenyls (PCB/PCT),
  - mercury containing components, such as switches or backlighting lamps,
  - batteries,
  - printed circuit boards of mobile phones generally, and of other devices if the surface of the printed circuit board is greater than 10 square centimetres,
  - toner cartridges, liquid and pasty, as well as colour toner,
  - plastic containing brominated flame retardants,
  - asbestos waste and components which contain asbestos,
  - cathode ray tubes,
  - chlorofluorocarbons (CFC), hydrochlorofluorocarbons (HCFC) or hydrofluorocarbons (HFC), hydrocarbons (HC),
  - gas discharge lamps,
  - liquid crystal displays (together with their casing where appropriate) of a surface greater than 100 square centimetres and all those back-lighted with gas discharge lamps,
  - external electric cables,
  - components containing refractory ceramic fibres as described in Commission Directive 97/69/EC of 5 December 1997 adapting to technical progress Council Directive 67/548/EEC relating to the classification, packaging and labelling of dangerous substances,
  - components containing radioactive substances with the exception of components that are below the exemption thresholds set in Article 3 of and Annex I to Council Directive 96/29/Euratom of 13 May 1996 laying down basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionising radiation,
  - electrolyte capacitors containing substances of concern (height > 25 mm, diameter > 25 mm or proportionately similar volume)

These substances, preparations and components shall be disposed of or recovered in compliance with Article 4 of Council Directive 75/442/EEC.

2. The following components of WEEE that is separately collected have to be treated as indicated:

- cathode ray tubes: The fluorescent coating has to be removed,
  - equipment containing gases that are ozone depleting or have a global warming potential (GWP) above 15, such as those contained in foams and refrigeration circuits: the gases must be properly extracted and properly treated. Ozone-depleting gases must be treated in accordance with Regulation (EC) No 2037/2000 of the European Parliament and of the Council of 29 June 2000 on substances that deplete the ozone layer.
  - gas discharge lamps: The mercury shall be removed.
3. Taking into account environmental considerations and the desirability of reuse and recycling, paragraphs 1 and 2 shall be applied in such a way that environmentally-sound reuse and recycling of components or whole appliances is not hindered.
  4. Acting in accordance with the regulatory procedure with scrutiny referred to in Article 14(3), the Commission shall evaluate as a matter of priority whether the entries regarding printed circuit boards for mobile phones, and liquid crystal displays are to be amended.

### ***(b) Technical requirements for storage and treatment sites***

*Excerpt from Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003 on waste electrical and electronic equipment (WEEE)*

#### ANNEX III

##### Technical requirements in accordance with Article 6(3)

1. Sites for storage (including temporary storage) of WEEE prior to their treatment (without prejudice to the requirements of Council Directive 1999/31/EC):
  - impermeable surfaces for appropriate areas with the provision of spillage collection facilities and, where appropriate, decanters and cleanser-degreasers,
  - weatherproof covering for appropriate areas.
2. Sites for treatment of WEEE:
  - balances to measure the weight of the treated waste,
  - impermeable surfaces and waterproof covering for appropriate areas with the provision of spillage collection facilities and, where appropriate, decanters and cleanser-degreasers,
  - appropriate storage for disassembled spare parts,
  - appropriate containers for storage of batteries, PCBs/PCTs containing capacitors and other hazardous waste such as radioactive waste,
  - equipment for the treatment of water in compliance with health and environmental regulations.

## **(c) Use of Personal Protective Equipment**

*Excerpt from the International Labour Office Report on Safety and Health In the Non-Ferrous Metals Industries.* This guide is available free-of-charge at the following web link:  
[www.ilo.org/public/english/dialogue/sector/techmeet/menfm01/menfmcp-e.pdf](http://www.ilo.org/public/english/dialogue/sector/techmeet/menfm01/menfmcp-e.pdf)

- 4.9 Personal protection
- 4.9.1 Personal protective equipment
  - 4.9.1.1 Where adequate protection against exposure to hazardous factors in the production of non-ferrous metals cannot be ensured by other means, such as eliminating the risk, controlling the risk at source, or minimizing the risk, suitable PPE and protective clothing, having regard to the type of work and risks, and in consultation with workers and/or their representatives, should be provided and maintained by the employer, with out cost to the workers, as may be prescribed by national laws and regulations.
  - 4.9.1.2 PPE should not be regarded as a substitute for engineering and technical measures. It should be regarded as a last resort, as a temporary measure, or in an emergency.
  - 4.9.1.3 The selection of protective clothing should take into account:
    - (i) the adequacy of the design and the fit of the clothing, allowing freedom of movement to perform tasks, and whether it is suitable for the intended use;
    - (ii) the environment in which it will be worn, including the ability of the material from which it is made to resist penetration by chemicals, minimize heat stress, release dust, resist catching fire and not discharge static electricity; and
    - (iii) the special requirements of workers exposed to molten metal and associated hazards, such as the need for reflective clothing or insulated clothing with reflective surfaces during exposure to high radiant heat and hot air.
  - 4.9.1.4 Sufficient PPE should be selected where appropriate on a personal basis. It should be used, maintained, stored and replaced in accordance with standards or guidance for each hazard set or recognized by the competent authority.
  - 4.9.1.5 Different items of PPE should be compatible with each other when they are worn together.
  - 4.9.1.6 PPE should not restrict the user's mobility or field of vision.
  - 4.9.1.7 Employers should ensure that workers required to wear PPE are fully informed of the requirements and of the reasons for them, and are given adequate training in the selection, wearing, maintenance and storage of this equipment.
  - 4.9.1.8 When workers have been informed accordingly, they should use the equipment provided throughout the time they are exposed to the risk that requires the use of PPE for protection.
  - 4.9.1.9 Items of special equipment for use in proximity to molten metal should protect the wearer from heat and should withstand splashes of molten metal. It should be possible to remove these items easily if molten matter gets between the body and the protective clothing.

- 4.9.1.10 When tasks are performed using hazardous chemicals, PPE should be provided in accordance with the ILO code of practice Safety in the use of chemicals at work (Geneva, 1993).
- 4.9.1.11 All necessary protective equipment provided should be maintained in good condition and replaced, at no cost to the worker, when no longer suitable for the purpose.
- 4.9.1.12 The protective equipment should not be used for longer than the time indicated by the producer.
- 4.9.1.13 Workers should make proper use of the equipment provided, and maintain it in good condition, as far as this is within their control.
- 4.9.1.14 Before reissuing the clothing or equipment, employers should provide for the laundering, cleaning, disinfecting and examination of protective clothing or equipment which has been used and may be contaminated by materials that are hazardous to health.
- 4.9.1.15 Protective equipment that may be contaminated by materials hazardous to health should not be laundered, cleaned or kept at workers' homes. Employers should ensure that workers do not take contaminated clothing home and should provide for the cleaning of such clothing at no cost to the worker.

## **Annex H: Examples of Incentives and/or Relief Measures for Facilities that Project Groups May Consider for Inclusion in Technical Guidance and Pilot Projects**

*Excerpt from the "OECD Guidance Manual for the Implementation of the OECD Recommendation C(2004)100 on Environmentally Sound Management (ESM) of Waste"*

### **Recommendation 6**

Member countries should... consider incentives and/or relief measures for facilities that fulfil the core performance elements listed in Annex I to this Recommendation;

Under this recommendation, governments are encouraged to reward facilities which have implemented the CPEs. The instruments could be incentives and/or relief measures leading to a benefit for the enterprise in terms of finance, regulation, good image, etc. (i.e. some reduction of the additional burden brought about by the implementation of the CPEs).

There is a range of incentives that some governments are already using to encourage facilities to introduce environmental management systems, and that could be used in the OECD context for facilities implementing the CPEs:

- reducing the frequency of regulatory inspections or of monitoring requirements and facilitating emission controls which can be performed by the staff itself;
- reducing reporting requirements that are duplicating those of environmental management systems in place;
- expediting and consolidating environmental permits/licences and auditing and certifying facilities.
- waiving certain environmental regulations, that are duplicating the provisions of environmental management systems: for example, in certain European countries where environmental reporting is mandatory through national law, EMAS-registered facilities are exempted from environmental reporting under national law;
- providing technical assistance and information;

- providing financial support (facilities having an EMS may be wholly or partly exempted from registration/permit fees, part of their EMS implementation costs is reimbursed, etc.);
- providing special recognition or award;
- providing preferences through public procurement;
- providing information about the value of such systems.

Governments could also consider the introduction of technology-enabling incentives, such as research grants and other methods to develop new waste management options (e.g. elimination of hazardous waste streams or conversion of hazardous wastes to useful products).

Empirical analyses of results of a survey conducted by the OECD in 2005<sup>[21]</sup> suggest that the two main public policy incentives that encourage a facility to introduce an EMS are the perceived reduction of the frequency of inspections, and the provision of public financial support. For small and medium-sized enterprises, the provision of information on the nature and benefits of an EMS by public authorities also seems to play a significant role. However, this is apparently not the case for larger firms. Fulfilment of the CPEs may result in additional costs and administrative burden for the facility, which may act as a deterrent to implementation.

To encourage the implementation of the CPEs by SMEs, the inspection and/or auditing (and certification if pursued by a facility) embodied in the CPEs (again, see Section 8) could also be simplified for facilities which already implement provisions equivalent to those of the OECD CPEs.

Governments, of course, are free to use any form of incentive they choose. however, caution is recommended, in order to avoid introducing measures which could have a counter-productive effect. For example, when firms are encouraged to implement the CPEs through relief measures (such as reduced frequency of inspections, audit reports or emission measurements), it is important that the “driver” for doing this be clearly perceived as an effort to reduce administrative costs, rather than to avoid regulatory oversight altogether.”

Footnote 21: See “Business and the Environment. Policy Incentives and Corporate responses”, (OECD, 2007).

## Annex I: Glossary of Terms

**Note:** *These terms were developed for the purpose of the report on ESM criteria recommendations, individual project guidelines, and overall Guidance Document developed under PACE, and should not be considered as being legally binding, or that these terms have been agreed to internationally. Their purpose is to assist readers to better understand these PACE documents.*

**Assemblies:** Multiple electronic components assembled in a device that is in itself used as a **component**.

**Basel Convention:** United Nations Environment Programme's (UNEP's) March 22, 1989 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, which came into force in 1992.

**Cleaning:** Removal of dirt, dust, and stains; and making cosmetic repairs.

**Component:** Element with electrical or electronic functionality connected together with other components, usually by soldering to a printed circuit board, to create an electronic circuit with a particular function (for example an amplifier, radio receiver, or oscillator).

**Computing Equipment:** Computing equipment includes: personal computers (PCs) and associated displays, printers and peripherals, personal desk top computers, including the central processing unit and all other parts contained in the computer; personal notebooks and laptop computers, including the docking station, central processing unit and all other parts contained in the computer; computer monitors, including the following types of computer monitors: (a) cathode ray tube (b) liquid crystal display (c) plasma; computer keyboard, mouse, and cables; computer printer: (a) including the following types of computer printer: (i) dot matrix; (ii) ink jet; (iii) laser; (iv) thermal; and (b) including any computer printers with scanning or facsimile capabilities, or both.

**Defective/Defect:** Defective **Computing Equipment** is equipment that is delivered from the supply chain and last manufacturer in a condition that is not as it was designed to be sold, or the equipment breaks or malfunctions due to a condition that is not as it was designed. Defective equipment does not include equipment that loses functional or cosmetic value as a result of normal wear and usage or as a result of consumer negligence.

**Direct reuse:** Continued use of **computing equipment** and **components** by another person without the necessity of **repair**, **refurbishment**, or hardware **upgrading**, provided that such continued use is for the intended purpose of **computing equipment** and **components**.

**Dismantling:** Taking apart **computing equipment, components, or assemblies** in order to separate materials and/or increase options for **reuse, refurbishment, or recycling**, and to maximize recovery value.

**Disposal:** Any operations specified in Annex IV of the Basel Convention (Article 2, paragraph 4 of the Basel Convention, and Appendix J in this document).

**Donation:** Comprises any action to transfer **computing equipment or its components that are still fully functioning for its intended use**, for charity to another owner without any monetary rewards, or benefits, or barter.

**End-of-life computing equipment:** Individual **Computing equipment** that is no longer suitable for use, and which is intended for **dismantling** and recovery of spare parts or is destined for **material recovery** and **recycling** or final disposal. It also includes off-specification or new **computing equipment** which has been sent for **material recovery** and **recycling**, or final disposal.

**End-of-Use: Computing equipment** that is no longer used as intended by the previous owner, but may be fully functional and used appropriately by others.

**Environmentally sound management (ESM):** Taking all practicable steps to ensure that used and/or end-of-life products or wastes are managed in a manner which will protect human health and the environment.

**Evaluation:** The initial process by which used **computing equipment** is assessed, to determine whether or not it is likely to be suitable for **refurbishment/repair** or **material recovery /recycling**.

**Essential Key Function:** The originally-intended function(s) of a unit of equipment or **component** that will satisfactorily enable the equipment or component to be reused.

**Final Disposal:** Relevant operations specified in Annex IVA of the Basel Convention (Appendix J 1 in this document).

**Fully Functional/Full Functionality: Computing equipment or components** are “**fully functional**” when they have been tested and demonstrated to be capable of performing the **essential key functions** they were designed to perform.

**Hydrometallurgical processing:** Uses of aqueous chemistry for the recovery of metals from ores, concentrates, or recyclable wastes or products. Typically Hydrometallurgy consists of three steps of (a) Leaching using an acidic or basic aqueous solution to dissolve the desired metal at ambient or elevated pressures and temperatures; (b) Solution concentration, purification, then metal recovery using methods such as: precipitation, cementation, solvent extraction, gaseous reduction, ion exchange, electrowinning or electrorefining and (c) recycling of

reagents and treatment of effluents. Hydrometallurgical operations in authorised industrial scale facilities are distinct from unauthorised and illegal environmentally harmful practices in the informal sector.

**Incineration:** A thermal treatment technology by which wastes, sludges or residues are burned or destroyed at temperatures ranging from 850°C to more than 1100°C .

**Labelling:** The process by which individual or batches of **computing equipment** are marked to designate their status according to the PACE guidelines.

**Landfilling:** The placement of waste in, or on top of, ground containments, which is then generally covered with soil. Engineered landfills are disposal sites which are selected and designed to minimize the chance of release of hazardous substances into the environment, e.g. using plastic landfill liners and **leachate** collection systems.

**Leachate:** Contaminated water or liquids resulting from the contact of rain, surface and ground waters, or other pollutants with waste.

**Material Recovery:** Relevant operations specified in Annex IVB of the Basel Convention (see Appendix J 2 in this document).

**Mechanical Separation:** Process of using machinery to separate **computing equipment** into various materials **or components**.

**Potential for reuse (reusable):** **Computing equipment** and its **components** that possess or likely to possess quality necessary to be directly reused or reused after they have been refurbished or repaired.

**Pyrometallurgical processing:** Thermal processing of metals and ores, including roasting, smelting, and remelting.

**RoHS:** Directive of the European Parliament and the Council on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (URL: [http://ec.europa.eu/environment/waste/weee/index\\_en.htm](http://ec.europa.eu/environment/waste/weee/index_en.htm)).

**Recycling:** Relevant operations specified in Annex IVB of the Basel Convention (see Appendix J 2 in this document).

**Redeployment:** Comprises any action of new deployment or use by the owner of previously used **computing equipment** or its **components**.

**Refurbishable:** **Computing equipment** that can be refurbished or reconditioned, returning it to a working condition performing the essential functions it was designed for.

**Refurbishment:** Process for creating **refurbished or reconditioned computing equipment** including such activities as cleaning, data sanitization, and software **upgrading**.

**Refurbished computing equipment:** **Computing equipment** that has undergone **refurbishment** returning it to working condition functional for its originally conceived use with or without upgrades and meeting applicable technical performance standards and regulatory requirements and possible upgrades.

**Remarketing:** Any action, including marketing activities, necessary to sell previously used **computing equipment** or its **components** directly or indirectly to customers.

**Remanufacture:** Any action necessary to build up as-new products using **components** taken from previously used **computing equipment** as well as new **components**, if applicable. The output product meets the original OEM functionality and reliability specifications. To remanufacture a product may require the complete or partial disassembly of the unit, replacement or reprocessing of all components not meeting specifications, and testing to determine the new product is fully functional. Depending on the applied components this process may significantly change the unit's composition, purpose, and design.

**Repairing:** Process of only fixing a specified hardware fault or series of faults in computing **equipment**.

**Reuse:** Process of using again used **computing equipment** or a functional **component** from used **computing equipment** in the same or a similar function, possibly after **refurbishment, repairing, or upgrading**.

**Segregation:** Sorting out **computing equipment** from other (electronic) wastes for possible **reuse** or for **treatment** in downstream processes that may include **recycling/reclamation/refurbishment/repair/reuse/disposal**.

**Separation:** Removing certain **components/constituents** (e.g. batteries) or materials from **computing equipment** by manual or mechanical means.

**Small and Medium Size Enterprises (SME):** According to the European Commission small and medium-sized enterprises are those businesses which employ fewer than 250 persons and which have an annual turnover not exceeding EUR 50 million, and/or an annual balance sheet total not exceeding EUR 43 million.

**States concerned:** Means parties which are States of export, or import, or transit whether or not Parties.

**Testing:** Process by which used **computing equipment** is assessed against established protocol to determine whether or not it is suitable for **reuse**.

**Transport of Dangerous Goods Recommendations:** UN Recommendations on the transport of dangerous goods which deals with classification, placarding, labeling, record keeping, etc. to protect public safety during transportation.

**Treatment:** Any physical, chemical or mechanical activity in a facility that processes computing **equipment** including **dismantling**, removal of hazardous components, **material recovery**, **recycling** or preparation for **disposal**.

**Upgrading:** Process by which used **computing equipment** is modified by the addition of the latest software or hardware in order to increase its performance and/or functionality.

**Used Computing Equipment:** **Computing equipment**, which its owner does not intend to use it any longer, but is capable of being reused by another owner, recycled, refurbished, or upgraded by another owner.

**WEEE Directive:** Directive of the European Parliament and the Council on Waste Electrical and Electronic Equipment.

**Wastes:** Substances or objects which are disposed of or are intended to be disposed of or are required to be disposed of by the provisions of national law (Article 2, paragraph 1 of the Basel Convention).

## Appendix J: Basel Convention - Annex IV Disposal Operations

### 1. Operations which do not lead to the possibility of resource recovery, recycling, reclamation, direct re-use or alternative uses

Section 1 encompasses all such disposal operations which occur in practice.

- D1 Deposit into or onto land, (e.g., landfill, etc.)
- D2 Land treatment, (e.g., biodegradation of liquid or sludgy discards in soils, etc.)
- D3 Deep injection, (e.g., injection of pumpable discards into wells, salt domes or naturally occurring repositories, etc.)
- D4 Surface impoundment, (e.g., placement of liquid or sludge discards into pits, ponds or lagoons, etc.)
- D5 Specially engineered landfill, (e.g., placement into lined discrete cells which are capped and isolated from one another and the environment, etc.)
- D6 Release into a water body except seas/oceans
- D7 Release into seas/oceans including sea-bed insertion
- D8 Biological treatment not specified elsewhere in this Annex which results in final compounds or mixtures which are discarded by means of any of the operations in Section A
- D9 Physico chemical treatment not specified elsewhere in this Annex which results in final compounds or mixtures which are discarded by means of any of the operations in Section A, (e.g., evaporation, drying, calcination, neutralization, precipitation, etc.)
- D10 Incineration on land
- D11 Incineration at sea
- D12 Permanent storage (e.g., emplacement of containers in a mine, etc.)
- D13 Blending or mixing prior to submission to any of the operations in Section A
- D14 Repackaging prior to submission to any of the operations in Section A
- D15 Storage pending any of the operations in Section A

## **2. Operations which may lead to resource recovery, recycling reclamation, direct re-use or alternative uses**

Section 2 encompasses all such operations with respect to materials legally defined as or considered to be hazardous wastes and which otherwise would have been destined for operations included in Section 1.

- R1 Use as a fuel (other than in direct incineration) or other means to generate energy
- R2 Solvent reclamation/regeneration
- R3 Recycling/reclamation of organic substances which are not used as solvents
- R4 Recycling/reclamation of metals and metal compounds
- R5 Recycling/reclamation of other inorganic materials
- R6 Regeneration of acids or bases
- R7 Recovery of components used for pollution abatement
- R8 Recovery of components from catalysts
- R9 Used oil re-refining or other reuses of previously used oil
- R10 Land treatment resulting in benefit to agriculture or ecological improvement
- R11 Uses of residual materials obtained from any of the operations numbered R1-R10
- R12 Exchange of wastes for submission to any of the operations numbered R1-R11
- R13 Accumulation of material intended for any operation in Section B