



PARTNERSHIP FOR ACTION ON COMPUTING EQUIPMENT (PACE)

Sub-group on Transboundary Movement (TBM)

Guidance on Transboundary Movement (TBM) of Used and End- of-Life Computing Equipment

Approved by the PACE Working Group

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In addition, special thanks is extended to the Chair of the Sub-group, Mr. Joachim Wuttke from Germany, for his leadership in finalizing the report and for ensuring that all comments have been reviewed and incorporated in the report where appropriate.

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Summary

1. This section addresses transboundary movement of collected used and end-of-life computing equipment¹. Once collected, computing equipment should be evaluated and/or tested, and labelled, to determine whether it is suitable for reuse², possibly after repair, refurbishment, or upgrading, or if it is destined for material recovery and recycling (Basel Convention Annex IV B operations, or Appendix G 2 in this document) or final disposal (Basel Convention Annex IV A operations, or Appendix G 1 in this document).
2. This procedure should be of assistance to regulatory agencies and authorities, exporters, importers, manufacturers, repair, refurbishment and recycling facilities and any organization that is involved:
 - a) In the export or import of used computing equipment for reuse.
 - b) In the movement of used computing equipment suitable for reuse, possibly after repair, refurbishment, or upgrading in the importing country.
 - c) In transboundary movements of end-of-life computing equipment destined for material recovery and recycling (Basel Convention Annex IV B operations, or Appendix G 2 in this document) or final disposal (Basel Convention Annex IV A operations, or Appendix G A in this document).
3. The type of transboundary movement procedure to be applied depends on the constituents and hazardous characteristics and on the disposal operation chosen for collected computing equipment after evaluation and/or testing and labelling or documentation³ of testing results. To determine what is and what is not covered under the Basel Convention, the Convention defines the “wastes” to be covered in Article 2.1 of the Convention, and stipulates that wastes are 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. The Convention then defines disposal by reference disposal operations listed in Annex IV. Hazardous constituents and characteristics of such wastes are then defined and classified by a series of technical annexes (I, II, III, VIII and IX) in the Basel Convention. In addition, every Party may determine, by its own national legislation, to define additional substances and objects as wastes and hazardous wastes⁴.
4. It is recommended that Basel Convention transboundary movement controls should be implemented for end-of-life computing equipment destined for material recovery and recycling (Basel Convention Annex IV B operations, or Appendix G 2 in this document) or final disposal (Basel Convention Annex IV A operations, or Appendix G 1 in this document) where the end-of-life computing equipment contains Basel Convention Annex I constituents, unless it can be demonstrated that these end-of-life computing equipment are not hazardous using Basel Convention Annex III characteristics.

¹ Computing Equipment covers personal computers (PCs) and associated displays, printers and peripherals. This shall include: personal desk top computers, including the central processing unit and all other parts contained in the computer; personal notebook and laptop computer, including the docking station, central processing unit and all other parts contained in the computer; computer displays such as: cathode ray tube, liquid crystal display, plasma; computer keyboard, mouse, and cables; personal computer printer:(a) including the following types of computer printer: (i) dot matrix, (ii) inkjet, (iii) laser, (iv) thermal, and (b) including any computer printer with scanning or facsimile capabilities, or both

² Reuse: a process of using again a used computing equipment or a functional component from a used computing equipment, possibly after repair, refurbishment or upgrading (from the PACE glossary of terms).

³ The documentation shall accompany the movement and refer to the computing equipment in the shipment.

⁴ Such determination should be made through Parties' obligations as per Articles 3 and 13 of the Basel Convention. Each Party has the obligation to inform each other, through the Basel Secretariat, of their national definitions and of any subsequent changes, which includes any additional substances and/or objects as wastes and hazardous wastes, URL: <http://www.basel.int/natreporting/index.html>

5. Regarding transboundary movements of used computing equipment for repair and refurbishment in the importing country, and subsequent reuse, the following procedures should apply:

5.1. If, following Article 2.1 of the Basel Convention or national legislation, at least one of the States concerned involved in a transboundary movement has determined⁵ that used computing equipment destined for repair or refurbishment in the importing country is classified as wastes, then the decision tree procedure (see Appendix B) should be used. The Basel Convention control procedure would then apply where such waste computing equipment is hazardous wastes in accordance:

- a) with Article 1.1(a) and contain Basel Convention Annex I constituents, unless it can be demonstrated that these used computing equipment are not hazardous using Basel Convention Annex III characteristics, or
- b) with Article 1.1(b) and is considered hazardous waste by the national legislation of one of the Parties involved.

5.2. However, the Basel Convention control procedure will not apply, only if, following Article 2.1 of the Basel Convention and national legislation, none of the States concerned involved in a transboundary movement have determined that computing equipment destined for repair or refurbishment in the importing country is classified as wastes. In such circumstances the voluntary notification procedure (Appendix A), or the decision tree (Appendix B) should be considered by the countries involved to ensure that such movements are being monitored, and the importing country is given an opportunity to react (consent, object, or identify conditions) to such movements.

6. Both procedures, the voluntary notification and the decision tree, as described in Appendix A and B respectively, should be subject to further review at specific time intervals in order to ensure that the objective of environmentally sound management is upheld and to reflect the knowledge and experience gained, including those from the proposed Partnership for Action on Computing Equipment (PACE) pilot projects.

7. The transboundary movement of collected computing equipment that has been tested and labelled or documented as suitable for reuse without further repair, refurbishment, or upgrading is outside the scope of the Basel Convention and applicable recommendations, and can be shipped as products as long as a reuse destination in the receiving country is assured and unless such equipment has been classified as hazardous waste by States concerned, or is otherwise restricted under applicable national law such as by a prohibition on import of such used goods by States concerned.

⁵ Ibid

Recommendations

8. A number of recommendations dealing with transboundary movement of used and end-of-life computing equipment are put forward:
- 8.1. All used computing equipment that has been collected should be first evaluated to determine whether it is suitable for direct reuse, reuse following repair or refurbishment, or for material recovery. Computing equipment that is suitable for reuse should be further tested for functionality and be labelled or have appropriate documentation and declaration of testing results (Appendix C), prior to any transboundary movement.
 - 8.2. When computing equipment destined for reuse is to be tested the test should utilize at minimum an effective test method to confirm that the equipment is fully functional⁶ and a battery test⁷ to determine to what extent they are suitable for reuse with or without repair, refurbishment or upgrading.
 - 8.3. Except as provided in paragraph 8.7, used computing equipment that has been collected but has not been evaluated and/or tested and labelled or documented as suitable for reuse is subject to Basel Convention procedures, unless it can be demonstrated that the end-of-life computing equipment is not hazardous using Basel Convention Annex I and Annex III characteristics.
 - 8.4. End-of-life computing equipment destined for material recovery and recycling (Basel Convention Annex IV B, or Appendix G 2 in this document) or final disposal (Basel Convention Annex IV A, or Appendix G 1 in this document) containing Basel Convention Annex I constituents are subject to Basel Convention transboundary movement controls, unless it can be demonstrated that the end-of-life computing equipment is not hazardous using Basel Convention Annex III characteristics.
 - 8.5. Where used computing equipment that has been evaluated and assessed to be likely suitable for reuse, possibly after repair, refurbishment or upgrading in the importing country has been classified as waste by at least one of the States concerned involved in their transboundary movement, the decision tree (Appendix B) should be used.
 - 8.6. Where used computing equipment destined for repair or refurbishment in the importing country are not classified as waste by any of the States concerned, a voluntary notification procedure (Appendix A), or the decision tree procedure (Appendix B) should be considered by the countries involved to ensure that such movements are being monitored, and the importing country is given an opportunity to react (consent, object or identify conditions) to such movements.
 - 8.7. The following shipments are normally considered outside the scope of these procedures and the Basel Convention unless the computing equipment is defined as or considered to be hazardous wastes under the Article 1.1b) of the Basel Convention, or unless restricted under applicable national law such as by a prohibition on import of such used goods by States concerned:

⁶ see chapter 3.1.11(i) of Guideline on Environmentally Sound Testing, Repair & Refurbishment of Used Computing Equipment

⁷ see chapter 3.1.11(ii) of Guideline on Environmentally Sound Testing, Repair & Refurbishment of Used Computing Equipment

- a) Collected computing equipment that has been tested and labelled or documented and declared as being fully functional⁸ and intended for direct reuse⁹ as per Appendix C.
- b) Shipments by individual customers of their own defective computing equipment under warranty or subject to a law allowing for a right of return of the equipment, for repair and refurbishment and where the same type or similar product is intended to be returned to the customer. This does not include equipment from take back programs.
- c) Batches of defective computing equipment under warranty that have been collected from individual customers or consolidated by manufacturers, original component suppliers, or their contractual agents, sent back to the manufacturer, original component suppliers, or their contractual agents, and for which the same type or similar product has been or will be returned to the customer,

Each such shipment must be accompanied by a customer invoice and/or other shipping document completed prior to the transboundary shipment, including the information contained in Appendix D.

- 8.8. When hazardous wastes/residues arising from the refurbishment/repair and/or material recovery/recycling operations from imported used or end-of-life computing equipment are to be sent back to the original exporting country or to a third country, the Basel Convention notification procedures are to be followed. As appropriate, these documents should include references to original documents to ensure effective tracking.
- 8.9. In situations where hazardous wastes/residues arising from the refurbishment/repair and/or material recovery/recycling operations are to be sent back to the original exporting country or to a third country, it is recommended that the contract between the exporter and importer specify details of the return of the hazardous waste, return dates and financial responsibilities.
- 8.10. All transboundary movements of used and/or end-of-life computing equipment should follow applicable transport rules.
- 8.11. Consistent with the PACE guidelines and report on ESM criteria, importing countries should take measures to establish an appropriate infrastructure to ensure that computing equipment which reach the final end of their lives are collected and recycled in environmentally sound facilities, be those located within or outside the country.
- 8.12. All transboundary movements of used computing equipment intended for refurbishment or repair and subsequent reuse should have proper packaging, to ensure protection of the asset value of the equipment as well as protection of human health and the environment during transport, see Appendix E.

⁸ **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.

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.

⁹ 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**.

Appendix A

Voluntary notification procedure

1. In cases where used computing equipment is sent regularly to the same repair, refurbishment or upgrading facility by the same exporter, and if there is no existing agreement between the exporter and the government authorities (importing and exporting countries), the exporter will provide a Statement of Evaluation and Intent to Reuse (“the Statement”) to the Governmental Authorities¹⁰ of the countries of export and import, and transit (if any), by means of e-mail, fax or other agreed method, prior to the departure of the shipment from the country of export. One Statement is sufficient for shipments within a defined time period of up to one year, or other time period as agreed by the parties involved.
2. In the case of single shipments of greater than five units of used computing equipment, or other quantity as agreed to by the parties involved (especially of trial shipments to a new repair or refurbishment facility), that have been evaluated and assessed to be likely suitable for reuse, the exporter will provide a Statement to the Governmental Authorities of the countries of export and import, and transit (if any), by means of e-mail, fax, or other agreed method, prior to the departure of the shipment from the country of export. In this case, the Statement would substitute an actual count of the shipment for a maximum count.
3. Statements, as described in paragraphs 1 and 2 above, would include the following:
 - (a) A commitment by the exporter that PACE guidelines will be followed and assurances that such shipments will be managed in an environmentally sound manner;
 - (b) A description of the shipment, in particular, content, maximum count and packaging;
 - (c) An indication of whether the information is for a single shipment or multiple shipments, and estimated frequency at which such shipments are to be exported;
 - (d) An indication of the proposed date of the first and the last shipment during the defined time period;
 - (e) Identification of the ports of export and import;
 - (f) Identification of and contact information (name, address and phone number) for the importer and exporter;
 - (g) A description of the evaluation used to determine that the used computing equipment in the shipment is suitable for reuse, possibly after repair, refurbishment or upgrading;
 - (h) Identification of and contact information (name, address, and phone number) of local persons associated with the importer and exporter who can provide any additional information about the shipment;
 - (i) Information on how residues and wastes arising from repair, refurbishment or upgrading operations will be managed.
4. All computing equipment, individually or in partitioned batches, must be appropriately documented with reference to the aforementioned Statement, or by other suitable method, so that recipients in the importing country are properly informed.

¹⁰ Governmental Authority means a governmental authority designated by a Party or Signatory to be responsible within such geographical area under the legal jurisdiction of the Party or Signatory as the Party or Signatory deems appropriate for implementing relevant rules and regulations and to receive information related to transboundary shipments of used computing equipment destined for reuse, possibly after repair, refurbishment or upgrading.

5. The Governmental Authorities should acknowledge by e-mail, fax or other agreed method the receipt of the Statement within the three calendar days, or other agreed time period, and should send that acknowledgement to the States concerned and to the exporter and the importer. After this time period has elapsed, any evidence of effective delivery of the Statement to the Governmental Authorities will be deemed as the acknowledgement date.

6. If the Governmental Authorities have provided authorization or have not responded within 14 calendar days from the acknowledgement date, transboundary movement may commence for the single shipment or the shipments within the period of time defined in the Statement. An updated Statement may be submitted at any time. However:

(a) If further information¹¹ is requested by the Governmental Authority of the State of export, import or transit, the shipment must not commence until the requested information has been provided;

(b) If the response indicates that there is no objection but suggests conditions, then the shipment may commence only after the necessary conditions have been taken into account.

7. The Statement is provided solely for use by the Governmental Authority and is not for disclosure to third parties if the statement is marked as business confidential.

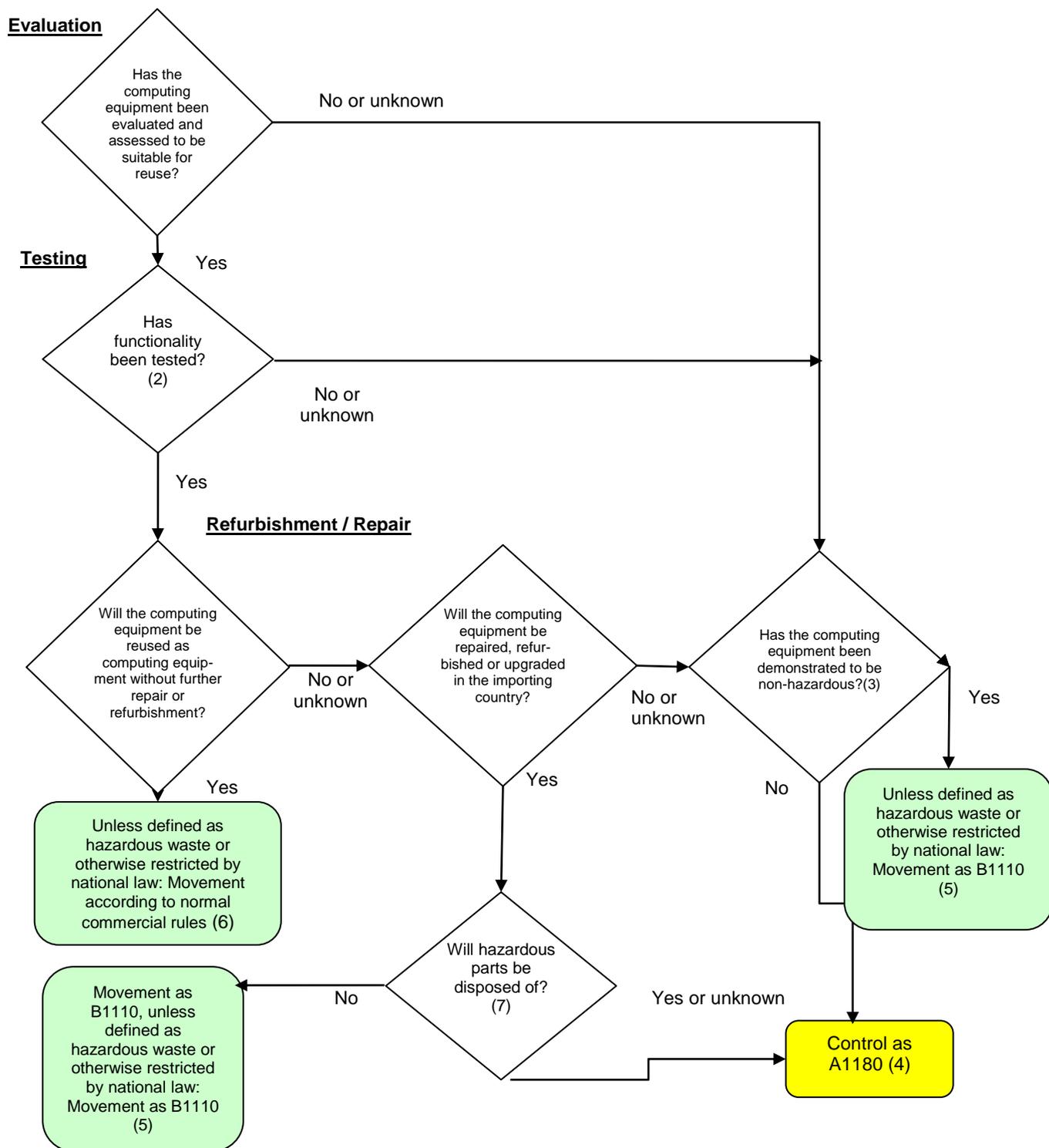
8. The content of this procedure should be reviewed at specific time intervals in order to ensure that the objective of environmentally sound management is upheld and to reflect the knowledge and experience gained, including those from the proposed PACE pilot projects.

¹¹ The request for such information may indicate that more stringent provisions are to be applied, like those of the Basel Convention.

Appendix B

Decision tree procedure

Decision tree for transboundary movements of collected used and end-of-life computing equipment (1)

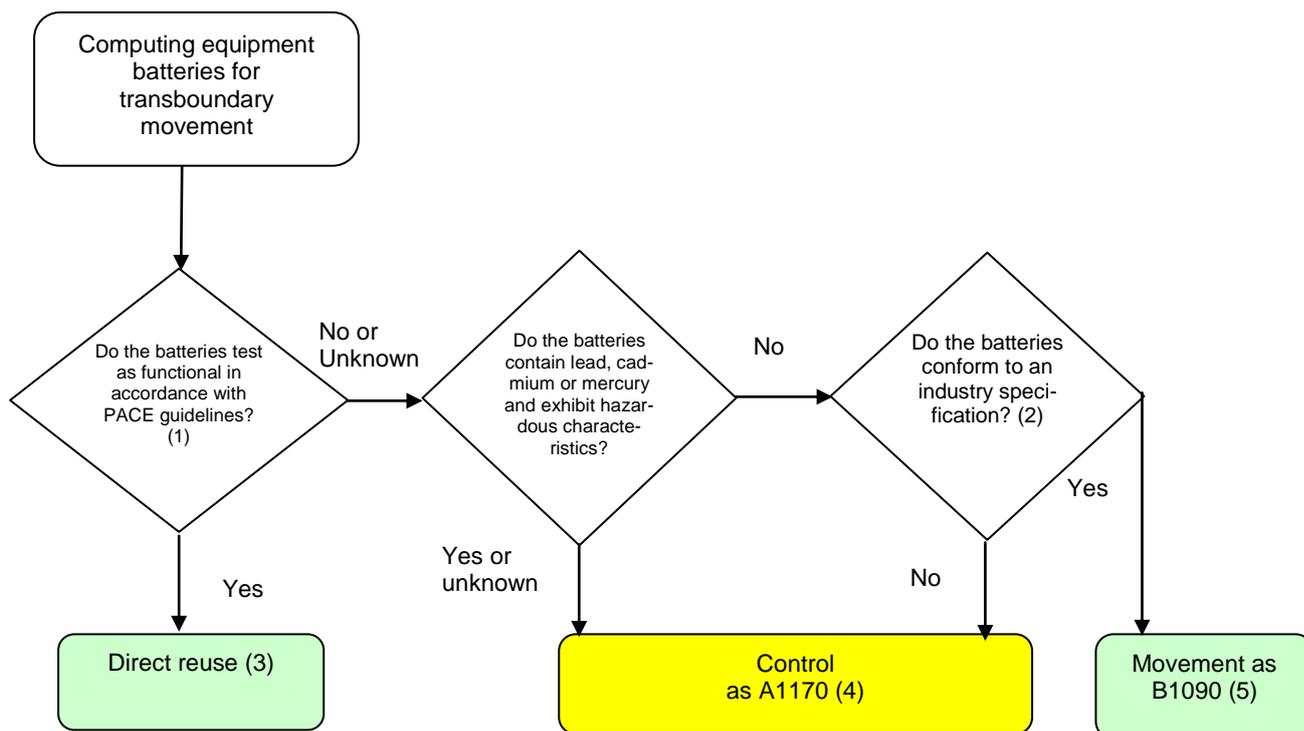


No. **Further recommendations and explanations**

- (1) Movement within OECD or European Union countries, subject to bilateral agreements, or those defined, as products under national legislation may not be subject to this procedure.
- (2) Results of evaluation and/or testing should be available through labeling or appropriate documentation (serial number referencing, or other suitable methods)
- (3) End-of-life computing equipment is hazardous if it contains Annex I constituents, unless it can be shown (through testing or other evidence) not to possess an Annex III characteristic. If batteries are present, they should be considered as part of the analysis (see the decision tree on transboundary movement of collected batteries).
- (4) The material should be controlled as hazardous waste under the Basel Convention. The code refers to the Annex VIII category. If one of the States concerned is not a Party, then a valid Article 11 agreement must be in place.
- (5) The material should not be controlled as hazardous waste under the Basel Convention, unless it is considered as a hazardous waste under Article 1.1.b by a Party or otherwise prohibited from importation by a State Concerned. The code refers to the Annex IX of the Convention. Exporters should nevertheless ensure there are neither export restrictions in place from the country or region of export nor import restrictions from the country of import applicable to these used computing equipment.
- (6) The material should not be considered as a waste, but rather as a commodity unless it is considered as a hazardous waste under Article 1.1.b by a Party or otherwise prohibited from importation by a State Concerned. Has the equipment or its constituents been defined as hazardous waste by the importing country under Article 1.1.b of the Basel Convention? Is there knowledge of other national or regional applicable restrictions? If so, then the equipment should be managed as A1180. Otherwise such equipment should be recorded and declared as being fully functional and intended for direct reuse utilizing Appendix C. Subsequently it can then be shipped using the commercial shipping codes found under the Harmonized Commodity Description and Coding System, including those codes listed under section 8471 for computers and accessories and those codes under section 8443 32 for printers. For computing equipment with batteries, those batteries should have been tested to determine whether they can hold an appropriate charge.¹²
- (7) If the repair, refurbishment or upgrading will not be conducted in compliance with the PACE guidelines or if components or parts of used computing equipment, involved in a transboundary movement, contain Annex I constituents and are untested, non functional, or are expected to be replaced, or otherwise likely to be destined, as a consequence of repair or refurbishment, to go to an Annex IV destination in the importing country, then shipments should be considered as a controlled hazardous waste shipments, unless it can be shown that the components or parts do not exhibit Annex III characteristics. The Governmental Authorities will make a determination as to the appropriate de minimis waste quantities and values (level of contamination) above which Basel Convention controls will be exercised. In Annex IX of the Basel Convention, the waste entry B1110 (“Electrical and electronic assemblies”) has two footnotes:
 1. “In some countries, these materials (used computing equipment) destined for direct reuse are not considered wastes.”
 2. “Reuse can include repair, refurbishment or upgrading, but not major reassembly” in the importing country.

¹² "Appropriate charge", see chapter 3.1.11 (ii) of Guideline on Environmentally Sound Testing, Repair & Refurbishment of Used Computing Equipment

Decision tree for transboundary movements of collected computing equipment batteries



No. Further recommendations and explanations

- (1) In order to determine whether a battery should be considered suitable for reuse and be considered non-waste it should be tested as described in the PACE guidelines to determine whether it can hold an appropriate charge.¹³
- (2) All computing equipment battery shipments should be sorted and/or pre-treated to meet appropriate national or internationally recognized specifications.
- (3) If the battery has been tested, as described in the PACE guidelines, to determine whether it can hold an appropriate charge and has passed the test,¹⁴ then it is considered a commodity and not a waste. Such batteries should be recorded and declared as being fully functional and intended for direct reuse utilizing Appendix C.
- (4) If the battery shipment does not meet the conditions of not containing lead, cadmium or mercury and does not conform to appropriate national or internationally recognized specifications, it should be controlled under the Basel Convention. The number here refers to Basel Convention Annex VIII hazardous waste category. If one of the States concerned is not a Party then a valid Article 11 agreement must be in place.
- (5) The number here refers to the Basel Convention Annex IX hazardous waste category. Exporters must nevertheless ensure there are neither export restrictions in place from the country or region of export nor import restrictions from the country of import applicable to that Annex IX category.

The content of this decision tree procedure should be reviewed at specific time intervals in order to ensure that the objective of environmentally sound management is upheld to reflect the knowledge and experience gained, including those from the proposed PACE pilot projects.

¹³ "Appropriate charge", see chapter 3.1.11 (ii) of Guideline on Environmentally Sound Testing, Repair & Refurbishment of Used Computing Equipment

¹⁴ Ibid

Appendix C

DECLARATION OF TESTING AND DETERMINATION OF FULL FUNCTIONALITY AND REUSE DESTINATION OF EXPORTED USED COMPUTING EQUIPMENT

Information to be provided on testing

Consignor/Holder (responsible for testing): Name: Address: Phone No: E-mail:	Exporter (if different than Consignor): Name: Address: Phone No: E-mail:	Carrier Name: Address: Phone No: E-mail:
Importer Name: Address: Phone No: E-mail:	User, Retailer, Consignee (if different than Importer): Name: Address: Phone No: E-mail:	Country of Export: Country of Import:
<p>Declaration:</p> <p>I the legal holder of the below listed computing equipment hereby declare that prior to export the used computing equipment in this shipment, listed below, was tested after it was removed from service, or after it was repaired/ refurbished, and is in good working condition and fully functional¹⁵. I confirm that this equipment is being imported for the purpose of direct reuse¹⁶ and not for recycling, or final disposal.</p> <p>Name: _____ Date: _____ Signature: _____</p>		

Type of Equipment ¹⁷	Model #	Serial # (if applicable)	Year Manufactured	Date of Testing	Type of Tests and Comments

¹⁵ **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.

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.

¹⁶ 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**.

¹⁷ List all equipment in the shipment and identify types of whole equipment such as: PC, laptop, printer, scanner, etc. Component parts such as: circuit board, memory, hard drives, power supplies, or batteries can be sent in the batch without the details, required in columns 2 and 3, but still will need to be tested.

Appendix D

INFORMATION ACCOMPANYING SHIPMENTS OF COMPUTING EQUIPMENT RETURNED UNDER WARRANTY, OR OTHERWISE EXCLUDED FROM CONTROL PROCEDURES (RECOMMENDATION 8.7)

1. Person who arranges the shipment/Exporter: Name: Address: Contact person: Tel.: Fax: E-mail:	2. Importer Name: Address: Contact person: Tel.: Fax: E-mail:	3. Consignee/Receiving Facility (if different than Importer) Name: Address: Contact person: Tel.: Fax: E-mail:	4. Description of the Shipment/Reasons for Shipments: <input type="checkbox"/> warranty returns or subject to a law allowing for a right of return (8.7 (b)) <input type="checkbox"/> batches under warranty or subject to a law allowing for a right of return (8.7(c))
5. Actual quantity/volume:		6. Actual date of shipment:	
7. (a) First Carrier¹ Name: Address: Contact person: Tel.: Fax: E-mail: Means of transport: Date of transfer: Signature:	7. (b) Second Carrier Name: Address: Contact person: Tel.: Fax: E-mail: Means of transport: Date of transfer: Signature:	7. (c) Third Carrier Name: Address: Contact person: Tel.: Fax: E-mail: Means of transport: Date of transfer: Signature:	
8. Countries/States concerned:			
Export/dispatch	Transit		Import/destination
9. Declaration of the owner of the equipment: I declare that the used computing equipment in this shipment is defective equipment being returned to the manufacture, original component supplier or its contractual agents as the result of a warranty, or pursuant to a law allowing for a right of return. Name: _____ Date: _____ Signature: _____			
10. Declaration of the person who arranges for the shipment/exporter: I declare that the above information is complete and correct to the best of my knowledge. Name: _____ Date: _____ Signature: _____			
TO BE COMPLETED BY THE RECEIVING FACILITY			
11. Shipment received at the receiving facility: <input type="checkbox"/> Quantity/volume received: Name: _____ Date: _____ Signature: _____			

¹ If more than three carriers attach information as required in blocks 7(a), (b) and (c).

Appendix E

PACKAGING GUIDELINES

The following guidelines may be used to distinguish proper packaging from improper packaging for computing equipment and components destined for direct reuse or reuse.

For shipments¹⁸, the following packaging guidelines would apply in order to help preserve the value and reusability of the equipment, and represent only one criterion among others to help distinguish waste from non waste:

- Each piece of computing equipment should be protected with cushioning material appropriate to preserve asset value (e.g., bubble-wrap, packaging foam).
 - **Laptops** and their chargers should be packed together in boxes reasonably fitted to the unit.
- **Cables, keyboards and mice** should be packed in separate boxes.
- Stacked layers of **computing equipment** should be separated by appropriate intermediate packaging to preserve asset value (e.g., cardboard, bubble-wrap, packaging foam), and shrink wrap should be used to secure shipments to pallets.
- Stacking of equipment should be no more than as follows:
 - **Display devices** – 4 layers only, unless 17” (43.2 cm) or larger, in which case 2 layers; flat panel displays should be stacked vertically;
 - **Desktop PCs** – 15 layers;
 - **Laptops** – 5 layers stacked vertically; and
 - **Printers** – 5 layers.
- **Batteries** – should be packaged in a way to avoid contact with their terminals, to avoid short circuits and fires;
- **LCD backlights** – Due to their fragile nature, where removed, LCD backlights should be individually packaged in a rigid container that prevents breakage during the transport and should also be sealed in a foil laminated bag in case of any breakage during the transport. In general, removing and packaging LCD backlights for reuse is a specialist activity generally to be undertaken by professionals with detailed knowledge and experience of handling these hazardous components.
- Each load should be properly secured to the pallet (e.g. with plastic shrink-wrap).

Small, individual items of computing equipment should be packed in a box, properly encased with cushioning material, and include sufficient fill to prevent movement. For multiple items within the same box, each part should be separated with appropriate intermediary packaging. Boxes should be suitable for the length and type of shipping being used. Where pallets are used, boxes should be secured to pallets using shrink wrap or other means.

¹⁸ These provisions are in addition to applicable requirements under the UN Recommendations on the Transport of Dangerous Goods (i.e., UN Orange Book): Model Regulations, 15th revised edition, 2007, or later version.

Appendix F

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, or Appendix G 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 G 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 (Appendix G 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).

Recycling: Relevant operations specified in Annex IVB of the Basel Convention (Appendix G 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 G

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 of 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