E-Waste Collection Solution Guidance

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This solution and guidance material has been developed with the contribution of Innovation Norway for the IOM E-waste Project. The IOM E-waste Project focuses on creating a circular economy for e-waste in displacement settings. Solvoz developed various solutions to support sustainable procurement practices, focusing on the procurement aspect of the e-waste value chain to green humanitarian responses. As part of the Project, Solvoz has developed sustainability and circularity criteria for several product types and services, in consultations with numerous humanitarian and private actors. This is one of the outcomes of this partnership.

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1 E-Waste Collection Service

1.1 Guidance for E-waste collection Service

The following guidance provides technical specifications and information for the contracting of an e-waste collection service in displacement settlements, and it is targeted at the organisations that run and organise such settlements. E-waste collection must be separated from other general solid waste management plans due to its toxic nature and its potential economic value. Collected e-waste must be handed to an authorised e-waste treatment facility or e-waste recycler. The following describes the expected services provided by the contracted party.

1.1.1 Facilities

The service provider will need to provide a range of facilities for the collection of waste. This includes reception centres, central depots for the sorting and temporary storage of waste before onward travel, and reception centres for the e-waste if exchanged with a gate-fee. In a large-scale displacement settlement, it is recommended that each zone has an e-waste reception centre so the e-waste collection is accessible for all the population of the settlement.

Alternatively, repair shops can serve as e-waste collection points (or reception centres) by following the current guidance and develop a repair-and-sell business model as briefly described in Section 1.1.7.3.

1.1.1.1 Reception of e-waste

E-waste reception requires a desk and a scale to weigh the quantity of e-waste handed in. Personnel of the e-waste collection point must receive the e-waste, weigh the quantity, pay for the e-waste brought, and register incoming e-waste types and quantity.

The service provider must have a roofed structure for the e-waste collection point with sufficient storage space to store collected e-waste and keep the necessary equipment for the operation. The structure should be secure and allow for the temporary storage of e-waste before moved on to central collection points.

1.1.1.2 Storage space for e-waste

The service provided needs to provide facilities that are safe and secure and cannot endanger the community. The storage area should be sheltered against rainfall and direct sunlight with lifted floor to avoid the direct contact with bare soil. Collected e-waste can be stored outside if they are contained in a water-proof and covered bin to protect the e-waste from direct exposure to bare soil, weathering, and sunlight.

All batteries must be removed from all EEE before storage and stored separately. Rechargeable batteries should be stored on racking outside the collection point in a secure, cool, well ventilated, dry storage area and away from sources of heat including direct sunlight.

1.1.1.3 E-waste bins

Collected e-waste should be classified by type and separated where possible into different bins. E-waste can be classified for example as reusable/repairable (to repair shops) or can be

used by repair shops to provide spare parts). Waste can also be sorted by the type of materials based on the metals and components that can be sent to a scrap dealer or recycler.

1.1.1.3.1 Unattended bins

If e-waste is to be collected without a gate-fee, several collection points can be installed throughout the displacement settlement to facilitate their accessibility. The e-waste collection bins should be from durable and impermeable material (i.e., thick plastic) with cover to protect it from weathering and toxic run-off from rain events. The community must have an open access to the e-waste bins, but it is recommended are protected from vandalism and theft.

Clear culturally appropriate signage is necessary to ensure the right type of waste is collected in each bin. It also necessary to ensure the service provider communicates the use and location of bins to the community. The service provision should empty the bins on regular basis and maintain the bins.

1.1.1.4 Security

The service provider must ensure that all equipment and e-waste should be properly secured after business hours.

1.1.2 Type of e-waste -waste to be collected

There should be a clear agreement between the organisation contracting the service, service provider and community what type of e-waste and materials will be received at the collection point. E-waste collection point may accept all electrical and electronic equipment (EEE) such as torches, solar lanterns, and mobile phones. In addition, it makes economic sense to collect metal scraps using the e-waste collection system.

1.1.3 Sorting of collected e-waste (optional)

The e-waste collection point should have a space for workshop for dismantling the collected EEE to increase the economic value of the waste. Dismantling of EEE must be done with care in a well-ventilated area, and dismantling staff must be fully protected with gloves, security goggles, and appropriate cotton clothes. Dismantled EEE must be sorted for the following items:

- PCBs (printed circuit board),
- cables,
- metals,
- plastics,
- glass,
- batteries

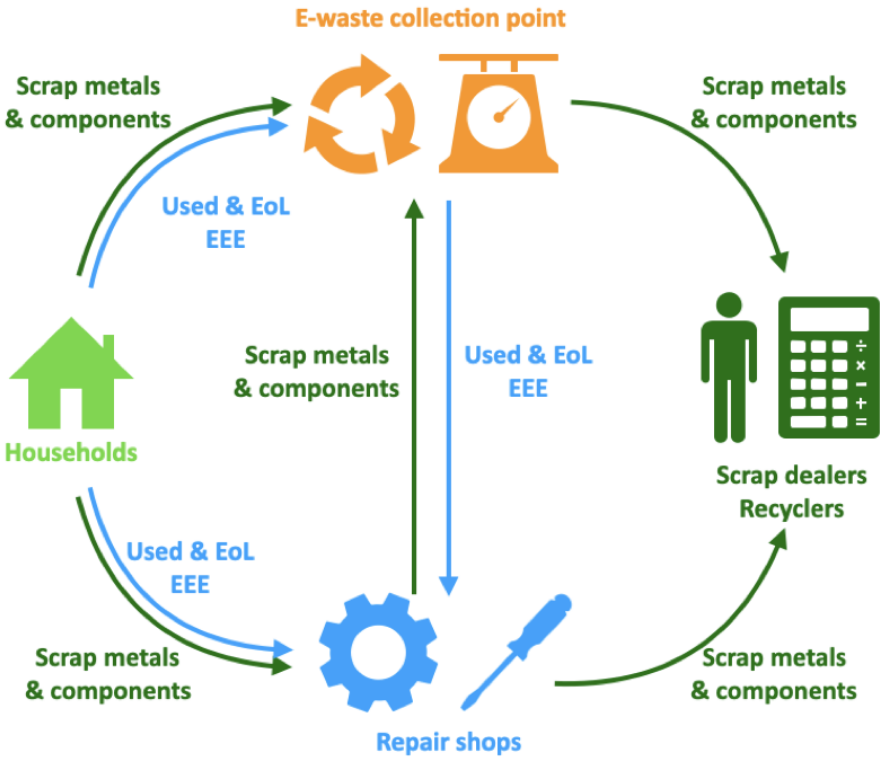
It is possible to trade unsorted e-waste with local scrap or e-waste dealers although unsorted e-waste generally will have less economic value.

1.1.3.1 PPE requirements

PPE (personal protection equipment) must be available in a dismantling workshop and PPE must be used for all dismantling jobs as the level of toxicity of e-waste is unknown. Basic PPE includes gloves (protect against heat or cuts) and googles. If a thermal treatment for de-soldering is needed, wear face masks to protect against inhaling harmful particles.

1.1.4 Destination of collected e-waste

Collected EEE must be visually inspected first at the collection point. Most undamaged EEE can be sold to local repair shops to give a second life if repairable. Non-repairable EEE must be sold to scrap dealers or a recycling company. The general flow of items is described in the diagram below. It is good to agree with the service provider what are the onward flow of e-waste collected will be utilised by downstream users of waste in a sustainable way.



1.1.5 E-waste incentives

Providing an economic incentive for people to bring e-waste to a reception centre can greatly improve the amount and quality of e-waste collected. Waste brought by the population is normally remunerated based on the weight and type of e-waste. The rate of renumeration where possible should be calculated from the local e-waste trade values.

Where subsidies are provided to the service provider for the collection of e-waste and where agreed incentives are to be paid to community members for e-waste, then it is important to track and verify the collection of e-waste and incentives paid to community members. The organisation contracting the service should independently monitor the incentives being paid to the community and the volumes of collected e-waste.

1.1.6 Administration

The service provider should be able to keep basic paperwork, tracking in-coming and out-going e-waste, tracking the account, and being available to receive e-waste from displaced population on regular basis (business hours must be communicated publicly to the population). In-coming and out-going e-waste must be clearly documented and

communicated to the service contractor and the following information such as date, name of the person who brought the e-waste, the types of e-waste received and their weight, the operations carried out if dismantled or sorted, the incentive being paid for the e-waste, to whom the e-waste was handed out to (out-going e-waste), and the signature of the person who received the e-waste.

Example of in-coming e-waste registration format:

Date	Name	Tel N°	Type of e-waste	Weight of e-waste	Payment paid	Received by:(name)

Example of out-coming e-waste registration format:

Operation (repair, dismantling, sorting)	Date	Name of operator	Valuable components	Weight of the valuable components	Sold to: (person or company name)	Payment received

1.1.7 Monitoring and the e-waste collection service

The service contracting organisation should monitor the e-waste collection service on a regular basis in order to confirm activities are in accordance with agreed activities and volume of waste collected and distributed is properly documented. Agreements should ensure that the buyer has oversight of the administration related to the contract and is provided with regular reports.

1.1.8 Financial models

E-waste collection point will buy e-waste or provide economic incentives to encourage the displaced population to bring in their e-waste. Although brought-in e-waste can generate some money by selling the collected (and sorted) e-waste to a local scrap dealer or a recycler, it will likely need supplementary subsidies to operate correctly.

If e-waste collection service is expected to self-finance in a long term, the service provider must explore different business models during the period of the service contract. There are some potential financial models for commonwealth programs as described below. It is recommended to consider all the models to combine the self-funding capacity to operate e-waste collection points in a sustainable and responsible manner.

1.1.8.1 CSR (corporate social responsibility) funding model

The managing entity of the e-waste collection point or the organisation who mandates such an entity to operate in a displacement settlement can be entitled to search for a private company (mostly a manufacturer of EEE) who is willing to finance the necessary equipment and the operational fees of the e-waste collection point. In this case, the e-waste hand-in renumeration can be set at the local trading rates of e-waste.

1.1.8.2 EPR (extended producer's responsibility) funding model

The organisation who procures a large volume of EEE such as solar lanterns to distribute to the displaced population will oblige the supplier to pay fees of the e-waste collection point including the necessary equipment and the operation fees. The duration of the displacement settlement operation is an unknown factor, so the managing organisation must contribute to subsidise the operations of e-waste collection points. In this case, the e-waste hand-in renumeration must be less than the local trading rates to partially finance the operation fees of e-waste collection points.

1.1.8.3 Repair-and-sell model

The managing entity of the e-waste collection point can fund their own activities by combining the economic trading of the collected e-waste and repairing the broken products to sell them as second-hand products directly to the population. In such a case, repair training must be provided by the service contractor or other organisations to improve the skills of service providing entity.

1.1.9 Sustainability guidance

E-waste must be seen as toxic waste, so its collection will prevent the population from exposure to the toxic materials and the potential environmental pollutions. However, such activity must be carried out correctly to avoid undesirable consequences so that it will be responsible and sustainable in a long term.

1.1.9.1 Interdiction of dangerous practices

E-waste segregation practices and dismantling to extract recyclable materials can be dangerous. Following activities must not be practiced:

- Disassembly of rechargeable battery cells
- Burning of e-waste and/or its components
- De-soldering the lead-containing solder

1.1.9.2 Safe storage of dangerous goods

Most e-waste contains toxic materials, so the collected e-waste must be safely stored in covered containers. It is particularly the case for the storage of single-use and rechargeable batteries. Batteries should be completely discharged if possible, and stored in a well-ventilated and dry area. They should be stored away from direct sunlight, heat sources, and water. Batteries should be stacked so that they're stable and won't be damaged. It is recommended to develop an emergency action plan in case of fire.

1.1.9.3 Repair practices

Collected e-waste must be inspected for the possibility that it can be repaired. If the repair activity is not a part of business model of the service provider, they are recommended to partner with local repair shops to reduce the quantity of e-waste and extend the product lives of broken products.

1.1.9.4 End-of-life waste management

The service provider must have a written contract with local e-waste management entity to assure the end-of-life of collected e-waste. If there is no e-waste management entity in the surrounding environment then the contracting organisation, relevant authorities and community should discuss actions that can be taken for the safe disposal of waste.

1.1.9.5 Local service provider

It is strongly recommended to procure a service provider locally to enhance the local economy and livelihood. In addition, locals know better the surrounding context and can quickly implement partnerships with repair shops, scrap dealers and e-waste management facilities.

1.2 PROCUREMENT GUIDANCE

The procurement guidance for E-Waste collection service providers will consider the procurement of services.

When searching for service provider, the buyer will consider the social, ethical, environmental and economics elements.

Those considerations should be judged in the following:

- Service provided and clear visibility on the waste treatment
- Application of sustainable principles by suppliers (CSR responsibilities)
- Economic evaluation (waste pricing mechanism)
- Monitoring mechanism for the service provided

For each part, the guidance provides clear advises and will help the buyer team to develop the award process with recommended supplier selection criteria and weighting system. An example of the weighting and evaluation criteria is available in Annex 6.

1.2.1 Service provision

The requirements for service provision will provide the key criteria for supplier selection. Section 1.3 lists the possible technical specifications and information for the contracting of an e-waste collection service.

The buyer needs to have a transparent information and clear understanding on the waste management process at the downstream part even if the provider act as a waste collector and not as a waste management in a whole.

Key to any agreement is the clarification of those different elements, responsibilities of both parties, vendor and contractor and related costs and expected service level.

1.2.2 Supplier qualification and sustainability

In this part we advise the way to assess sustainability related to e-waste service providers, their ethical and social responsibilities and their compliance to commercial activities.

In general, e-waste collection service providers may not have the same qualifications as general product suppliers. The following is guidance checks that should be made on the supplier.

1.2.2.1 Registration

The supplier should have an active business registration in its country of operation. The business registration in most countries can be checked against publicly available databases. Similarly, a tax registration for value added taxes (VAT) or goods and services taxes (GST) should be registered to the supplier. This will ensure the buyer organization can deduct taxes if where possible as a charitable organization.

1.2.2.2 Financial audits and outstanding obligations

The buyer should request the audited financial statement of the supplier and information on its major suppliers and customers. A financially secure supplier with many customers is likely to be a lower risk partner to engage with. Service provider with significant outstanding obligations, debt or significant commitments for large contracts compared to the size of the company also pose a risk.

1.2.2.3 Litigation

Companies that are involved in litigation proceedings may pose a risk in being able to fulfil their obligations as well as offer an insight into the organization's reputation.

1.2.2.4 Code of conduct and certification

Many E-waste collection service providers in low- and middle-income countries do not apply for certification due to cost or accessibility to certification processes. Service providers typically will not have the resources to undertake certification processes. Buyers can support local organizations by not disqualifying them immediately due to a lack of certification and instead support the assessment of the service provider by the inclusion of criteria in the supplier evaluation that directly assess sustainability and ethical practices of the vendor.

Where service provider is of a larger size then certification and signing onto the codes of conduct maybe relevant to include. There are a number of codes of conduct and standards related to human rights, labor rights, the environment, and anti-corruption; that they roughly fall into roughly three categories:

- Voluntary registration to codes of conduct and practice
- Independent bodies certification and audits
- Buyer assessment or audits

Service provider can demonstrate their intent to be a sustainable organization by voluntarily signing up to a recognized charter, standard or code of conduct. Service providers with engagement in sustainable management can also be found in the UN Global Compact database. The code of conduct clarifies the expectation of suppliers and buyers in terms of human rights, labor, environment, and anti-corruption measures. This includes amongst other principles, no forced or child labor, security and safety of workers, proper wages and benefits, rules on bribery or highlight conflict of interest.

Independent certification normally recognizes independent auditors or conduct audits themselves. The most well-known certification are “Ecovadis”, “B-Corp” or ISO 26000. These certifications are obtained for a fixed period and undertaken by an independent auditor and describe the level of sustainability of the organization.

1.2.2.5 Supplier reputation

An important objective for all buyers is to create savings through their purchasing decisions. Equally important in the decision is to ensure that the service provider that you engage with is a good actor. You should always ask who the buyer’s main clients are and ask for references and follow up. Similarly asking for recommendations in varied networks to identify good service providers and understand the operation of the market.

To give some examples of a good actor; a good supplier complies with good labor practices and human rights, does not harm the environment, its ownership is transparent (company

directors and investors) and the company is not subject to contravening any embargoes and/or sanctions.

There are a number of databases that are searchable related to corporate and social responsibility, sanctions lists and transparency of companies. A suggested list of databases and relevant guidance can be found in Annex 7. It is always as minimum useful to search online (google the company) in the relevant languages to check the background of the organization.

1.2.3 Economic criteria

Prioritising local service provider should be considered when selecting the vendor for obvious operational convenience and reducing the environmental logistics footprint while supporting local economies.

When considering E-waste collection service provider selection and costs related, there are several elements to take into account:

- Residual value per type of waste
- Cost of the collection and sorting
- Agreement on incentive for collection
- Any other costs related to service of e-waste collection activities

1.2.4 Agreements

In general, an e-waste collection service provider agreement duration is 1 year. Longer is the contract, better it is for both parties. The benefits would be the easiness of the waste collection process and the habits to incentive process and collection points location.

When defining an agreement, both parties need to stipulate:

- Type of e-waste covered by the contract
- Extent of responsibilities to avoid ambiguity by both parties
- Expectation from the buyer (segregation of accepted e-waste, the collection locations)
- Expectation from the e-waste collection service provider (correspond to above criteria defined in section 4.1.)
- Price / duration / terms of payment / monitoring mechanism
- Invoicing and payment

1.2.5 Monitoring mechanisms

In order to monitor the e-waste collected and so the related invoices (residual value), a mechanism needs to be established and applied by both parties.

The contractor needs to segregate the accepted e-waste and deliver to the accepted collection locations.

The service provider needs to have a clear weighting system at the point of reception to evaluate the residual value of the waste.

This mechanism provides a clear understanding of the process and the validation of payment process.

1.3 Solution Example: E-waste collection service for displacement camps

1.3.1 Description:

The following solution is for organizations and suppliers needing to contract an e-waste collection service in displacement camps to avoid scattering of e-waste which is potentially toxic to human health and the environment. The e-waste collection service will remove broken electrical and electronic equipment from the household which protects children from accidental toxic exposure. In addition, the collected e-waste could yield economical value and facilitate the transaction with hosting communities.

The solutions detail the key criteria for the e-waste collection service. These are summarised in the criteria tab and guidance on these criteria is attached. The following main criteria should be considered as a basis for a service contract.

1.3.2 Criteria Quality/functional

Criteria	**Values**
Locations	E-waste reception center / Fixed e-waste bins
E-waste reception center	Storage space / E-waste bins / Security
Equipment	Desk / Weighing scale
Administration	Equipment / Register book
Monitoring	Monthly site visit / Reporting
Types of e-waste to be collected	Torches / Solar lanterns / Mobile phones / IT equipment / Other electrical equipment
Sorting of e-waste (optional)	Dismantling capacity / PPE requirements /
E-waste hand-in incentives	Subsidized by contracting organisation / self-financing

1.3.3 Criteria sustainability

Criteria	Values
Interdiction of dangerous practices	Disassembly of rechargeable batteries / Burning cables / Burning PCBs
Safe storage of dangerous goods	Storage space / Covered containers / Ventilated battery storage
Repair practice	Repair activity / Repair training / Repair equipment
End-of-life waste management	Waste management contract
Local service provider	Community-based company Local company

1.3.4 Prerequisites

Prerequisite	Description
Interdiction of dangerous practices	Collected e-waste should be treated safely. Dangerous practices such as disassembling rechargeable batteries, burning of e-waste and/or its components to extract valuable materials must not be allowed.
Safe storage of dangerous goods	E-waste must be stored correctly to avoid rain run-off and direct sunlight. If possible, batteries must be removed from e-waste. Batteries should be stored in a well-ventilated and dry area. They should be stored away from direct sunlight, heat sources, and water. Batteries should be stacked so that they're stable and won't be damaged.
Waste management	E-waste (sorted or unsorted) must be handed to recyclers and/or authorised e-waste management company.

Registration and VAT/GST	The service provider should have an active business registration or organization registration in its country of operation. The business or organization registration in most countries can be checked against publicly available databases. Similarly a tax registration for value added taxes (VAT) or goods and services taxes (GST) should be registered to the supplier depending on its status. This will ensure the buyer organization can deduct taxes where possible if registered as charitable organization.
Monitoring and reporting obligations	The contracting organisation should conduct regular monitoring of the e-waste collection activities to ensure that the e-waste transaction is correctly handled. In addition, the quarterly reporting based on the registry book must be presented to the contracting organisation.

1.4 Reference

Schleicher, et. al.: An efficient & effective e-waste collection system for Ethiopia (2015)

Balasubramanian, et. al.: Off-Grid Solar E-waste: Impacts & Solutions in East Africa (2020)

Clast: Innovations and lessons in solar e-waste management (2021)

GIZ: End-of-Life management of batteries in the off-grid solar sector (2018)

WHO: Children and digital dumpsites (2021)

GIZ: Baseline assessment on electronic waste management and extended producer responsibility in displacement settings in Ethiopia, Kenya, Uganda (2021)

STEP: Business plan calculation tool for manual dismantling facilities (2016)

International Labour Organisation: Decent work in the management of electrical and electronic waste (e-waste) (2019)

https://www.maine.gov/dep/waste/ewaste/tvcomputerguidelines.html

STEP: Developing legislative principles for e-waste policy in developing and emerging countries (2018)

APPENDIX 1 SUSTAINABILITY CRITERIA

TOXICITY

The danger of toxic substances in electric and electronic products is widely recognised. The proposed sustainability criteria integrate the most acknowledged standards as criteria. However, the trend to avoid any level of chemical hazard will continue, and it is highly recommended to replace the traditional plasticisers, flame retardants and process chemicals by safer alternatives. GreenScreen® provides detailed up-to-date information on safer chemicals. The list of most commonly used chemical groups in electric and electronic products are provided by TCO certification as TCO Certified Accepted Substance List:

https://tcocertified.com/industry/accepted-substance-list/

Criteria and definitions

Electrical and electronic equipment and its spare-parts

Criteria	Definitions	Source
Complies with EU's RoHS Directive*	Conformance to RoHS Directive: heavy metals (Pb < 1000 ppm, Hg < 1000 ppm, Cd < 100 ppm, Cr(VI) < 1000 ppm), brominated flame retardants (PBB < 1000 ppm, PBDE < 1000 ppm), PVC softener for wire insulation (DEHP < 1000 ppm, BBP < 1000 ppm, DBP < 1000 ppm, DIBP > 1000 ppm).	NSF/ANSI 457 - 2019
List of declarable substances as specified by IEC 62474**	Manufacturer shall list the presence of IEC 62474 declarable substance groups and declarable substances in the product at or above the reporting threshold amounts stated in the IEC 62474 Standard.	NSF/ANSI 457 - 2019
Contains minimum allowable halogens in electric wires	Avoidance of electric cables containing halogenated compounds. Level of chlorine or bromine greater than 5000 ppm, or fluorine greater than 1000 ppm, based on the test method IEC 62321-3-1 and IEC 62321-3-2.	NSF/ANSI 457 - 2019
Contains minimum allowable halogens in plastics	Avoidance of halogenated compounds in plastic parts exceeding 25g. Level of chlorine or bromine greater than 5000 ppm, or fluorine greater than 1000 ppm, based on the test method IEC 62321-3-1 and IEC 62321-3-2. Exemptions for printed circuit boards.	NSF/ANSI 457 - 2019

* Annex 1 provides the basic information on EU's RoHS Directive.

** Annex 2 provides IEC 62474 listed substance information.

Batteries

Criteria	Definitions	Source
Contains minimum level of heavy metals	No more than 0.0005% (5 ppm) of mercury by weight and no more than 0.002% (20 ppm) of cadmium by weight.	EU Battery Directive***
Components with heavy metals clearly marked	Batteries with more than 40 ppm lead, 20 ppm cadmium or 5 ppm mercury must also be marked with the chemical symbol for the metal. Exemptions for fire alarms.	EU Battery Directive***

*** Annex 3 provides the basic information on EU's Battery Directive.

RECYCLABILITY

End-of-life product components can provide a valuable resource to produce a new product by means of recycling. Most commonly recycled materials on the African continent are metals and plastics. Metals have infinite recycling capacity whereas plastics have finite recycling capacity due to the degradation of polymerisation. In addition, metal recycling can take place at a very small and a local scale as small and affordable electric smelters are omnipresent on the African continent. However, recent movement on the contient allows simple plastics such as PET, PE, and PP (sometimes PS) to be recycled as post-consumer resins. The plastic recycling companies and the types of recycled polymers in African are listed (non-exhaustive list) in the website of ENF Recycling:
https://www.enfrecycling.com/directory/plastic-plant/Africa

Criteria and definitions

Criteria	Definition	Source
Recycled materials used	Manufacturer shall declare the minimum percentage by weight of recycled content in the product and for each of the components as applicable. NSF 457-2019-1 (Article 6-1-1)	NSF/ANSI 457 - 2019
Product components' materials labelled if recyclable	Plastics shall be classified and indicated according to the ASTM International Resin Identification Coding System.	NSF/ANSI 457 - 2019

End-of-life Management

E-waste is an emerging problem worldwide. The humanitarian interventions shall not leave such waste as a negative heritage to the places of interventions as such waste contains hazardous substances that can endanger the human health and the environment. In most developing countries, the capacity to properly treat e-waste exists locally even if limited.

In order to assure the proper treatment of e-waste, international cross-sectorial partnership is necessary. Such a partnership involves manufacturers, suppliers, humanitarian organisations and agencies, as well as the local waste treatment actors, and the integration of the end-of-life management requirement for the humanitarian procurement of electric and electronic products is recommended.

Criteria and definitions

Criteria	Definition	Source
End-of-Life product take-back scheme available	Manufacturers shall provide a nationwide product take-back service for recycling and disposal.	NSF/ANSI 457 - 2019
Service contract with local waste management company	Manufacturers shall contract a local company for the disposal of end-of-life products.	

Reparability

Reparable products contribute significantly to reduce environmental impacts and to develop local economy. The main objective is to provide multiple life stage to a product before reaching its end-of-life by designing the product that facilitates repairing and repurposing. The introduction of reparability in the product design is rather a new concept. Most vigorous effort was taken by France where Reparability Index (measurable indicator) as a consumer indicator was officially introduced to five categories of electronic equipment (smartphones, laptops, televisions, washing machines and lawnmowers) since 2021.

The reparability category of Sustainability Criteria has two sets of criteria; mandatory and recommended, to accommodate manufacturers to adapt in steps. In open-access space, organisations such as ifixit.com provide repair manuals of various electronic equipment. The use of such open-space knowledge database is strongly encouraged particularly for the products procured by humanitarian and aid organisations as it will allow the sharing of repair know-how for those who are remotely located.

Mandatory criteria and definitions

Criteria	Definitions	Source
User manual with trouble shooting guidance available	Manual should be in language(s) accessible to the target population, language level relevant to target group and contain graphic content for ease of use and understanding.	IEC 45554:2020
Availability of spare parts	IEC 62550:2017. Or whereas spare parts are defined as part which can replace a faulty, failed or worn-out replaceable part, the supplier must provide information on the list of spare parts with specifications	IEC 45554:2020

	and how to obtain them. All parts listed in « Frequently replaced parts » must be available as spare parts. If a special tool is required to replace a spare part, such a tool must be provided with the spare part.	
Frequently replaced parts listed	Parts list should provide sufficient information on parts specification to support sourcing.	IEC 45554:2020
Repair manual**** available	Manual should be in language(s) accessible to the target population. The repair manual contains safety procedures, energy specifications, component list, repair tool list, diagnostic procedures, and repair procedures.	IEC 45554:2020

**** Annex 4 provides the list of minimum contents to be included in a repair manual.

Recommended criteria and definitions

Criteria	Definitions	Source
Designed for disassembly	Whereas disassembly is defined as a process whereby an item is taken apart in such a way that it could subsequently be reassembled and made operational (source: IEC 62542 definition), the item must be designed intentionally for repair, material recovery, value retention, and meaningful next use. Disassembly steps and manipulations must be counted and clearly documented.	IEC 45554:2020
Interoperable parts used	Interchangeable parts are parts (or components) that are, for practical purposes, identical. They are made to specifications that ensure that they will fit into any assembly of the same type.	TCO certification
Standard plugs, connectors, and charging solutions used	IEC plugs and connectors (IEC 62196, 60309, 60320, 60906-X, 62180-1-X), IEC charging solutions (IEC63002 based on the USB technologies)	TCO certification
No special tools required for disassembly and repair	Disassembly and repair sequences require only the common tools (listed in IEC 45554 Table A.3), or special tools are provided with the provision of spare parts.	IEC 45554:2020
Upgradeability	Where applicable, updates of firmware and software must be available.	TCO certification

Local Production

Locally produced or assembled products allow quick and local repair services, so it would be the ideal in the perspective of the development of a circular economy.

Criteria and definitions

Criteria	Definition	Source
Local production or assembly	A product is manufactured or assembled locally with a certificate of origin as proof.	

ANNEX 2 EU ROHS DIRECTIVE IN A NUTSHELL

EU's RoHS directive regulates the hazardous substances used in the manufacture of electrical and electronic equipment (EEE). It specifies maximum levels of 10 restricted substances that are toxic to the environment (risk of landfill pollution), and are dangerous when exposed during manufacturing, waste treatment, and recycling. These 10 restricted substances and their maximum levels are the following:

- Cadmium (Cd): < 100 ppm
- Lead (Pb): < 1000 ppm
- Mercury (Hg): < 1000 ppm
- Hexavalent Chromium: (Cr VI) < 1000 ppm
- Polybrominated Biphenyls (PBB): < 1000 ppm
- Polybrominated Diphenyl Ethers (PBDE): < 1000 ppm
- Bis(2-Ethylhexyl) phthalate (DEHP): < 1000 ppm
- Benzyl butyl phthalate (BBP): < 1000 ppm
- Dibutyl phthalate (DBP): < 1000 ppm
- Diisobutyl phthalate (DIBP): < 1000 ppm

The scope of the original RoHS was expanded to cover all electrical/electronic equipment, cables, and spare parts with compliance required by July 22, 2019.

The list of exemptions is contained in Annex III and specific exemptions for medical devices and monitoring and control instruments are listed in Annex IV of ROHS II: http://ec.europa.eu/environment/waste/rohs_eee/legis_en.htm.

Permanent exclusions from RoHS include the following: military equipment, space equipment, equipment designed to be part of another piece of equipment falling outside the scope of RoHS, large scale industry tools, large scale fixed installations, means of transport for persons or goods, non-road mobile machinery, active implantable medical devices, photovoltaic panels, equipment for research and development only available business to business.

There are on-going discussions (called RoHS Pack 15) taking place for the possible amendment and inclusion of seven new substances. The seven additional substances being assessed include:

- Beryllium
- Cobalt (dichloride and sulphate)
- Nickel (sulphate and sulfamate)
- Diantimony trioxide
- Indium phosphide
- Medium-Chain Chlorinated Paraffins (MCCPs)
- Tetra-bromobisphenol A (TBBP-A)

ANNEX 3: IEC 62474 DECLARABLE SUBSTANCE LIST IN A NUTSHELL

https://incompliancemag.com/article/the-power-of-iec-62474-for-product-compliance-and-eco-design/

The IEC 62474 Declarable Substance List (DSL) is an internationally recognised and consolidated list of substances that are subject to regulations. The DSL listed substances are considers as potentially present in electrical and electronic products and systems. Manufacturers and suppliers use the DSL in their design and supply chain management to specify and control substances of interest.

Substances on the DSL are declarable, but not always hazardous or restricted. Entries may be included on the DSL because the substances and materials are valuable for recovery. This includes critical raw materials (CRMs) which are starting to appear in regulations that require reporting to assist in recycling.

The DSL and exemption lists are available online from the IEC 62474 database at http://std.iec.ch/iec62474.

ANNEX 4 EU BATTERY DIRECTIVE IN A NUTSHELL

All batteries and accumulators, and waste batteries and accumulators, regardless of type or application, are covered under the EU Battery Directive (2006/66/EC and Amendment 2013/56/EU: https://ec.europa.eu/environment/topics/waste-and-recycling/batteries-and-accumulators_en). The Directive specifies the following:

Chemical symbols shall only be mentioned if batteries contain one or more of the heavy metals above the following limits: 0,0005 % mercury (Hg), 0,002 % cadmium (Cd) or 0,004 % lead (Pb). The chemical symbols must be accompanied by the crossed-out wheeled bin logo.

The capacity label requirement is only applicable for rechargeable, portable and automotive batteries (more information on Regulation (EU) 1103/2010).

The mercury restriction for batteries is less than 0,0005%. An exception is made for button cells: a mercury content less than 2% was allowed until 1 October 2015 (more information on Directive 2013/56/EU).

The mercury restriction for automotive batteries is stated in the End-of-Life Vehicles (ELV) (more information Directive 2000/53/EC).

The cadmium restriction for portable batteries is less than 0,002%. The restriction did not apply to battery packs for cordless power tools until 31 December 2016.

Medical devices/equipment and alarm/emergency systems are excluded for cadmium restrictions.

The EU is preparing new battery regulations which are expected to come into force in 2022 - 2023. The new regulations will envisage a circular economy of batteries and set sustainability requirements by requiring more information to be publicly available, enhanced traceability of batteries, increased recycling and reuse of batteries, and increased use of recycled raw materials. More information can be found:

https://www.europarl.europa.eu/thinktank/en/document/EPRS_BRI(2021)689337

ANNEX 5: REPAIR MANUAL CONTENT RECOMMENDATIONS

Repair manual must be available publicly either on the manufacturer's or the supplier's website, or on the open-source website dedicated for the development of repair culture such as ifixit.com so that repair professionals as well as local suppliers and users have access to such information.

The repair manual does not have specific format or technical requirements, but it is expected to contain the following topics.

SAFETY PROCEDURES

Nothing is more important than safety. The repair manual must provide safety measures to avoid accidental electrocution and other injuries. In addition to the personal safety, the procedures to assure equipment safety must be provided.

ENERGY SPECIFICATIONS

Power, voltage, and current used by the product must be clearly specified.

COMPONENT LIST

In order for a repair person to understand the product, it is essential to provide the list of components and component drawings. In addition, their placement can be shown in diagrams for a better understanding. For products containing multiple active components, it is advised to provide a block diagram as well as wiring and connection diagrams. The list must contain the specifications of the component (if generic component can be used to replace the original broken component) or the product number (if the component is specific to the product) so that a repair person can source a spare part.

LIST OF REQUIRED REPAIR TOOLS

Required repair tools must be clearly named with their specifications if necessary. If a special tool is required, it is the responsibility of the manufacturer to provide such tool(s) to each local supplier.

DIAGNOSTIC AND TESTING PROCEDURES

It is recommended to provide an overall approach to troubleshooting techniques so a repair person can understand the global and logical process of the product. Effective way to present the overall approach is by providing a flow chart with "yes or no" options that leads to identify the cause of fault. It is also helpful to provide testing procedures (if any) to confirm the cause of fault. In addition, if the use of basic test equipment (digital multimeters, capacitance checker, etc) can assure the safety and the diagnostic, it must be listed in the diagnostic section.

REPAIR SEQUENCES AND PROCEDURES

Each repair sequence must contain a specific disassembly sequence to remove the component to be repaired or exchanged and a step-by-step explanation of repair procedures. If applicable, instructions for installation of relevant software and firmware must be provided. It is also useful to indicate where possible the level of difficulty of each repair sequence so the user will determine if it is self-repairable or not.

ANNEX 6: PROCUREMENT EVALUATION CRITERIA.

Proposed evaluation criteria and weighting for the procurement award process is an example. Your procurement team and tender committee should discuss what are the key requirements for the tender and weighting before formal engagement with suppliers.

E-WASTE COLLECTION

Parameter	Criteria	Weighting Level
Service score	Range of waste collected	High
	Collection schedule	High
	Staff experience and skills	High
	Equipment, facilities and security	Medium
Economical score	Incentive and subsidy schema	high
	Service fees and direct charges	Medium
Sustainable criteria	Sustainable and safe working practices	High
	Level of dangerous and toxic material usage	High
	Storage of dangerous materials	High
	Waste management proactices	High
Company reliability	Sustainable engagement (certification, code of conduct or equivalent)	High
	References	Medium
	Financially stable	Medium

ANNEX 7: PROCUREMENT REFERENCES

DUE DILIGENCE CHECKS

For screening the main sources are

- https://sanctionssearch.ofac.treas.gov/
- https://webgate.ec.europa.eu/europeaid/fsd/fsf
- B2B Supplier/
- Buyer Blacklist (SBBL)

Litigation check depends per country whether it is public data and easily accessible.

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Paid databases

- https://www.reprisk.com
- https://www.sustainalytics.com/ basic score is searchable, but again only stock listed companies)
- https://www.msci.com/our-solutions/esg-investing/esg-ratings, (there are many more).

STANDARDS, AUDITS AND CHARTERS

- ISO 2600 & 26001
- Global compact
- Ecovadis
- B-Corp


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