E-waste management action plan for the collection and recycling of solar lanterns in UNHCR displaced persons settlements

Report under the support to UNHCR in the implementation of the Global Compact on Refugees in the Humanitarian-Development-Peace Nexus





In cooperation with



Imprint

As a federally owned enterprise, GIZ supports the German Government in achieving its objectives in the field of international cooperation for sustainable development.





Published by: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Registered offices Bonn and Eschborn, Germany

T +256 414104100 E info@giz.de

I www.giz.de/en

Authors:

Tobias Schleicher and Andreas Manhart, Öko-Institut e.V. Dr. Tadesse Amera, Pesticide Action Nexus Association, (PAN-Ethiopia)

Responsible:

Energy Solutions for Displacement Settings (SUN-ESDS) Support to UNHCR in the implementation of the Global Compact on Refugees in the Humanitarian-Development-Peace Nexus (SUN)

Design/layout: kippconcept gmbh, Bonn, Germany

URL links:

Responsibility for the content of external websites linked in this publication always lies with their respective publishers. GIZ expressly dissociates itself from such content.

GIZ is responsible for the content of this publication.

On behalf of German Federal Ministry for Economic Cooperation and Development (BMZ) Referat 221 10963 Berlin, Germany

Bonn, December 2022



Federal Ministry for Economic Cooperation and Development

Table of Contents

Lis	st of Figures	4
Lis	st of Tables	5
Lis	st of Abbreviations	6
Su	mmary	6
1	Introduction	7
2	Technical scope	8
3	The role of EPR and legal considerations	9
4	E-waste take-back models for displaced persons settings	11
	4.1 Case 1: International production	12
	4.2 Case 2: Production in the country	13
5	Options for e-waste take back scheme	14
	5.1 Case 1: International production	14
	5.1.1 Option 1: Use of existing partners	14
	5.1.2 Option 2: Using local waste companies	15
	5.1.3 Option 3: Using international waste companies	16
	5.2 Case 2: National production	17
	5.2.1 Option 4: Using local producers	17
	5.2.2 Option 5: Using local producers and partners	19
	5.3 Synopsis of options	20
6	Estimation of costs for collection and sound end-of-life management	
	of used and end-of-life solar lanterns and other small e-waste	21
	6.1 Investment costs	22
	6.2 Operational costs	23
7	Recommendations	24
8	Roadmap for action	25
9	Annex	26
	9.1 EPR Legislation Ethiopia	26
10	References	27

List of Figures

Figure 1:	E-waste management action plan within the project context	7
Figure 2:	Impression of portable solar lanterns as Core Relief Items (CRI)	8
Figure 3:	The principle of extended producer responsibility (EPR)	9
Figure 4-1:	E-waste take-back in case of international production	12
Figure 4-2:	E-waste take-back in case of national production	13
Figure 5-1:	Using existing partners in the country as option 1 in case	
	products are manufactured by international producers	14
Figure 5-2:	Using local waste companies	15
Figure 5-3:	Using international waste companies	16
Figure 5-4:	Using local producers	18
Figure 5-5:	Using local producers & partners	19
Figure 6:	Container-based collection point	
	equipped with desk and scale to facilitate transactions	22

List of Tables

Table 5-1:	Advantages and challenges of option 1	15
Table 5-2:	Advantages and challenges of option 2	16
Table 5-3:	Advantages and challenges of option 3	17
Table 5-4:	Advantages and challenges of option 4	18
Table 5-5:	Advantages and challenges of option 5 (local producers & partners)	19
Table 5-6:	Heuristic synopsis of options for take-back schemes	20
Table 6:	Indicative costs for collection and environmentally sound management	
	of solar e-waste in the context of low- and middle-income countries	
	(East- and West-Africa)	23

List of Abbreviations

CRI	Core Relief Items
EPR	Extended Producer Responsibility
GIZ	Gesellschaft für Internationale Zusammenarbeit
MFT	Multi-Functional Team
UNHCR	United Nations High Commissioner for Refugees

Summary

This e-waste management action plan provides guidance for UNHCR with regards to e-waste management in displaced persons settings. Therefore, it elaborates on the role of extended producers' responsibility (EPR) and several e-waste take back models. Furthermore, it provides an estimate on related costs for collection and sound end-of-life management of used and end-of-life solar lanterns and other small e-waste. Finally, recommendations for implementation are given.

1 Introduction

Between 2016 and 2020, UNHCR procured 3.41 million solar lamps at a total cost of \$US 84.91 million. In total, in 2020 UNHCR spending on solar lamps represented one fifth (20 percent) of its total budget for core relief items. Moreover, in 2020 sales of solar lamps to UNHCR accounted for around 12.5% of all quality assured solar lanterns sold globally. Hence, UNHCR has enormous purchasing power in the off-grid solar industry. Accordingly, since 2016, UNHCR purchases of solar lanterns have generated an average of 204.68 tonnes of electrical and electronic waste (e-waste) per year (Spear, R. and Cross, J. 2021).

To address this challenge, UNHCR collaborates with GIZ and Oeko-Institut e.V. who develops an e-waste management action plan as part of the project component *Energy Solutions for Displacement Settings* under the global programme *Support to UNHCR in the Implementation of the Global Compact on Refugees (GCR) in the Humanitarian-Development-Peace Nexus (SUN).* In particular, in a first step our mandate was to develop technical guidance and an action plan for the management of e-waste generated in refugee camps operated by UNHCR (Deliverable 1: E-waste management action plan). In a second deliverable (D2), procurement guidelines for UNHCR are derived (see Figure 1-1).

Both activities are flanked by a continuous consultative process with GIZ/UNHCR.





Source: Öko-Institut e.V.

2 Technical scope

The technical scope of this guidelines document covers portable solar lanterns as Core Relief Items (CRI) for displaced persons living in the camps and settlements under the administration of the United Nations High Commissioner for Refugees (UNHCR). Figure 2-1 gives an impression of the appearance of such luminaires. Typically, portable solar lanterns operate at a maximum rated power of 10W. For more product details, see the Procurement Guidelines (D2) developed in the project.

Figure 2: Impression of portable solar lanterns as Core Relief Items (CRI)



Source: Öko-Institut e.V. (2022).



3 The role of EPR and legal considerations

Before we discuss possible contractual arrangements (see section 4) for e-waste take-back/collection in the context of displacement settlements, the crucial role of existing legal requirements on extended producer responsibility (EPR) shall be highlighted.

EPR is a widely accepted ethical concept saying that producers and importers have the responsibility for sound end-of-life management. In particular, those actors are addressed who bring equipment onto a market. Basically, it is the implementation of the "polluter-pays-principle" as it forwards the responsibility, both in technical and financial terms, to the one who causes the environmental problem. Hence, if a country has implemented an effective EPR scheme, each product placed on the market must be mirrored by another end-of-life one that is taken out of the markets ("take-one-in/take-one-out" principle).¹



Figure 3: The principle of extended producer responsibility (EPR)

Source: Öko-Institut e.V. (2022).

¹ This description follows an ideal picture. As a rule, discounts are used for collection targets, such as 45% or 65% of the quantity brought to market 3 years before.

Furthermore, EPR includes the responsibility to:

- 1. Supply durable and high-quality products and systems (incl. warranty & maintenance)
- 2. Take efforts to reduce the amount of hazardous substances in their products
- 3. Use system designs that support repairability and recyclability
- 4. Ensure collection and environmentally sound recycling of equivalent amounts of end-of-life devices (setting ambitious collection targets)

Number 1-3 relate to procurement criteria that are further elaborated within deliverable 2 (Procurement Guidelines) of the project. In the following, we seek to analyse the national EPR schemes as well as harmonisation and embedding of further requirements by UNHCR with national legislation.

Box 1: Example of Uganda

Uganda has passed the National Environment (Waste Management) Regulation (2020 No. 49). It states that "a person who develops, manufactures or processes a product shall, [...] be responsible for:

- Use of best available technology and process design that maximises resource efficiency, and applies the waste management hierarchy in the production processes for the product;
- · Monitoring the product cycle from beginning to end, to prevent mixing of waste; and
- Take-back of the product after its sale or use for environmentally safe treatment or disposal."

Furthermore, it states that "the responsibility for take-back of products referred to in sub-regulation (1) extends to a product steward who imports, distributes or sells a substance, a preparation or other product."

Summarising, in Uganda, there is a legal framework that stipulates that importers and distributors are (jointly) responsible for proper EoL management. Although the exact division of responsibilities cannot be conclusively clarified from the law alone, the conclusion remains that UNHCR's contractual partners who bring such equipment into the country are subject to legal EPR obligations. However, since the system is not yet well established, there is most likely some leeway in its way of implementation.

However, as in many other low- and middle-income countries, also in Uganda the EPR scheme is not fully operational yet. One reason for this might be the relatively new concept of EPR, not fully clarified roles and responsibilities, as well as a comparably low priority on enforcement. Hence, the Ugandan EPR scheme is not fully operational, but still requires involved parties to take proactive action in order to operate in compliance with legal frameworks.

4 E-waste take-back models for displaced persons settings

The core of the e-waste management action plan at hand is to elaborate and discuss several innovative contractual models that allow UNHCR and/ or partners to ensure effective and safe e-waste management in displaced persons settings including subsequent treatment. Sustainable collection and recycling of e-waste includes the following steps:

- 1. Local collection or take-back of devices in or near displaced persons settlements
- 2. Responsible intermediate storage of end-oflife devices (especially with regards to Li-ion batteries due to fire risks)
- 3. Responsible transport to repair and/or recycling facilities

- 4. If available, local pre-treatment (such as de-pollution and dismantling, including possible re-use of components)
- 5. Shipment to recycling facilities for components that cannot be treated responsibly within the country
- Final responsible downstream solutions for fractions that cannot be recycled (e.g. brominated plastic parts).

Note: The application of take-back models in procurement are part of the procurement guidelines that are the second result of this project.

4.1 Case 1: International production

The first case to be elaborated and disused is related to a production of core relief items (solar lanterns) outside the country in question. Figure 4-1 illustrates all relevant actors in such a situation. For this case, it must be noted that producers cannot be forced to take action in countries they have no own business activities in. Therefore, it is also not possible to oblige producers to organise and finance e-waste take-back and collection. For EPR, however, it is rather relevant to define which actor is responsible for bringing the new product to the market of a country (called "distributor" or "marketer").





Source: Oeko-Institut e.V.

While an international producer holds contractual relationships (dotted line) with UNHCR after a successful procurement process, it is a second agreement (dotted line) with an implementing partner on-site that distributes products handing them over to displaces persons in settlements (continuous line). In such a situation, there are several possible arrangements guaranteeing take-back and collection of e-waste illustrated in section 5.1.

4.2 Case 2: Production in the country

Another case is a situation where a producer of CRIs has a physical presence in the same country where the products are distributed. In such a case, UNHCR could enter in a contractual agreement on e-waste directly following the principle of extended producer responsibility (EPR).





Source: Oeko-Institut e.V.

This model shall be discussed in further detail in section 5.2.

Note: Besides production of CRI in the country, also wholesale and final assembly of devices are relevant cases. In such cases, contractual arrangements may also be made with distributors of this type.

5 Options for e-waste take back scheme

5.1 Case 1: International production

5.1.1 Option 1: Use of existing partners

As introduced above, in many cases, producers of CRIs have no physical presence in the target country of distribution. In such a case, UNHCR can enter a contract addendum on end-of-life management with implementing partners that physically distribute the CRIs in the countries (see blue dotted line in Figure 5-1). Complementary, implementing partners can be supported by local repair & recycling facilities that are included within further contracts based on sustainability guidelines (dotted line) and take-back products for repair and recycling physically (continuous blue line). Finally, both, implementing partners and repair & recycling facilities might have to be supported by international experts, considering that local repair and waste management companies in many low- and middle-income countries cannot offer a full-fledged end-of-life management yet (also blue dotted lines).





Source: Oeko-Institut e.V.

However, this model is related with several comparative advantages and challenges summarized in Table 5-1.

Table 5-1:	Advantages	and challenges	of option 1
14010 0 1.	/ a fantagee	ana onaccongoo	01 0 0 1 0 1 1

Advantages	Challenges	
 Existing implementing partners have access to users and can develop locally appropriate take-back and collection models 	 Existing implementing partners likely have little experience with waste collection & management 	
• Local recycling and processing generate local value addition	 They will need a local partner to take over and process collected waste 	
	 Such local waste management partners might have limited know- how and capacities in high quality e-waste management 	
	 UNHCR has no direct control over EoL management (no direct con- tractual relationship with waste management operator) 	
	 No feedback-loop between producers and recyclers on how to improve design-for-repair and design-for-recycling (in all Case 1 models) 	

Source: Oeko-Institut e.V.

5.1.2 Option 2: Using local waste companies

Besides the possibility to make use of existing partners, UNHCR can also enter cooperation's with local waste companies within the country of the settlement. In such a case, it would be

necessary to enter into an additional partnership agreement with local repair and recycling companies (see Figure 5-2).



Figure 5-2: Using local waste companies

Source: Oeko-Institut e.V.

In turn, local repair and recycling companies would be in contractual agreements with the persons in displacement settlements and further international support partners. As in Option 1, it might be required to grant additional technical support to local repair and recycling partners (see section 5.1.1).

Also, option 2 is related with a set of advantages and challenges depicted in Table 5-2.

Advantages	Challenges		
 More direct control over EoL-management (direct contractual relationship with waste management operator) 	 Waste management companies might have little experiences within displaced persons settings 		
 Local recycling / processing generates local value addition 	 Local waste management partners might have limited know-how and capacities in high quality e-waste management 		
• Local recycling contracts with a strong focus on high quality management can help to grow sound waste management capacities in the country	 No feedback-loop between producers and recyclers on how to improve design-for-repair and design-for-recycling (in all Case 1 models) 		

Source: Oeko-Institut e.V.

5.1.3 Option 3: Using international waste companies

In this section the option of reference to international waste companies shall be discussed. As depicted in Figure 5-3, in such a case, UNHCR could enter into a partnership agreement with international service providers specialised on global sound solutions for sound waste management (blue dotted line). Such companies usually conduct their services with the support of locally operating waste management companies for logistical purposes, but commonly not with a view to support local value addition.



Figure 5-3: Using international waste companies

Source: Oeko-Institut e.V.

As for the other options, also option 3 is related with several advantages and challenges. Accordingly, they are summarized in Table 5-3. It is noteworthy that this model can provide a full compliant waste management solution but has strong limitations in terms of local value addition and income generation.

Advantages	Challenges	
 Good control over EoL-management (direct contractual rela- tionship with experienced waste management operator) 	 International waste management companies (and their local part- ners) might have little experiences within displayed person settings 	
• Easy administration: 1 contract for 1 setting	 Limited local value addition (most likely, the bulk of collected e-waste would not be processed locally) 	
	 Limited stimulus for growing sound management capacities in the country 	
	 No feedback-loop between producers and recyclers on how to improve design-for-repair and design-for-recycling (in all Case 1 models) 	
	 Basel convention notifications if e-waste needs to be shipped internationally 	

Table 5-3: Advantages and challenges of option 3

Source: Oeko-Institut e.V.

Note: A central result of the stakeholder consultation process was that UNHCR excludes option 3 (cooperation with international waste management company) because a special focus shall be set on local value addition and income generation as stressed in section.

5.2 Case 2: National production

5.2.1 Option 4: Using local producers

In parallel the analysis of options for e-waste management in the case of international production, this section assesses the options in case of national production of the devices (or situations in which an international producer has a physical presence in the country). A typical case of this option is that solar lanterns are finally assembled in a target country.²

² Final assembly and related take-back and repair activities were identified in several Sub-Saharan African countries such as Burkina Faso, Benin and Mali.





Source: Oeko-Institut e.V.

As illustrated in Figure 5-4, UNHCR could require the producer to actively build-up and maintain a take-back and end-of-life management scheme through its contractual arrangements with the producer. Subsequently, producers would have an obligation to re-collect their own products in displaced persons settlements (or equivalent amounts of similar waste categories) and cooperate with recycling facilities, either on a national or international scale.

Table 5-4:	Advantages and	challenges of	option 4
------------	----------------	---------------	----------

Advantages	Challenges		
 Feedback-loop between producers and recyclers on how to improve design-for-repair and design-for-recycling 	 Interlinks between distributors & collectors need to be established 		
 High local value addition (production, repair, recycling) as producers and implementing partners operate locally 	 Local waste management partners might have limited know-how and capacities in high quality e-waste management 		
 Such set-up can help to grow sound circular economy busi- ness models in the country 			
• Easy administration: 1 contract for 1 product line per setting			

Source: Oeko-Institut e.V.

5.2.2 Option 5: Using local producers and partners

Finally, we analyse a model (option 5) that stresses the cooperation with local implementing partners in case of local production (Figure 5-5). Here, UNHCR requires the producer to conduct sound end-of-life management but specifies that interaction with the users is conducted through existing implementing partners also responsible for distribution.





Source: Oeko-Institut e.V.

As for the previous cases, also option 5 is related with advantages and challenges summarized in Table 5-5.

Table 5-5:	Advantages and	challenges	of option 5	(local produ	cers & partners)
------------	----------------	------------	-------------	--------------	------------------

Advantages	Challenges
 Feedback-loop between producers and recyclers on how to improve design-for-repair and design-for-recycling 	 Local waste management partners might have limited know-how and capacities in high quality e-waste management
 High local value addition (production, repair, recycling) as producers and implementing partners operate locally 	
 Such set-up can help to grow sound circular economy busi- ness models in the country 	

Source: Oeko-Institut e.V.

5.3 Synopsis of options

This section provides a synopsis of the above-mentioned options 1-5. It is carried out comparatively in a heuristic way, whereby the three sustainability criteria of (1) economy, (2) environment and (3) social aspects as well as a fourth category, based on other side benefits such as positive developments and integrated value creation, are applied. The results are provided in Table 5-6.

Options/Aspects	Economic	Environment	Social	Side benefits ³
Option 1				
Option 2				
Option 3				
Option 4				
Option 5				

Table 5-6: Heuristic synopsis of options for take-back schemes

Source: Oeko-Institut e.V.

The results of the comparison in Table 5-6 are based on the advantages/disadvantages elaborated for each option in the previous sections. The green colour is given if the related advantages clearly outweigh the disadvantages. The yellow colour shows that at least one or several aspects are critical and needs to be addressed. The red colour is given if the disadvantages clearly outweigh advantages.

From an economic point of view, all options are favourable apart from option 3 that includes several economic disadvantages (e.g. a limited stimulus for growing sound management capacities in the country). In terms of environment, the result is rather vice-versa as international recycling partners can have good control over EoL-management (option 3) whereas local waste management companies might have limited know-how and capacities in high quality e-waste management. However, from a social perspective, option 3 is clearly related to the social disadvantage to not create local value addition. Finally, regarding other positive developments, options 4 and 5 have clear side benefits such as supporting the set-up of sound circular economy business models in the country.

³ Enabling feedback loops for more circular products.

6 Estimation of costs for collection and sound end-of-life management of used and end-of-life solar lanterns and other small e-waste

Financial requirements for sound collection and end-of-life management can be differentiated in investments cost and operational costs, which are elaborated in more detail in the sections below. The following calculations and estimates strongly depend on a number of framework conditions, most notably the following:

- Collection is initiated in an area with no other formal e-waste or hazardous waste management system in place.
- The area to be covered is assumed to be quite densely populated (urban, or semi-urban population densities).
- Local waste management and recycling companies exist, but with limited experiences in e-waste collection and recycling.
- Local repair shops absorb a certain share of used equipment already. These repair operations are also generators of e-waste as many devices and parts cannot be repaired by them anymore.
- Informal operators (scrap collectors/dealers) are active and mainly target the collection and trade of scrap metal (steel, aluminium etc.).

- There are well established interactions and communication pathways with the inhabitants of the addressed area.
- This situation can be responded to by the following collection and management approach:
 - Collection is not limited to solar lanterns, but to all types of e-waste present in the community;
 - All persons can deliver e-waste to a central collection point. To stimulate deliveries, some incentives are given to suppliers⁴. Incentive levels are chosen in a way they do not compete with local reuse operations (value of compensation < reuse value of repairable devices).
 - E-waste is accumulated in one central storage (room, building or sea-container). No infrastructure is built/financed for subsidiary collection.
 - Collected e-waste requires transport to a recycling facility via truck (e.g. 5t loads each).

⁴ Incentives can have various forms, including monetary incentives, mobile phone credits, discount vouchers etc.

6.1 Investment costs

Hardware requirements for collecting used and end-of-life solar lanterns and similar e-waste strongly depend on the scale and geographical reach of the intended system. Applying the model as described above, investments would be widely limited to a storage facility and some supporting goods⁵ (storage containers, scale, personal protective equipment ...). Transports to recycling can be either covered through transport service arrangements, or through the cooperating recycling partner (see section 6.2 on operational costs).

The costs for such a storage facility depend on local property situation and the required size. In any case it is important that the storage space fulfils the following criteria:

- Sheltered from rainfall, flooding and direct sunlight
- Lockable to prevent unauthorised entry and theft

- Accessible for everybody during opening hours (collection)
- Be able to cater a sheltered counter (desk) and scale to facilitate transactions

The size depends on the intended collection volume and throughput. A possible minimum option is the utilization of a sea-container providing storage space and housing a desk and scale in the front part (see Figure 6-1). Such an arrangement cannot cater for much more than 5-10 t of e-waste for one container⁶ but allows a quick set-up of collection. In case of high collection volumes, higher transport frequency to recyclers can release potential pressure on storage space.

An indicative price for a sea-container, including basic furniture may range around 5,000 US\$. Depending on the local situations, additional cost may arise from ground works / foundation and erection of an additional roofing (maybe required in hot climates). Property price (buy or rent) must be additionally considered.



Figure 6: Container-based collection point equipped with desk and scale to facilitate transactions

Source: Oeko-Institut

⁵ This model does not include building up of local repair and recycling centre(s). Although this can be an attractive option for local value addition and income generation, its realisation may likely fall into a later period after consolidation of take-back and collection systems. In that case, the cost estimate must be revised accordingly.

⁶ Sea-containers can hold nominal loads of -26-28 t. Nevertheless, the containers must also house a transaction point und usually cannot filled entirely with e-waste due to safe sorting and storage needs. It can therefore be estimated that one 20-foot-long container may cater a total e-waste volume of not more than 5 t, and a 40-foot-long container not more than 10 t of e-waste.

6.2 Operational costs

Operational costs arise from staff costs and costs associated with collection and recycling activities. Staff costs very much depend on local situation, but it is assumed that a collection point as sketched above can be run by 2-5 staff, whereof 1-2 organise transactions during opening hours, and 1-2 work as guards and for loading operations⁷. In case of larger collection points with throughputs significantly higher than 1 t per day, more staff might be required. Another person (part time position) is needed for accounting of flows and expenses related to incentives. This person does not have to be present at the collection point permanently.

Average costs for collection, transport and recycling have been evaluated by (Magalini et al. 2020). The data is presented in Table 6-1 and is derived from real-life costs of e-waste collection and recycling in East- and West-Africa.

Table 6:	Indicative costs for collection and environmentally sound management of solar e-waste in the
	context of low- and middle-income countries (East- and West-Africa)

	Access to waste (incentives)	Transport to recycling	Treatment (mixed solar e-waste)	Total
Min	0.00 \$/kg	0.12 \$/kg	0.70 \$/kg	0.82 \$/kg
Max	0.10 \$/kg	0.52 \$/kg	1.87 \$/kg	2.49 \$/kg
Average	0.05 \$/kg	0.24 \$/kg	1.15 \$/kg	1.44 \$/kg

Source: Magalini et al. 2020

The data provided in Table 6-1 provides a good indication, but the cost ranges also illustrate quite some uncertainties. Therefore, the following factors may help to evaluate whether to calculate more with higher or lower costs as indicated in the table:

- Current inflation increases many costs (transport, labour ...). Therefore, costs are likely to have increased since 2020.
- Transport distances matter a lot. In settings where recycling requires large transport distances (e.g. > 100km), prices for transport are almost certainly on the higher side.
- A high share of reusable equipment (e.g. many solar lanterns of the same design) may allow value creation from repair operations, thus reducing the treatment costs.
- A focus on high standard recycling (provenly sound management of all output fractions) may add to the total costs⁸.
- In case transboundary movements are required for recycling (no recycling solution within the country), additional efforts and costs are required to organise transports in-line with the requirement of the Basel Convention⁹. In many settings, such compliance may be associated with considerable administrative burden and risks for delays (PREVENT/Step 2022).

⁷ Loading of trucks may need additional workforce, but this workforce is not required permanently.

⁸ The costs for treatment are derived from existing recyclers in East and West-Africa. Some of these recyclers have not yet found and developed solutions for all e-waste fractions and refer to prolonged storage. In case all output fractions are to be managed, costs for solution development and implementation may arise additionally.

⁹ The Basel Convention regulates the transboundary movement of hazardous waste and is based on the prior-informed-consent procedure where the environmental authorities of the exporting country, transit countries and the receiving country agree to the shipment prior to its conduct.

7 Recommendations

- Based on the previous chapters and discussions at the stakeholder's workshop, the project team derives final recommendations for the short- and medium-term e-waste management action plan:
- In many low- and middle-income countries (e.g. Uganda), EPR-legislation has been developed (or is about to be developed) but is not fully operational yet. In various jurisdictions, this results into a situation where legal responsibilities for producers, importers and distributors exist, but that are still not detailed out or operational-ised yet.
- While this gap may be seen as an operational challenge, it can also be regarded as an opportunity: By developing and implementing take-back and end-of-life management systems, UNHCR can lead by example and support the setting-up of meaningful collection and end-of-life management mechanisms for products that are distributed under its responsibility.
- The appropriate collection and take-back scheme should in any case consider the national legal framework and requirements. In case of uncertainties, interaction/with the national environmental authorities can help to resolve such issues.
- As UNHCR aims to set a special focus on user centred design approaches as well as local value addition, it is recommended to focus on cooperation by a contract addendum with implementing partners on-site or local waste management companies if present (see also section 6 of procurement guidelines).
- A special focus shall be set on existing repair and other service infrastructures as they are regarded as a promising entry for take-back and recycling on the ground.
- In case local waste management companies are identified for cooperation, qualified expert assessments of capabilities, limitation and support

needs should verify compliance with responsible waste management practices.

- It is recommended that UNHCR, as distributor of electronic devices in displaced persons settlements, does not only focus on future take-back models (concluded by contract amendments) but also considers short-team action by collection and responsible recycling of equivalent amounts of related e-waste (pilot projects).
- It is recommended to get started with targeted pilot collection systems first (e.g. in ~3 locations). Such pilots should be used to test the feasibility of models and to create implementation learnings for a larger roll-out at a later stage. Such pilots should ideally also test the expansion of collection to more items (e.g. other electrical and electronic equipment)
- However, it is also recommended to reflect the latter point in light of other waste categories such as mixed household waste.
- In any case, section 5.3 of this document illustrated that e-waste management is in most cases associated with net costs and cannot be financed by revenues from recycling outputs. Hence, responsible e-waste management also has a considerable financial implication for distributors. As illustrated above, this can be fully or partly shared/passed on to further upstream actors such as producers/suppliers.
- This ultimately results in additional costs for UNHCR. In section 5.3, we elaborated estimated additional operational costs of 0.82 \$/kg - 2.49 \$/kg (average: 1.44 \$/kg). Investment cost per pilot project would be at least at 5'000 \$. Additional costs tend to be even higher in markets where e-waste management systems have not yet been developed.
- Pilot projects have been a proven instrument to focus on real volumes and get collection/take back as well as repair/recycling schemes started.

8 Roadmap for action

In this section we will summarise actions for the implementation of an e-waste management action plan:

- 1. Identify up to 3 displaced persons settlements where a pilot project on e-waste collection and management can be implemented.
- 2. Coordinate with municipal and other national government stakeholder to clarify responsibilities considering the current status of EPR implementation.
- 3. Depending on the national and technical circumstances of the options for a take back scheme, select the suitable model for the pilot project (options 1-5, see section 5).
- Set-up the pilot project in a way that it is combined with a trial of user-centred design. Learnings from the trial can be translated in further criteria for the procurement process (see deliverable 2 of this project: procurement guidelines).
- 5. Ensure in-house institutional support regarding the additional costs of implementing sustainable e-waste management in UNHCR (upper management level).

9 Annex

9.1 EPR Legislation Ethiopia

Ethiopia has Hazardous Waste Management and Disposal Proclamation No. 1090/2018 which contains rules that follow closely obligations imposed on Ethiopia by Basel and Bamako Conventions. The proclamation describes Hazardous waste as listed in Annex 1 or as defined in a directive that shall be issued by the Environmental Protection Authority (EPA), Article 2 (10)]. Under its Article 4(2) it defines the scope of application to any person, who generates, reuses, recycles, stores, transports, or disposes hazardous waste in all parts of Ethiopia. The proclamation promotes cleaner production principles by obliging producers to minimize release of hazardous waste by reducing and eliminating the hazardous substances in the raw materials during the production process. Additionally, it also promulgates monitoring of the production process as one mechanism to reduce hazardous waste release during production. It also put obligation on the hazardous waste generator to create conditions necessary for collection, reuse or recycling of the product after its expiry period (Article 5 sub article 2 b).

Ethiopia also has a regulation on the Management and Disposal of Electrical and Electronic Waste (No. 425/ 2018) which was passed by the Council of Ministers of Ethiopia in 2018. Under Article 2(2) it defines "electrical and electronic waste" as all types of electrical and electronic equipment and its parts, except radioactive equipment, that have been discarded. The regulation also applies to producers, distributors, retailers, importers, transporters, collection centres, re-furbishers, dismantlers, recyclers and consumers of electrical and electronic equipment listed under Annex 1 of the Regulations and any other Directive issued by Environmental Protection Authority-EPA (Article 3). The regulation also proclaimed Extended Producer Responsibilities (EPR) on wholesaler, retailer and importers to strengthen reuse & recycle. It also requires issuance of permits from EPA for waste handling including collection, dismantling, and transportation.

10 References

- Magalini, F.; de Fautereau; B.; Heinz, C.; Stillhart, R.; Clarke, A. (2020): E-waste Management Recommendations for BGFA Programme. Online verfügbar unter https://www.nefco.int/ wp-content/uploads/2020/08/E-waste-Management-Recommendations-for-BGFA-Programme_Sofies_ July-2020.pdf, zuletzt geprüft am 03.11.2022.
- PREVENT/Step (2022): Practical Experiences with the Basel Convention: Challenges, Good Practice and Ways to Improve Transboundary Movements of E-Waste in Low and Middle Income countries. A Collaboration between PREVENT and StEP. Online verfügbar unter https://prevent-waste.net/ wp-content/uploads/2022/04/PREVENT-StEP_Practical_Experiences_Basel-Convention_discussionpaper-2022.pdf.
- Spear, R. and Cross, J. (2021): Towards a Circular Economy in UNHCR. A focus on core relief items. Hg. v. UNHCR Innovation Service. The University of Edinburgh.
- Verasol (2018): Pico-PV Quality Standards. Version 8.0 December 2018. Online verfügbar unter https:// storage.googleapis.com/verasol-assets/Pico_MQS_v8_0.pdf.

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Registered offices Bonn and Eschborn

Friedrich-Ebert-Allee 32+36 53113 Bonn, Germany

T +49 228 44 60-0 F +49 228 44 60-17 66

E info@giz.de I www.giz.de

Dag-Hammarskjöld-Weg 1-5 65760 Eschborn, Germany T +49 61 96 79-0 F +49 61 96 79-11 15

On behalf of



Federal Ministry for Economic Cooperation and Development