e-Waste Toolkit

REDUCE - REUSE - RECYCLE

REDUCE		Factors to Consider	Recommendation
Product Design	Green design & design for recyclability and reduction of hazardous substances	• What substances/rare elements are contained in the products? • What are the requirements for recycling of my product?	• Understand the constituents of your products. • Engage with manufacturers and product designers to replace the hazardous elements such as mercury, lead, cadmium and PVC, e.g. mercury in CFL tubes can be replaced by using LED bulbs, Plastic packaging can be replaced with other forms of packaging such as ArboformR, lead acid batteries can be replaced with Lithium Ion. • Label components for ease of identification. • Make the product easy to dismantle e.g. use of screws instead of soldering. • Minimize the number of contaminants; e.g. limit the number and type of plastic used as most plastics are handled differently at the point of recycling.

	Design for reparability	• Is it possible to repair the product?
		  • How have the components been assembled?
		  • Is it possible to disassemble components?
		  • Are spare parts available?
			• Consider modular design for easy fault finding.
			• Use screws, less glue, more surface mounting and less soldering to put together internal components.
			• Understand the most common faults/ points of failure in the product.
			• Provide spare parts and an easy to understand repair guide/manual/ schematics.

REDUCE		Factors to Consider	Recommendation

Product Design	Design for durability (reduce fragility / increase durability)	• What is the product lifespan?
		• What is the weakest link/ component?
			• Consider using more robust components which last longer:
			  • Develop better product casing/housing that is less susceptible to breakage.
			  • House fragile components together to avoid breakage/wear during day to day use.
			• Develop smarter technology that allow for remote monitoring:
			  • A smart battery management system will monitor performance KPIS and overall State of Health. This will capture early complications before actual failure.
			  • Cloud computing which will curb the issue of hardware obsolescence.

	Design for compatibility, interchangeability & interoperability	• Can customers swap components/parts with other products? • Can a customer upgrade to a higher tier product? • Is the technology used open source?	• Consider using open source software, which allows for swapping of products and encourages multiple product lives through the second-hand market. • Design products to be less proprietary; integrate compatible parts/hardware such as ports, plugs, cables as well as software. • Enable/participate/support product standardization efforts. • Design products that are easy to disassemble and make possible reuse of components from different products.
Customer & Organizational Role	Customer	• What is the role of the customer in product life extension?	• Provide basic maintenance training to the customer during installation. • Provide an easy to understand user guide.
	Organizational Efforts	• What is your organizational approach to e-waste?	• Purchase durable green products; reference e-tools such as EPEAT to make purchasing decisions. Use environmentally friendly labels. • Consider repair for non-functioning organizational devices before making the decision to purchase new ones. • Create a culture around circular economy: adopt circular economy precepts within your organization and educate your employees on its importance. • Develop programs for donation of old electronics.

REUSE		Factors to Consider	Recommendation
Product Design	Design for reparability	• Is it possible to repair the product? • How have the components been assembled? • Is it possible to obtain spare parts available?	• Consider modular design for easy fault finding. • Use screws, less glue, more surface mounting and less soldering to put together internal components. • Provide spare parts and an easy to understand repair guide/manual/ schematics.
Repair Capacity	Servicing & Maintenance	• How are products handled when they are out of warranty? • Can customers repair the products individually? Do they have access to local repair technicians?	• Make available repair manuals and schematics that can be used by the consumer to troubleshoot and repair the product. • Build local repair capacity; collaborate with local technicians and equip them to repair products.

RECYCLE		Factors to Consider	Recommendation

Product Design	Design for recyclability	• What are the risks involved in recycling?
		• What is the constituent make-up of the product?
		  • High risk, medium risk, low risk? Some risks involved in recycling include battery explosions, poisoning, leakages etc.
		  • Can they be recycled?
		• What are the requirements for recycling the constituents?
			• Design the product to have few plastic and less hazardous substances high risk substances include Lead, Lithium, CFLS Medium risk include aluminum, glass, include and low risk includes PCBS, cables, plastics etc.
			• Design products to be easy to disassemble and label for easy identification.

RECYCLE		Factors to Consider	Recommendation
Recycling requirements	External	• How to select a qualified e-waste management service provider?	• Determine your recycling needs. • Develop internal benchmark requirements. Factors to consider can include facility location, staff capacity, facility housekeeping, transport/ storage/HSE protocols, facility licenses/ accreditations, audit performance, circular economy practices, data protection/security practices, tracking/recording protocols existing benchmarking tools
	Internal	• How to build internal capacity for recycling?	• Train staff on how to handle the different constituents. • Equip staff with necessary PPE. • Provide sufficient storage; separate rooms for storage of end-of-life (EoL) products and storage equipment for different components, e.g. drums for Lithium Ion batteries and pallets for Lead acid batteries. • Comply with local/regional regulations, e.g. OHS/ HSE requirements. • Develop internal protocols for storage and transportation. • Integrate tracking systems for EoL products that you handle.

Links to Resources:

- SERI
- iFixit
- Repair Clinic
- How Stuff Works
- GOGLA e-waste toolkit module 1
- GOGLA e-waste toolkit module 2
- EPA product assessment tool
- Sunny Money Picosolar Repair Guide

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The materials in this e-waste toolkit have been developed for EEP's Africa portfolio in collaboration with CLASP, an international organization improving the energy and environmental performance of the appliances and equipment we use every day.