

## GOGLA E-waste Festival Summary Report



The GOGLA e-waste toolkit is being funded by **Swedfund**. The design and content of the Toolkit is being developed in association with the GOGLA E-waste Working Group.

## Executive Summary

**The E-waste Festival saw industry members, recyclers, donors, investors and researchers from around the world get together to continue their collaboration on off-grid solar e-waste. Over 50 people attended GOGLA's E-waste festival in Nairobi, covering a range of topics, from improving take-back and collection to finding ways to involve the informal sector or efforts to improve lithium ion battery refurbishment and recycling**

The e-waste landscape remains a complex one for companies that cannot leverage larger volumes and in regions where e-waste management infrastructure is still short from being able to deal with an array of waste fractions locally. Some of the topics which attendees felt should have priority are:

- Increasing take-back and collection rates through:
  - New partnerships (with third-party collectors and informal sector)
  - Improved collection infrastructure
  - Raising consumer awareness
- Improving battery technology and explore battery refurbishment possibilities (especially for li-ion).
- Influencing and adapting to upcoming e-waste regulation.
- How to promote refurbishment and repair instead of replacement of OGS products.

The Festival saw the announcement of the eight GlobalLEAP Solar E-waste Innovation Prize winners; off-grid solar companies and recyclers will deliver projects with a combined value of 1 million USD to move the needle on e-waste.

This report outlines the content and highlights of the E-waste Festival, including the outputs and project ideas that came out of it.

The sector is headed in an exciting direction when it comes to creating new partnerships to tackle e-waste management. The presence and commitment of so many different actors, as well as their willingness to work toward a common goal, reaffirms our belief that the time is right for increased action on the e-waste agenda.

## Introduction

From cleaner and safer energy to enabling jobs and economic activity, the off-grid solar industry is delivering huge social and environmental value. Between 2010 and 2018, 42 million off-grid solar products have been sold, 58.4 million metric tons of CO<sub>2</sub> and black carbon averted, and an estimated 246 million people have ever lived in a house with improved energy access thanks to off-grid solar products<sup>1</sup>.

However, the story around the end-of-life of products is less strong. And as the industry grows, it becomes ever more important to take action. Many companies have got operations and partnerships in place to take-back products that return through the warranty claims process, but most products that reach their end-of-life in a consumer's home are not properly managed. The potential impact of solar products in the e-waste stream is proportionally small (it is estimated to be around 3% in Kenya<sup>2</sup>, the country with the highest sales in Africa<sup>3</sup>), household appliances, ICT equipment and mobile phones still represent much larger waste volumes. As energy access improves, the impact is expected to grow through greater use of electric and electronic equipment, and though the potential impact is not fully understood, it is expected to remain significantly smaller compared to other waste streams. However, the industry agrees that it still represents a risk to consumers and the local environment and should therefore be addressed.

In April 2018, GOGLA's Sustainability Working Group got together to address this challenge. The industry identified five main priority action areas (highlighted: implemented actions):

- Identify and share best practices at each step in the product lifecycle.
- Increased engagement with the policy and regulatory environment.
- Develop a product design guide to enhance reparability and recyclability.
- Take-back schemes enabled by smart communications platforms or messages.
- Better data on e-waste for companies and the sector.

The Sustainability Working group became the Consumer Protection and E-waste Working Groups, reflecting the focus and commitments of the industry. The e-waste festival was the first time the E-Waste Working Group met as such, with the goal of bringing people together to share and generate new ideas, projects and partnerships.



Participants of the E-waste workshop in April 2018.

1. Global Solar Off-Grid Market Report H2 2018

2. Cost Benefit Analysis and Capacity Assessment for the Management of Electronic Waste (e-waste) in the Off-Grid Renewable Energy Sector in Kenya (July 2017)

3. Global Solar Off-Grid Market Report H2 2018



## Day 1

The three-day event took place in the Nairobi Garage space in Kilimani and was kicked off by the opening remarks of Esther Wachira from Swedfund, Greyson Metili from Mobisol Tanzania (co-chair of the e-waste Working Group) and Drew Corbyn. The imperatives for business action on e-waste were discussed:

- Brand and PR risk (for companies and sector)
- Better retention of customers
- Environmental and consumer protection
- Government regulation
- Investor pressure

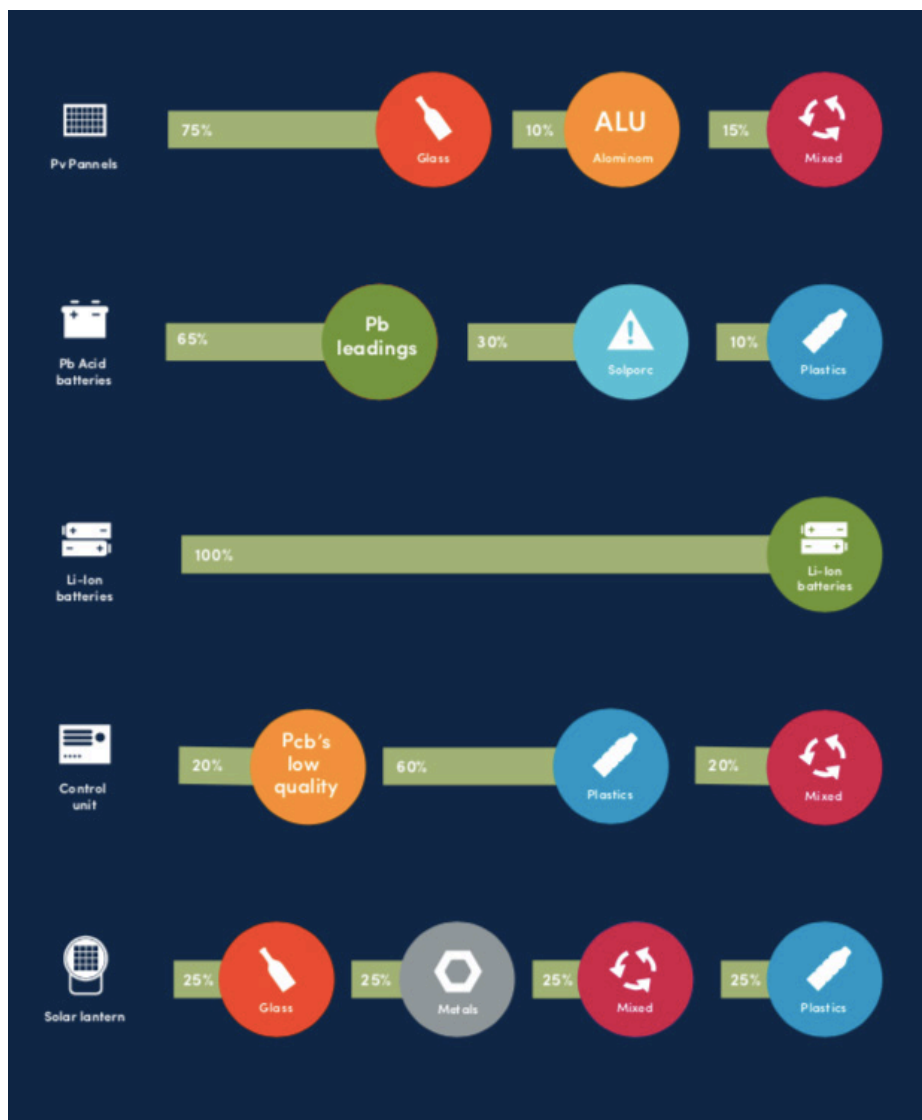
The audience expressed that, in their view, environmental and consumer protection were the main drivers for better e-waste management.

To get started, Athina Kyriakopoulou (formerly Phenix Recycling Tanzania, currently an independent consultant in the sector, Athina worked with GOGLA to develop a large part

of the deliverables of the e-waste toolkit) facilitated an ice breaker game with the purpose of clarifying the differences between components and fractions and determining what is the typical way of managing each at end of life – repair, recycling or disposal.



Identifying “Component” or “Fraction, and “Repairable”, “Recyclable” or “Disposal” in the opening was fantastic!



## Presentation: Repair clinics as collection points

Presenter: Dr. Declan Murray

The relationship between people and their products can be complicated, and off-grid solar products can go through many stages in their lifecycle (first, second and even third life<sup>4</sup>) before they are finally disposed of. In Kenya, local repair clinics (*"fundis"* – Swahili word meaning "skilled person") can be extremely useful for customers with out of warranty (or non-quality verified) products, in areas where OGS companies do not have presence, or simply looking for an affordable way to continue benefitting from their products. *Fundis* typically repair a range of electronic products – mobile phones, small household appliances and off-grid solar products. They are found in cities and towns across the country; Declan gave the example of a small town that had five or six such *fundis*.

Since 2016, the uptake of solar products has caused an increase in the number of products some clinics receive (in the case Declan presented, the fundi receives one solar lantern/system per day). Clinics have little space to store large volumes of waste, but they can receive parts of systems for up to component level repairs.

Given the multitude of *fundis* that exist, they collectively have access to large volumes of products at end of life and have an expansive coverage, there is an opportunity to tap into this network as part of a formal collection program. Currently, OGS companies are reluctant to formalise relationships with *fundis* due to the difficulty in ensuring quality service and the brand risk they would have to assume. On the other hand, introducing centralised waste management systems is also likely to disrupt and marginalise the existing repair economy.



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## Presentation: E-waste considerations in Partner Markets

Presenter: Charlotte Heffer (d.light)

d.light operate as a vertically integrated company in their main markets and through distribution partners in other markets. They are increasingly working with distributors to implement an after-sales and end-of-life management strategy. In her presentation, Charlotte outlined d.light's recent partnership advancements:

- Operational support for partners (training for field and call centre agents).
- Dedicated after-sales resources such as troubleshooting guidelines, spare parts planning, or claims verification.
- Developing new training materials to streamline and reduce costs of training
- Support in identifying e-waste handlers

The new approach also involves a shift of focus: from replacement to repair (replacing components, repairing PCB, running diagnostics and channel EOL components for proper recycling/disposal).

The shift will not happen overnight and there are challenges and experiences that can serve the industry as learnings ([see e-waste materials for more information](#)). Going the extra mile to improve e-waste management will inevitable mean companies will have to incur some costs. But, after all, the sector is committed to both financial and impact returns.

## Workshop: Access to Off-Grid Solar E-waste

The morning focused on (arguably) the main barrier to improved e-waste management – access to waste from consumers. The group discussed various take-back channels and mechanisms and explore ways to address the challenges of each.

Participants split into groups according to three themes to have a facilitated discussion and come up with project ideas to address increased access to waste from consumers.

The project ideas are presented as 'Areas of opportunity' that could be developed by companies or sector support programs.

### Group A

Access to waste through OGS companies. How can OGS companies increase the rates of take-back.

### Group B

Third Party Collection Centres. How can OGS companies work with and support third party collection centres?

### Group C

Engaging the informal sector. How to work with the informal sector?

## Outputs of the Workshop

### Group A: How can OGS companies increase collection rates?

#### Challenges

- Out of warranty products (and sometimes in-warranty) slip outside of OGS reverse logistics.
- Lack of consumer awareness about the potential hazards of improper handling/disposal of batteries.
- Generally, customers take their products to a repair shop or bring them to the service provider if they need them repaired or want to dispose of them. However, a number of products are not disposed of responsibly, they get passed onto new owners, or are stored in houses in case it has value or use in the future.
- Environmentally sound e-waste management is costly. Companies operating in the space add this to a list of other challenges – such as the last mile challenge of engaging with rural/low-income customers.

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#### Areas of opportunity

- Collective company action. The off-grid solar industry could establish an industry-led compliance scheme whereby participating companies invest and govern an entity to manage collection, transport and recycling (an example is [Karo Sambhav](#) in India). This entity can be more cost-effective as it is able to develop the specialist expertise and achieve economies of scale. Another approach is for the industry to coordinate and align resources to procure compliance from an e-waste management company.
- Using the customer journey to create awareness. Companies (especially those with PAYG business models that enable long-term relationships between provider and customer) can use their customer touchpoints to reinforce messaging around proper disposal and create a better understanding around environmental and safety hazards of e-waste. Other channels such as word-of-mouth and radio can also be considered.
- Alternative financing mechanisms. Public funding or impact investors could subsidise 1) warranty extension, 2) after sales services, 3) repair and maintenance. Companies that offer these services to the market (thus increasing impact and reducing environmental risks) could get finance for an 'extended product life bond'.
- Results based finance for e-waste. Companies and recyclers could be given a financial incentive for demonstrating increased take-back and recycling of products. This would encourage investments in operations and partnerships and help achieve higher volumes (that would reduce the unit cost). The verification requirements could align with the National Register that will track volumes of waste that is collected and treated.



## Group B: How can OGS companies work with and support third party collection centres?

### Challenges

- Developing partnerships, infrastructure and logistics requires investment and management (collection mechanisms typically only exist for products that fail during the warranty period and collection points might have limited capacity to assess warranty claims or whether a product can be repaired or it is waste).
  - Companies may not want to collaborate on collection and logistics – product design, defects, swap rates, repair needs are all perceived to be commercially sensitive (though this is debated). Furthermore, companies want to obtain products that have failed to allow analysis of the problems and improve design.
  - Providing incentives for consumers may be harder with third parties (OGS can offer such as discounts or merchandise) but this is difficult to manage through a third party.
  - Safety: Since e-waste potentially contains hazardous and toxic elements there are safety risks with engaging such as schools and health clinics.
  - Security: E-waste may have a positive value to informal repairers and recyclers and therefore may need to be guarded against theft and leakage.
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### Areas of opportunity

- Working with schools and students to raise awareness and gain access to waste. There is an opportunity to educate students about an environmental issues and ingrain the principle of responsible disposal in the next generation. A school campaign could raise awareness among students and encourage them to bring off-grid solar products (and possibly other electronics) into school for collection on a scheduled date (where the waste is then collected by a licensed transporter). Students could be incentivized by school meals or recognition such as an award. Solar Aid / Sunny Money have demonstrated that the school network can be leveraged for distribution of entry-level products. Computer for Schools Kenya (a sister organization to the WEEE Centre) has also shown the potential of working with schools to provide and service second-life computers (and collect when they reach end of life).



## Group C: Engaging the informal sector

### Challenges

- Currently, the informal recycling sector is seen as a potential partner but there is no clear path forward to increase collaboration and brands have expressed their concerns regarding IP rights and brand image.
- OGS companies are hesitant to formalise relationships with fundis as it is very difficult to ensure the quality of service. OGS companies invest heavily in their brand (for which word of mouth is one of the main marketing channels) and would consider this a brand risk.
- The informal sector is decentralised, consisting of many independent entrepreneurs, that presents practical challenges for working together.

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### Areas of opportunity

- Create a digital platform that facilitates partnerships. Likely in the form of an app, it would allow companies and recyclers (formal and informal) and companies looking to dispose of their e-waste to connect. The platform would also provide access to training materials and ease collection and payment processes.
- Greater standardization of product components to increase repairability. A barrier to increased repair is the non-standard nature of components (e.g. batteries, connectors, electronics) that makes it very hard for local repairers to stock spare parts for the wide range of products on the market. An alliance of manufacturers could work together to identify possible components and parts that could be standardised. Furthermore, making technical specifications and repair guides available to local repairers, combined with an open-source training program would be required to build capacities.

## Technical Considerations, Storage and Handling Recommendations

After the participatory exercise, we heard from BBOXX and Mobisol and their policies to deal with repairs, recycling and employee safety.

Find the presentations in the [festival materials](#).

### BBOXX and E-Waste Management

BBOXX has 25 stores in the country manages repairs and end of life:

- By working with in-house repairs (up to PCB component-level repairs). The repair center receives faulty and repossessed products from shops. Working spare parts are kept for future repairs.
- By working with manufacturers (specifically for PCB repair)
- Establishing partnerships with recyclers for systems and lead acid batteries (Enviroserve).

### Mobisol: Keeping Employees Safe

Mobisol's commitment to e-waste management is rooted in the values of their founding members and their code of ethics: Mobisol

considers protecting the environment and people's health part of their vision. Which is why an efficient, environmentally responsible use of resources can be translated to their day-to-day operations.

Greyson Metilli explained how this takes shape in practice:

- Producing easy to grasp guidelines (what they call one-point-lessons), identify and avoid risks and threats to health and safety.
- Defining acceptable ergonomics in workstations
- Use Personal Protection Equipment – gloves, overalls, helmets and safety boots (+masks for battery handling).

One of the main challenges that companies deal with is categorization of products (inventory management system optimization).

Considerations may be different depending on the fractions, as we saw in [Module 1 of the e-waste toolkit \(Technical Introduction to Recycling\)](#), and this is also reflected on the materials mentioned above.

## Day 2

The second day was marked by a policy session in the morning for GOGLA and KEREa members and a parallel session about the opportunities and challenges for e-waste management companies and recyclers. In the afternoon we heard from the eight Global LEAP winners and the projects they will be implementing over 12 months.

### Kenya E-Waste Policy Engagement

This was a closed-door session for members of GOGLA and KeREA. During this session the participants looked at the content of the draft e-waste bill and policy in Kenya and discussed the terms that the industry would like incorporated to support their efforts towards responsible waste management. The bill is reportedly moving through parliament, though it is still not clear when it will come into effect or the degree of enforcement. The industry welcomes regulation that is appropriate and fair, though has concerns about the potential for undue and excessive costs that would hinder efforts to achieve national electrification targets, hurt low-income consumers, and subsidising the treatment of non-quality-verified goods from free-riders. An industry response to the bill was discussed and will form the basis for engagement with policy makers (find the industry response on the [member space of the GOGLA website](#)). A priority for companies is to have a seat at the table on the National Steering Committee that will define the influential Implementation Framework.

### OGS Market & Business Models

While GOGLA and KEREa members were deep in policy discussions, investors, recyclers and researchers could join a session to talk about business models in the off-grid solar space and get a high-level understanding of the sales and market data, as well as discuss their relationship with OGS companies and overall interest in collaborating with the industry. Motivations spanned from being ahead of the curve for investors and donors (tackle e-waste before it becomes a harder challenge to address), There were eight e-waste management companies present, indicating a strong interest to create partnerships and seek opportunities for e-waste management companies and recyclers. There were also expressions of interest to join GOGLA as Associate member to enjoy the networking (at events such as this), market intelligence and join in the E-waste Working Group.

Some of the main challenges and blocking points mentioned include:

- Financing end of life operations (within companies). Making sure the right incentives exist in current financing options, so that it allows for blueprinting and integration of e-waste management into businesses' strategies.
- Lack of regulatory frameworks/incentives for businesses to deal with e-waste.
- Business interests and regulation: what constitutes the right legal framework might be different for each party, since the financial responsibility for e-waste management in EPR schemes lies with the producer (cost-effectiveness is key to drive compliance).

Unlocking barriers to access to waste could bring e-waste volumes to a level where recyclers can operate with increased stability.



My personal highlight was to discover the willingness of off-grid solar companies to work in partnership with e-waste handlers



## Global LEAP winners announced

The Global LEAP Solar E-Waste Challenge will make 1 million USD in grant funding available to 8 companies with innovative approaches to e-waste management in the off-grid solar sector in sub-Saharan Africa, which includes solar lanterns, solar home systems (SHSs), and solar-powered appliances at their end-of-life. Grant funding is made available for recycling and e-waste management companies who work with (or plan to work with) the off-grid solar sector operating across sub-Saharan Africa, other specialized e-waste service providers, and off-grid solar distributors who want to pilot or expand end-of-life operations.

In the frame of the Global LEAP e-waste challenge, CLASP will also publish a market scoping report<sup>2</sup> which looks at:

- Current and previous approaches to e-waste management
- Barriers to improving solar e-waste management
- Opportunities to improve solar e-waste management
- Priorities for future research.

The winners of the challenge represent both companies and recyclers, and their projects span across seven countries.



### Lessons for the Wider Sector

There are two main focus areas for the winning projects: improving take back and collection, and the possibility of battery (Li-Ion) refurbishment or recycling in country. As we learned across the three days of the festival, these are two of the main barriers the industry faces at the moment to improve their recycling and e-waste management operations. One of the aims of the challenge is also to generate learnings for the whole industry. The progress and results will be closely followed over the next 12 months, in the hope that the pilots can be replicated and/or translated into other contexts. CLASP and GOGLA will be working with awardees to identify key learning points and coordinate results measurement and dissemination. GOGLA is a partner on the program and supports market scoping, grant design, communications and learning. We've not been involved in selecting proposals of administering grants to maintain our neutrality as an industry association.

## Project Proposals

Company	Countries of implementation	Project description
<b>Enviroserve Rwanda</b>	Rwanda, Burundi DRC Uganda	Establish solar e-waste collection points in each of Rwanda's 30 districts and neighboring country border points. Collection sites will be strategically located to access rural and hard-to-reach customers. Grant funds will also be used to work with innovation partner, Carnegie Mellon University - Africa, to develop a tracking system to optimize logistics and streamline communication with users. The goal is to cover 100% of Rwanda, including border points, and to collect 70% of solar e-waste from Rwanda and the region.
<b>Fenix International</b>	Uganda	Pilot a program to utilize their last-mile presence and extend existing recycling processes to cover non-Fenix component-based solar systems. They will use their Service Centers as trade-in locations for customers interested in recycling their worn-out generic systems. Furthermore, they seek to engage last-mile service agents to identify high-risk products like lead acid batteries and return them to logistics hubs. Fenix will launch and refine the program in Uganda and use the learnings to pilot a similar program in Zambia. They anticipate collecting at least 15,000 kilos of discarded generic solar components.
<b>d.light</b>	Kenya	Incentivising customers to dispose of End of Life (EoL) and Out of Warranty (OOW) solar products at d.light outlets. Through a targeted consumer awareness campaign, the project will encourage customers to buy new solar products at a discounted rate when old products cannot be repaired, thus preventing a return to the use of other energy sources like kerosene. d.light will collect solar products regardless of manufacturer, and analyse data to understand the types and volumes of solar e-waste that have been kept in customers' homes, as well as response to the incentive mechanism.
<b>WEEE centre</b>	Kenya	Focus on collection, refurbishment and recycling of off grid solar products. The Centre will conduct a nationwide awareness campaign to increase public knowledge on the importance of solar e-waste recycling and existing e-waste collection centers. WEEE Centre will also create strong linkages with large solar companies in the region as the designated facility for disposal. The grant funding will allow WEEE Centre to increase capacity and training for solar e-waste recycling both within and outside the Centre.
<b>WeTu</b>	Kenya	Create 7 battery collection points in WeTu hubs along the coast of Lake Victoria. Engage 9 Beach Management Units, comprising of 4,7K fishermen, who use an estimated 2,5K batteries to power fishing lanterns daily. The focus will be on managing li-ion batteries, given the lack of e-waste management operations in the area.
<b>Hinckley Recycling</b>	Nigeria	Hinckley will work with Lumos Nigeria, Taisen and Carnegie Mellon University - Africa. The project will involve coordination with formal and informal collectors to ensure safe recycling of batteries. Hinckley plans to conduct research on informal collectors' role in accessing e-waste in remote areas of Nigeria; evaluate the efficacy of incentives and improved logistics to access remote locations; develop a process to reuse battery cells by manufacturing new products from off-grid solar batteries.



## Solibrium

Kenya

In collaboration with Swiss Foundation myclimate, and with technical support from Omnivoltaic, Solibrium will address the emerging issue of solar e-waste primarily through SHS life-extension activities. With funding from the grant, Solibrium aims to create the enabling conditions for a viable take-back/buy-back business model through a combination of research on existing use of SHS and e-waste management, the development of a platform for managing and tracking solar e-waste, and the deployment of various battery management technologies and techniques aimed at increasing SHS battery lifespan. The long-term aim is to scale their e-waste model across Kenya.

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## SunnyMoney

Zambia

Developing an innovative take-back scheme in the Choma District of Zambia. The project will incentivize rural customers to return non-functioning solar products to local schools and agents. The company will also focus on repair, aiming to develop open source training manuals and videos that would be made available on a customized web platform and through an App. The materials would be made accessible to local repair shops and schools to increase understanding of solar e-waste and how to repair products. The SunnyMoney e-waste App will also act as an online marketplace to enable the exchange of and access to key spares, components needed for repair and refurbishment, and act as a portal for refurbished products to be sold.

## DAY 3

Festival participants visited the WEEE Centre with the aim of getting a better understanding of the practicalities of e-waste handling and treatment. The **WEEE Centre** is located in the outskirts of Nairobi, they share location with second-life battery manufacturer **Aceleron** and **Computers for Schools Kenya** – the organization has recovered ICT equipment, refurbished and sent it to over 10,000 schools in Kenya since 2002.

Around 30 people attended the visit, making in one of the largest corporate groups to have an organized visit to the WEEE Centre's facilities. During the visit, the group was able to see first-hand how equipment is dismantled and how certain fractions are treated. From plastics shredding to cable-stripping, attendees were able to follow the journey of waste.

Knowledge of recycling processes and e-waste management operations is important for manufacturers and distributors for several reasons:

- To understand storage and handling considerations of e-waste
- To enter a partnership with better knowledge of several aspects of e-waste management (cost structure, roles and responsibilities, the possibility of benefitting from the presence of other actors in the e-waste landscape).
- To identify and understand existing challenges for recyclers and working together towards creating a better situation for both parties. In particular, raising awareness of consumers and take-back and collection require cooperation and coordination between producers and recyclers.





## CONCLUSIONS

We are confident that the industry is on the right track to bring to life the ideas and projects that have taken shape in the last months or have come out of this event. The sector is headed in an exciting direction when it comes to creating new partnerships to tackle e-waste management collaboratively. The presence and commitment of so many different actors, as well as their willingness to work toward a common goal were one of the highlights of the event.

The industry welcomes regulation and stands ready to collaborate to refine the bill and implementation framework. The off-grid solar industry has unique perspectives and strengths to contribute to e-waste management that can serve society and environment.

During the coming 12 months, we look forward to see the pilot projects funded by Global LEAP take shape and bring learnings for the entire industry. We hope that the discussions we've had will continue in the future and that we can build upon them as we continue to go faster, further, together.

A big thank you to Swedfund, the team of CLASP, USAID, KEREA, CDC, Athina Kyriakopoulou, and all of the presenters and participants.



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The Voice of the **Off-Grid Solar Energy** Industry