GOGLA

The Voice of the Off-Grid Solar Energy Industry

E-waste Toolkit Module 4 Briefing Note

E-waste Regulation and Compliance

Executive summary

Changes are happening in the way e-waste is handled and regulated. For the off-grid solar sector, legislation is looming that will affect companies' operations and finances and ultimately increase the cost of doing business. In Kenya, Rwanda and Ghana regulation is already being put in place which will have broad reaching effects and likely see many more countries follow suit.

Producer Financing, using the Extended Producer Responsibility model (whereby the off-grid solar company is the "Producer), is the most common form of regulation. The EPR model entails operational and financial obligations for producers, with both direct and indirect associated costs. The principal direct cost is for the collection and treatment of 'problematic fractions,' referring to e-waste which has a negative financial value. Producers will also be required to report actual and expected sales data to a national register to achieve regulatory compliance.
The terminology of this new regulation is all important, with significant elements that need to be defined. How are the responsibilities allocated to each stakeholder? How are off-grid solar products categorised? How are the financial obligations calculated?

In addition, there are various challenges for companies, and the industry, to consider as they engage with regulation and compliance. Ensuring the effective design, implementation and enforcement of regulation is vital to avoid making quality products less affordable. This would result in negative outcomes for low-income consumers and the environment.

Regulation and EPR business models from more mature markets offer inspiration for developing an appropriate and cost-effective industry response. An industry compliance scheme or Producers Responsibility Organisation offers various advantages; it can achieve improved economies of scale, invest in building expertise that member companies can draw upon, manage finances and control costs, and be a strong representative for the industry.

Through this toolkit, seminars and briefing notes provided, GOGLA aims to inform and inspire discussion among companies and stakeholders in the sector, as we navigate this new regulatory environment. Overcoming the challenges of e-waste enables the sector to reach more customers with quality, affordable off-grid solar products, providing energy access to more households, while upholding our collective environmental responsibility.

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Introduction

Globally, 44.7 million metric tonnes of e-waste is produced each year. This figure is growing with increased sales of electronic products and shorter product replacement cycles.

Europe and the Americas generate the highest amount of e-waste per capita at 16.6kg per person and 11.6kg per person respectively. These numbers are prodigious compared to Asia, which produces 4.2kg per person, and Africa which generates 1.9kg per person[1]. Governments around the world are recognising the environmental concerns associated with e-waste and 67 countries have adopted e-waste legislation to date.

E-waste legislation is yet to be introduced for the off-grid solar sector, though regulation is now being put in place in some countries that will affect companies' operations and finances. Off-grid solar products are, by definition, included in the scope of e-waste legislation, though not the target specifically. Off-grid solar waste represents only a fraction of the total sum of e-waste produced, even in countries with a mature off-grid solar market. For example, in Kenya, off-grid solar waste is about 3% of the total generated and in Rwanda and Nigeria off-grid solar represents only 0.4% and 0.02% respectively[2].

The introduction of mandatory legal obligations by policymakers is the usual approach, and often considered the most effective, to ensure environmentally sound management of the various types of electrical and electronic waste, otherwise known as e-waste streams. It may be argued that government regulation is necessary, particularly where the waste product has a negative financial value, meaning there is no incentive for the private sector to collect and treat products at the end of their life cycle. In this case, regulation could enforce and increase the rate of e-waste treatment, allocate the cost fairly among producers and enable profitable recycling businesses.

However, designing and implementing e-waste regulation is challenging, particularly in developing countries. The reason for this is threefold: informal collection and recycling is prevalent, basic infrastructures for waste management are scarce and both consumers and industry are less aware of waste management risks and practices[3]. The off-grid solar market also serves highly price-sensitive consumers and any price mark-up due to e-waste management will likely lead to fewer sales. This would result in negative social and environmental outcomes and hinder efforts to achieve energy access targets.

An alternative (or intermediate step) to mandatory regulation is voluntary industry and consumer action. For example, a voluntary industry compliance scheme, supported by public sector investments in collection and recycling infrastructure, combined with smart incentives could motivate stakeholders and leverage their respective strengths may be more effective.
The aim of this briefing note is to help companies understand e-waste regulation and compliance. It provides an overview of the e-waste legislation landscape, including the current status of regulation in key countries, describes how the Extended Producer Responsibility (EPR) mechanism works, and outlines different industry approaches to compliance. This briefing note complements the GOGLA Industry Opinion on Lifecycle and Recycling.

Policymakers seeking GOGLA's view on designing an enabling environment for improved off-grid solar waste management should turn to Guidance for Governments.

1 E-waste Monitor (2017).
2 Cost Benefit Analysis and Capacity Assessment for the Management of Electronic Waste in the Off-Grid Renewable Energy Sector in Kenya (DfID, 2017).
3 E-waste Handbook for Policymakers. (ACE, 2019).

Background

Industry initiatives on e-waste

The off-grid solar industry has environmental protection in its DNA. The issue of e-waste has long been on the agenda of the sector with many companies voluntarily establishing e-waste management operations and partnerships, even in the absence of regulation. These efforts are motivated by environmental and social protection, investor interests as well as brand and PR concerns.

In 2014, GOGLA members voted to adopt an Industry Opinion on lifecycle and recycling[4]. The Industry Opinion states that members are committed to the principle of Extended Producer Responsibility. These are:

- Develop products that can be easily maintained and repaired. Spare parts need to be made available.
- Strategies to implement proper take-back and recycling should be envisaged in countries of operation
- Identify synergies in the use of standard resources and materials to facilitate separation during recycling and reuse.
- Avoid the use of hazardous substances and find alternatives for them, if technically possible. If this is not possible, incentives for collection of the parts containing these hazardous substances should be developed.

It states that GOGLA members will align their efforts with other stakeholders to raise consumer awareness and look for solutions to integrate and contribute to common collection and recycling activities.

Conventions

Several international conventions, protocols and laws provide guidance and standards for e-waste management. Below are the frameworks for global approaches, such as the Basel or Rotterdam conventions, and the regional conventions including the Bamako convention, addressing imports of hazardous waste, and the Maputo protocol to safeguard health and safety considerations. Joint action to address e-waste management has become more relevant in recent years[5].

Basel Convention

Scope: Global.

Objective: Address the potential health and environmental risks of hazardous waste.

The definition of hazardous waste, as outlined in the convention, is based on their origin and/or composition and their characteristics. Other waste (household waste and incinerator ash) are also considered. Its main aims are:

1. Reducing hazardous waste generation and promotion of environmentally sound management, regardless of the location of disposal.
2. Restriction of transboundary movements of hazardous waste except in accordance with principles of environmentally sound management.
3. Creating a regulatory system that applies to cases in which transboundary movements should be allowed.

Bamako Convention

Scope: Regional.

Objective: Prohibiting imports and controlling movement of hazardous wastes within Africa.

The convention was created to address certain aspects of e-waste management that are not covered by the Basel Convention. The treaty was developed by the nations of the Organisation of African Unity, it prohibits imports of all waste without exceptions and it provides a stronger tool to prevent hazardous waste trade affecting less developed countries.

There is also the **Stockholm Convention**, which has global scope and relates to persistent organic pollutants (POPs) and the **Minamata Convention**, again of global scope, covering mercury and mercury compounds.

4 GOGLA Industry Opinion on Lifecycle and Recycling (2014).
5 Developing legislative principles for e-waste policy in developing and emerging countries (StEP initiative, 2018).

Off-grid solar and e-waste legislation

Status of e-waste legislation in leading off-grid solar markets

Off-grid solar waste is governed by a spectrum of government policy, strategies, bills and Acts. For example, in Kenya there is a Waste Management Policy and Environmental Act that are relevant for off-grid solar repair and waste management operations and recycling partners. This applies particularly to hazardous battery waste. There is also the draft E-waste Bill that focuses on the end-of-life management of the product. It is important to note that the E-waste Bill provides the legal mandate, but it is the Implementation Framework that contains many of the significant details that determine the financial obligations of producers. In late 2017 GOGLA commissioned a study to look at the status and scope of e-waste legislation in the key off-grid solar markets (see table below) and has actively opened up the topic for discussion with policymakers in Kenya, Ghana and Cote d'Ivoire.

E-waste legislation is championed by Ministries of Environment, regulated by Environmental Agencies or Regulators and implemented by a National Steering Committee, ideally with engaged representatives from the private sector. Collaborative solutions between the Ministries of Environment and Energy need to be put in place to overcome the challenges of balancing environmental protection and accelerating energy access targets.

As with other policy topics, the speed of development, type of regulation and level of enforcement varies depending on the national context and priorities. In Kenya, the E -waste Bill was first drafted in 2013, and with renewed impetus is likely to be signed into law in late 2019. In Ghana, e-waste is a high-profile issue on the national agenda and the slum of Agbogbloshie in the capital Accra has been referred to as "the world's biggest e-waste site." As such, the Hazardous and Electronic Waste Control and Management Act (Act 917) was published rapidly in 2016 with support from the President's office. E-waste legislation is published in India, though the off-grid solar sector is not subject to enforcement. It is acknowledged the regulator has higher priorities given the negligible contribution and low-hazard nature of off-grid solar in India's context.

The East African Communications Organisation (EACO) represents an example of a regional entity working on e-waste regulation. The organisation

Table 1: Baseline e-waste status in EAC, Ghana and India and implications for Off-Grid Industry[6]

Country	E-Waste legislation	Availability of recycling infrastructure	Off-Grid Products specifically in scope	Betteries in scope	Main EEE in scope (connected SHS)
BUR	First Draft	Fair / Poor	No	No	TV, Radio, Fans, water pumps
KEN	Draft, pending final approval	Fair / Good	Potentially	Yes	TV, Radio, Fans, water pumps
TAN	Expected draft in 2019	Fair / Poor	No	N.A.	N.A.
RWA	Published	Fair / Good	Under discussion (to be in)	Yes	TV, Radio, Fans, water pumps
UGA	No Draft	Poor	No	No	TV, Radio, Fans, water pump
GHA	Published, not enforced	Fair / Good	Yes / Partially	Yes	TV, Radio, Fans, water pumps
IND	Published, not enforced for off-grid solar	Fair / Good	Not in scope	Separate Batteries legislation for LABs	TV, Refrigerator, AC

SOURCE: GOGLA / Sofies, 2017, updated August 2019

6 Note, this table is a sample and does not capture all the countries where e-waste legislation is in the pipeline. Please refer to the member space in the GOGLA website for more information about specific national documents. Availability of Recycling Infrastructure definitions: Fair = one or more e-waste recyclers available, decent operations with no apparent health and/or environmental risk. Handling of batteries remains a challenge in all countries. Good = Recyclers available with dedicated technologies for de-pollution or treatment available (CRT cutter, De-gassing for CFC, cable strippers, etc.)

Off-grid solar and e-waste legislation

has an E-waste Working Group that aims to harmonise policies, strategies and regulations on e-waste management in the region[7]. Development partners are also supporting governments on off-grid solar e-waste policy including GIZ, IFC, UN Environment and UKAID through the Africa Clean Energy Programme. There are a wealth of resources available to guide the development of e-waste legislation, with some particularly helpful materials from the Solving the E-waste Problem (StEP) initiative.

Similarly, the GSMA is ramping up its efforts on e-waste through the CleanTech programme. The initiative offers opportunities based on the synergies between the off-grid solar and mobile sectors. The hardware has an overlapping consumer base, both rural and distributed, and the business models are integrated through communications and digital technology.

Defining the product scope of e-waste

A crucial element of e-waste policy is the definition and product scope. This gives regulators, producers and recyclers clarity on the products that are governed by the legislation and affects how the producers' financial obligation is calculated. A standard definition of e-waste is outlined in the Kenya draft bill:

"electrical and electronic equipment" means equipment which is dependent on electric currents or electromagnetic fields in order to work properly and equipment for the generation, transfer and measurement of such currents.

"electrical and electronic equipment waste" means waste resulting from electrical and electronic equipment from home and commercial use, including components, sub-assemblies and consumables that form part of the product when disposed.

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7 EACO Working Groups.

Off-grid solar and e-waste legislation

The definition is expanded to a categorised product list. For example, Table 2 shows the six categories from the EU WEEE Directive. The Kenya draft bill and accompanying documents[8] list 11 categories, with the notable additions of Lighting Equipment and Batteries compared to the EU categories. Waste streams with a high environmental and/or health risk are typically the focus of environmental agencies, whereas categories with a high material value are targeted by private sector both formal and informal. Batteries are sometimes in scope of e-waste regulation though may also be covered elsewhere in hazardous waste regulation.

Lighting equipment

a. luminaries for fluorescent lamps;
b. straight fluorescent lamps;
c. compact fluorescent lamps;
d. high intensity discharge lamps, including pressure sodium lamps and metal halide lamps;
e. low pressure sodium lamps;
f. other lighting or equipment for the purpose of spreading or controlling light.

The Lighting Category and associated sub-groups in the Kenya draft e-waste bill.

Following the definition stated above, off-grid solar products are undoubtedly within the scope of e-waste legislation. However, off-grid solar products are not explicitly listed in any legislation appearing to date, instead the constituent components and appliances are listed. This is an indication that off-grid solar is not currently a primary target of policymakers. It is possible this reflects the relatively low environmental and health risks, the small market size, or limited awareness of the market.

There is an argument for advocating off-grid solar products should be explicitly itemised in the bill. This would give greater transparency, certainty and control over the financial obligations attached to managing e-waste, though this can risk making responsible off-grid solar companies an undue target and derail potential cross-subsidisation[9].

Table 2: the six product categories in the EU WEEE Directive (Off-grid solar has been added for comparison)

Category	Weight / size	Environmental / health	Material value
1. Cooling & Freezing (CFCs)	High	High	Medium
2. Screen	High	High	Medium
3. Lamps (with mercury)	Low	High	Low
4. Large household appliances	High	Low	Medium / High
5. Small household appliances	Medium	Low	Medium
6. IT and Consumer Equipment	Medium	High	High
Solar (Grid / Off-Grid)	High / Low	Medium	Low

SOURCE: GOGLA E-waste Toolkit Seminar 4 (Sofies slides)

8 National E-Waste Management Strategy, revised draft (Ministry of Environment and Forestry, April 2019)
9 Briefing Note 3: Financials of E-waste includes a description of how a producer's financial obligation is calculated according to the product categorisation.

E-waste regulation in practice

Types of e-waste regulation

There are four main types of regulation. Each outlines a different set of operational and financial obligations for the respective stakeholders. These four models are:

- Waste-holder Financing: the individual disposing of the waste pays.
- Consumer Financing: The consumer pays direct to the e-waste fund upon purchase of the new product.
- Producer Financing: The producer, defined as the original equipment manufacturer or importer, pays.
- Hybrid Model: Taxpayers finance access to waste and producers finance remaining steps.

Producer Financing using the Extended Producer Responsibility model is the most common form of regulation, both in developed and developing economies[10]. There are a variety of finance mechanisms to obtain funds from producers. The payment may be made upon placing the product on the market (e.g. an "Eco-levy" or "Advanced Recycling Fee"), or at the time the waste is treated[11].

Ghana has recently implemented an Eco-levy and is the only country in sub-Saharan Africa to adopt this mechanism. The regulation obliges importers of any electrical and electronic equipment to pay a fixed levy prior to importation and absolves them of any operational responsibility on take-back, collection and treatment[12]. The Eco-levy amount is $1.5 for solar lanterns and $8 plus for Solar Home System (SHS) kits depending on components and appliances. This represents a significant addition to the product price that can have negative implications for the affordability of products for price-sensitive customers.

Extended Producer Responsibility (EPR)

Mandatory compliance has commonly taken the shape of Extended Producer Responsibility (EPR). This model sees the main financial obligation for compliance placed with the producer. EPR involves a shift in responsibility be it administratively, financially and/or physically, from governments, municipalities and by extension taxpayers, to the entities that make and market the products that enter the waste stream. It still embodies the implementation of the polluter-pays principle (PPP), but makes a change in the definition of the 'polluter'. In the original version of the PPP, the polluter was defined as the individual directly causing pollution which in most cases is the consumer. Within the EPR framework the polluter is defined as the economic agent that can play a decisive role in avoiding pollution, for example through eco-design efforts[13].

> The Extended Producer Responsibility Directive is a means of encouraging the design and production of electrical and electronic equipment which take into full account and facilitate repair, possible upgrading, reuse, disassembly and recycling.
>
> EU WEEE Directive

10 Notable exceptions include California where the consumer pays upon purchasing the product and Japan, where consumers pay upon disposal.
11 A description of the various economic instruments / finance mechanisms is contained in: Extended Producer Responsibility, Updated Guidance for Efficient Waste Management (OECD, 2016).
12 The legislation – with a full list of Eco-levy amounts per component - is available on the GOGLA website member space.
13 Development of Guidance on Extended Producer Responsibility, EPR (European Commission, 2014).

E-waste regulation in practice

There is evidence that EPR systems have helped decrease the volume of waste headed for final disposal[14] and increased rates of recycling. EPR systems have also contributed in many places to the development of a recycling industry. However, in some countries they are rarely enough to serve as an influencing factor[15]. In order to holistically address e-waste management improvements, legislation normally considers the collection, reuse, and recycling experience through the lenses of collection, financing, cost-effectiveness, transboundary movements.

The off-grid solar sector has unique strengths when it comes to take-back, collection and transport of waste. Many companies have extensive distribution networks, often reaching the customer's door with roaming agents. Beyond this, Pay As You Go (PAYGo) companies have regular contact with their consumers, they know their location, system performance and contact details. Recognising and leveraging these unique sector strengths will improve and accelerate efforts to realise a cost-effective e-waste system.

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Defining the "Producer"

The producer is legally obligated to comply with EPR. A clear, indisputable definition of who constitutes the producer is therefore critical. The most common definition of the producer is **the manufacturer, importer or brand owner of the product**. In some countries, such as India, producer and manufacturer are defined separately, as are distributor and importer, but they must all still comply with the EPR obligations if they are putting a product on the market (ACE, 2019). Kenya's draft e-waste bill outlines the following definition:

'Producer' means any person who introduces new or used electrical and electronic equipment into the market and may include a person who:

- manufactures and sells electrical and electronic equipment under own brand;
- resells electrical and electronic equipment produced by other suppliers under own brand;
- imports electrical and electronic equipment into Kenya;
- assembles electrical and electronic equipment for sale; or
- distributes electrical and electronic equipment;
- receives any electrical and electronic equipment which is to be donated.

14 Briefing Note 2: Design for Reduction of Waste outlines various product design and business model opportunities to extend product life and enhance repair, refurbishment and recycling of off-grid solar.

15 Extended Producer Responsibility: Updated Guidance for Efficient Waste Management (OECD, 2016)

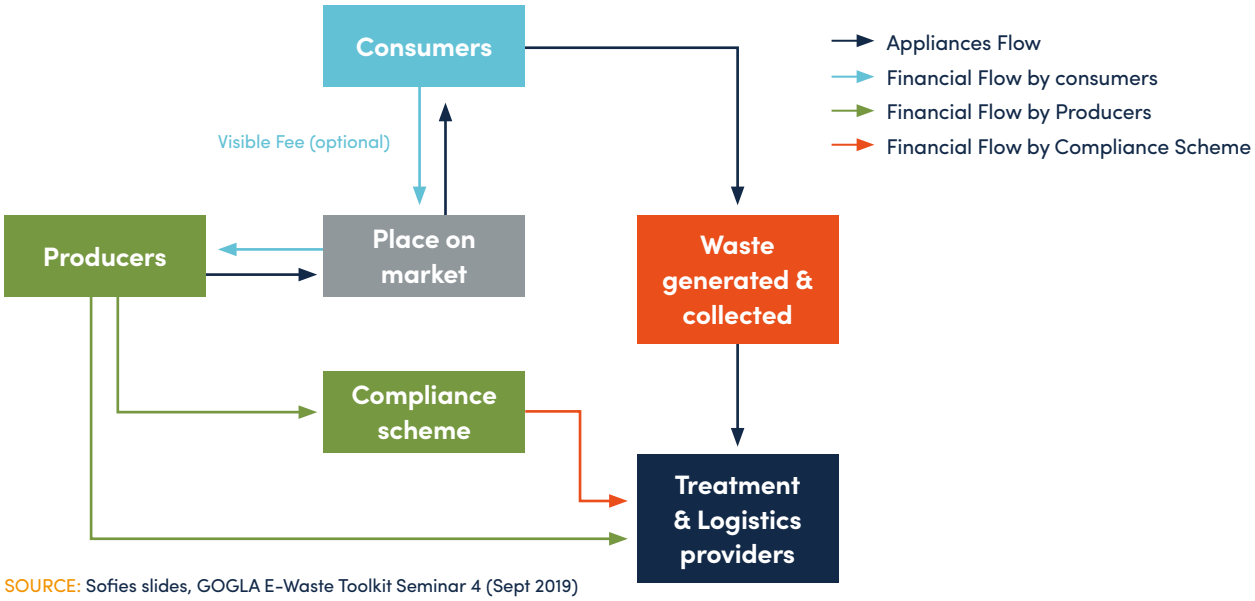
E-waste regulation in practice

EPR example – EU WEEE Directive

The WEEE Directive ('waste electrical and electronic equipment') is generally accepted as the main reference model for emerging policy frameworks. The first version of the directive was adopted in 2002, with the document further amended in 2012 to contemplate a transition period of 2012-2018 including clarifications regarding collection rates, handling and transport and disposal, and detailing financing provisions.

The Directive contemplates three main components: health and safety, reducing environmental impact, and resource efficiency – particularly regarding eco-design efforts. It is anchored on precautionary principles, preventative action (the notion that environmental damage should be rectified at source), and the 'polluter pays principle' (PPP).

Figure 1: Schematic of the EU WEEE Directive



SOURCE: Sofies slides, GOGLA E-Waste Toolkit Seminar 4 (Sept 2019)

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E-waste regulation in practice

Table3: Example of allocation of responsibilities and costs according to EU WEEE Directive (ACE, 2019)

Stage in the End-of-Life	Operational responsibility	Financial responsibility	Notes & Examples
Access to waste	Consumers	Free of charge Producers might reimburse	· Consumers are disposing of their waste for free in existing collection infrastructures (municipalities & retailers or other dedicated ones). Infrastructure costs (set-up + running) are borne by municipalities or retailers. · In some cases, Producers or their Compliance Scheme reimburse them for a quota of operational costs (e.g. Netherlands, Belgium), or reward effective collection performances (e.g. Italy)
Collection costs - containers and logistics infrastructures	Collectors Recyclers	Usually Producers	· Service providers (logistics companies contracted by Producers/Compliance Schemes) own containers. Renting price is usually included in the contractual agreement with Producers/Compliance Schemes. · In some cases, Compliance Schemes purchased containers (e.g. Italy, for lamp collection)
Transport	Collectors Recyclers	Producers	· Service providers (logistics companies contracted by Producers/Compliance Schemes) contractually agree on the price for services provided.
Treatment	Recyclers	Producers	· Treatment plants (contracted by Producers/Compliance Schemes) contractually agree on the price for services provided (net treatment cost, per waste stream usually, positive or negative) in a competitive environment.
Enforcement	Government	Government	· Enforcement is the responsibility of central government and dedicated agencies (which are authorised to issue fines).
Audit on treatment standards	Government Producers	Government Producers (Compliance Schemes) running own audits	· Audits, particularly linked with issuing and monitoring of waste permit provisions are the responsibilities of central government and dedicated agencies (also authorised to issue fines). · In many cases Producers/Compliance Schemes are voluntarily auditing their contracted suppliers (on an annual basis a minima) to enforce contractual provisions and monitor environmental performance according to applicable standards (e.g. WEEE Forum WEEELabex)
Awareness Raising	Government Producers NGOs	Governments Producers (Compliance Schemes) voluntarily	· Awareness raising is usually the responsibility of Member States. · In Austria the clearinghouse is responsible for setting a fee for the costs incurred by municipalities or associations of municipalities to ensure the harmonised information of final consumers as a function of the number of residents; costs are borne by Compliance Schemes according to market share. For 2013, it amounted to 0.055 €/inhabitant (approx. 460,000 Euro) · In many cases Compliance Schemes across EU organise dedicated awareness raising campaigns.

E-waste regulation in practice

The 2002 Directive successfully catalyzed the establishment of EPR schemes, with many introduced between 2004 and 2006. The relationship between the collection targets laid out in the Directive[16] and the actual collection rates is difficult to attribute, but it can be assumed that, regarding recycling, the development of EPR has fostered reasonably high recovery rates. Collection rates are extremely variable, ranging between 1.2 kg/capita (Romania) to 17.2 kg/capita (Sweden) for WEEE and between 5% and 72% for battery recovery (Malta and Switzerland, respectively)[17]. Generally, EPR has successfully shifted responsibility to the producers, but its effects on product design have proven more difficult to ascertain[18].

Regarding the Directive's economic performance, accessing cost data to assess fees remains a challenge partly due to commercial sensitivities among Producer Responsibility Organisations (PROs). Available data shows that average tariffs paid by producers of WEEE present significant variations. Prices for a television range from EUR 0.8 to 8.0 a piece in France, whereas in Greece producers pay 254 EUR per tonne of TV's put on the market[19].

Until 2013, there was only one PRO/Compliance Scheme in the Netherlands, whereas other countries had multiple players operating in the recycling sphere which enables competition and improves the quality of services. WEEE NL was created to fulfil that exact purpose. Compliance systems such as PROs and other types of voluntary schemes ease and streamline collection and recycling, they generate jobs and facilitate collaboration between public and private actors.

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16 45% of the average weight of EEE placed on the market in the three preceding years was the target between 2016 and 2019. From 2019, that target was raised to 65% or alternatively, 85% of WEEE generated on the territory of a given EU Member State.
17 Latest data is from 2010. Source: Development of Guidance on Extended Producer Responsibility, EPR (European Commission, 2014). It is important to note that several schemes also started earlier, voluntarily.
18 Extended Producer Responsibility: Updated Guidance for Efficient Waste Management (OECD, 2016).
19 Development of Guidance on Extended Producer Responsibility, EPR (European Commission, 2014).

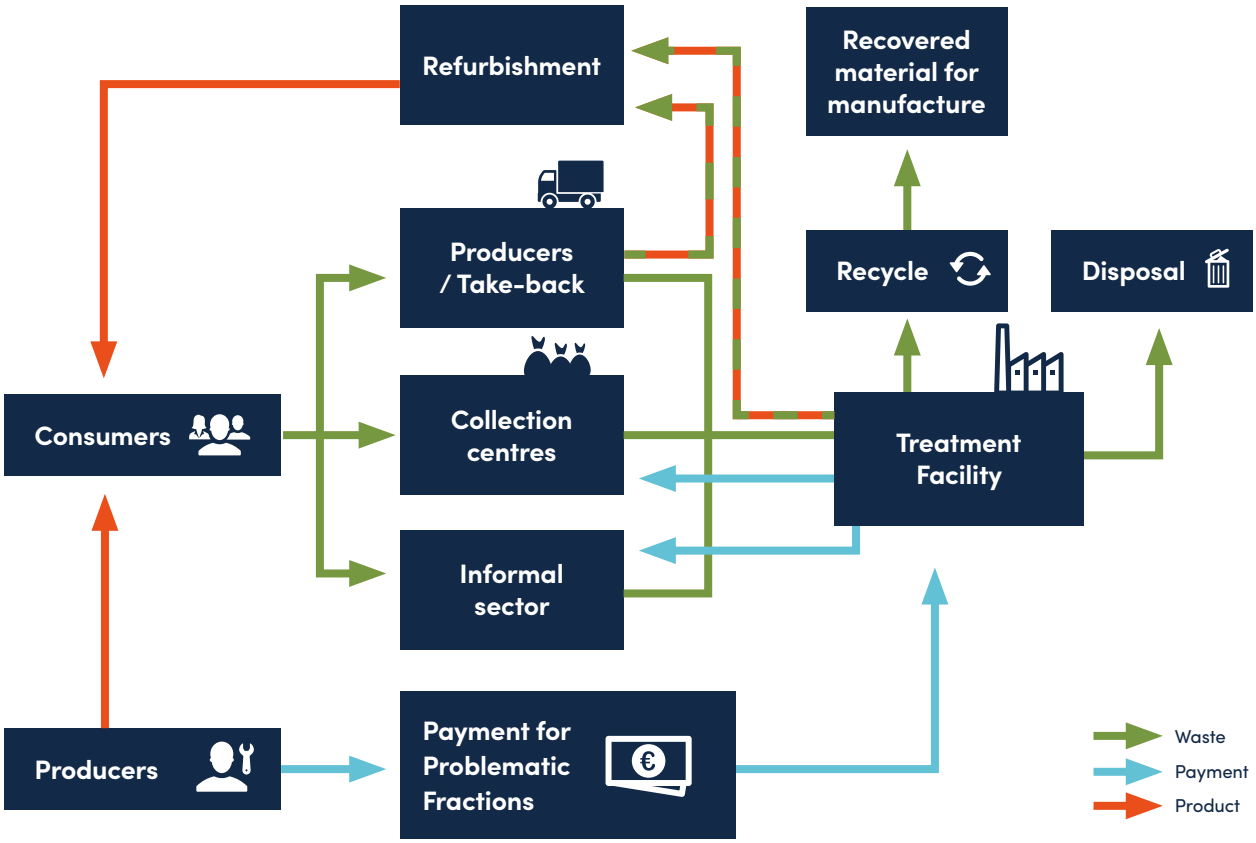
E-waste regulation in practice

EPR in action – Kenya's Draft E-waste Bill

The bill - formally known as the Environmental Management and Co-Ordination (Electrical And Electronic Waste Management) Regulations, 2019 - is being introduced by the Ministry of Environment and Forestry and will be implemented by National Environmental Management Agency (NEMA). It sets out the establishment of a National Steering Committee that will define the Implementation Framework and manage the National EEE Register. It outlines the responsibilities of each of the stakeholders and the importation controls, prohibitions and penalties.

The EPR model entails both operational and financial obligations for producers, accounting for both direct and indirect associated costs. The principal direct cost is for the collection and treatment of 'problematic fractions,' referring to e-waste which has a negative financial value. Other direct costs include the license and registration with the regulator, though this is a nominal annual sum. Indirect costs include administrative efforts on sales data and recycling reporting, selection and audits of licensed transporters and recyclers amongst other cost considerations.

Figure 2: E-waste management value chain (Adapted from: E-waste Dismantling – An Entrepreneur's Guide, IFC)



* Producers: as per the definition of producer outlined in the section 'Extended Producer Responsibility' in this Briefing Note.
* Problematic fractions: e.g. lithium ion batteries, the formula to calculate this depends on national waste management policies.
* Treatment facility: refers to the treatment stage of e-waste, regardless of the actor that carries this out and of whether that is done by an e-waste management company or a recycler.

E-waste regulation in practice

Table 4: Operational and financial responsibilities per stage of the e-waste chain

Stage in the End-of-Life	Operational responsibility	Financial responsibility
Access to waste	A generator [waste holder] shall ensure electrical and electronic waste is segregated from other forms of waste and is taken to refurbishers, designated collection centres or licensed recyclers. Producers may facilitate take-back.	None defined.
Collection	Refurbishers. Collection centres (need to register with NEMA and operate according to standards.). Producers. Each of the above shall ensure waste is deposited at a licensed treatment facility.	Producer. A producer shall, within their relevant product type and on the basis of their market share, finance the treatment of problematic fractions by the licensed treatment facility.
Treatment	Recycling facilities need to be licensed by NEMA. Recyclers should give priority to refurbishment of appliances rather than recycling. Recyclers shall collect and treat e-waste in accordance with specific guidelines from NEMA.	Producer. A producer shall, within their relevant product type and on the basis of their market share, finance the treatment of problematic fractions by the licensed treatment facility.

It is important to note that the Kenya draft bill has no obligation for producers with respect to take-back, for example a producer must obtain waste products equivalent to 10% of the products they bring to market in any given year.
Producers also have the following reporting obligations:

- To register and declare (i) the number of products placed on Kenyan market on annual basis, dived into product categories, (ii) the subsequent year's projection of products to be introduced into the market.
- When applying for registration each producer should proof the contractual agreements with one of more licensed recyclers to fulfil his share of obligations.
- Annually, producers should report and prove thepayment for their "share" of financial obligations for the treatment of problematic fractions.
- The National Register calculates the individual producers' obligation based on total weight of products they placed on the market in each product category.

E-waste regulation in practice

Industry position on the Kenya Draft E-waste Bill

GOGLA, KeREA and their respective members worked together to review and the bill and submit an industry position to the respective Ministry. The off-grid solar industry welcomes the bill, recognising the need within the sector for this type of legislation.

Ensuring the effective design and implementation of regulation is vital to avoid affecting financially vulnerable consumers. It is essential to prevent quality products from responsible companies becoming less affordable while creating space for free riders with unbranded goods.

These messages may form a blueprint for analysis and advocacy in other countries.

To ensure effective implementation GOGLA recommends:

1. Enforcement efforts from National Authorities should be fairly implemented across all companies
2. E-waste National Steering Committee should include representation from off-grid solar industry
3. Collection point set up in accordance with the principle of proximity
4. E-waste National Steering Committee to fairly allocate the cost of collection in rural areas
5. To mitigate the financial liability in respect of waste originated by products placed on the market before legislation came into force
6. Allowing Producers to set-up their collective take back schemes to facilitate cost-effective compliance

Recommendation one refers to free riders, defined as companies avoiding legal obligations in respect of registering, reporting sales and financing proper management of e-waste. This includes the significant market for non-quality verified products.

Enforcing EPR

When it comes to the enforcement of EPR, financial risks are closely linked to both the design of policies and their enforcement. Without proper enforcement, stakeholders who comply with the required environmental, health, and safety standards can be at a financial disadvantage compared to those who don't comply, known as free riders.

Some actions which can ensure effectiveness may include:

- Regular exchange with the private sector to help identify free riders, challenges and possible solutions.
- Require identification and registration of producers and verify the information in their reports independently.
- Communication between environmental, customs and port authorities, as well as with the agency in charge of overseeing the register of companies or PROs for stringent enforcement on bans of illegal imports.

Promoting quality – the first step to reducing e-waste.

Quality verified products last longer and generate less waste. A recent study showed that the 17 leading non quality-verified products in East Africa had deficiencies that are likely to result in a short lifespan compared to Lighting Global certified products[19]. Following the waste hierarchy, a recommended first step for policymakers to reduce waste is through curtailing non-quality-verified products through standards adoption, importation control and enforcement.

19 Quality Matters: Technical Notes Issue 27 (Lighting Global, August 2018).

EPR business models

Whether e-waste management is handled voluntarily or to meet mandatory legal obligations, there are alternative business models for individual companies, or industry as a collective. Among these are:

1. The producer performs collection, dismantling, segregation and storage of waste. The waste fractions are sent to recyclers for treatment, recovery and disposal. It is likely necessary to have various recyclers to treat the different material fractions such as plastic, lithium batteries.
2. The producer contracts a single e-waste management company to take its waste products and fulfil the collection, transport and treatment obligations. The e-waste management company will identify recyclers to treat the waste and should ensure appropriate environmental and health standards are adhered to.
3. A compliance scheme or Producer Responsibility Organisation (PRO) that fulfils the obligations on behalf of the members through contracts with an e-waste management company or recyclers. The compliance scheme/PRO manages the financing of the system; paying for collection and treatment and charging members fees accordingly. While a PRO is founded by producers collectively and governed by members as a non-profit, a compliance scheme is similarly co-founded but run as an independent for-profit company that acts as a service provider for producers.

Table 5: Responsibilities and services of a PRO (ACE, 2019)

	Manage the financing of the system
	Organise and supervise collection and recycling activities
	Maintain integrity of the system through standards and audits
	Conduct awareness raising programs
	Manages the corresponding data
	Provide reporting and compliance on behalf of its members

In many countries, the absence of e-waste management companies means that producers have no option but to fulfil the responsibilities themselves, as described in option one. In countries with e-waste management companies (including Kenya, Rwanda, Ghana) a producer needs to assess the added value of the service. Clearly, the e-waste management company will charge a margin, though may still offer reduced costs for higher volumes and the cost optimisation of working with different recyclers. The e-waste management company is responsible for ensuring appropriate environmental and health standards. Compliance schemes and PROs are the standard model in the EU. The schemes have various advantages including:

- Better economies of scale which lower the unit cost of collection, transport and treatment.
- Cost optimisation due to not-for-profit nature and pursuit of members' interests.
- Improved industry efficiency by avoiding the need of each producer to build expertise, negotiate contracts, ensure compliance, etc.
- Transparency and control of costs.
- More bargaining power with service providers and control over standards and quality.
- A stronger voice in advocating policy and regulation
- Good PR for companies and the sector

It would require substantial effort and coordination to establish a compliance scheme or PRO for the off-grid solar industry. Building consensus on strategy and financing would also present challenges given the different product categories and their varying associated costs, business models and commercial sensitivities such as sales and take-back data.

KARO SAMBHAV – Lessons from operating as a PRO in India

Karo Sambhav was founded in 2017 from an industry need to create an inclusive, sustainable, scalable and transparent systems for e-waste handling in India. Where e-waste management operations are being developed in major urban areas, but informal recycling has long been common practice as well, and it is estimated that there is around 1 million people involved in manual operations. The organisation works countrywide, across 29 states and 3 union territories. Since their inception, they have collected over 3000MTs for responsible recycling and engaged over 500+ bulk consumers, 5000+ Informal Sector Waste Pickers and Aggregators, 800+ repair shops across the country and partnerships with brands like HP, Dell, Lenovo and Apple. Waste producers can benefit from being part of a PRO in a variety of ways. The main benefits are the trust that comes from the collective character of the initiative; reduced risks as the company doesn't assume the risk of complying themselves as this is passed on to the PRO; access to a broader network to stimulate synergies; improved brand perception from supporting environmentally sound e-waste management, job creation and sustainable livelihoods.

Lessons learned and advice

Rules and guidelines are a good start, but the system needs to be constantly optimised. Since there is no appropriate infrastructure for responsible recycling, it is very important that organisations identify how they can go beyond what regulation asks.

In most places, e-waste is not regarded as a waste stream and its health and environment impacts can be easily overlooked by consumers. This can prevent the uptake of sound e-waste management and hinder the cost-effectiveness of frameworks designed to handle it. If the consumer expectation that e-waste is not waste continued unchallenged, the system will not become cost-effective. This will only change through continued engagement, there needs to be multiple touch points and channels.

It is important to encourage new companies to ensure that they are working with the right stakeholders early on. This can be done by providing knowledge and information or simply creating a space where best practices can be shared.

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