



From Waste to Jobs

Decent work challenges
and opportunities in the management
of e-waste in Nigeria

From waste to jobs: Decent work challenges and opportunities in the management of e-waste in Nigeria

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Preface

E-waste constitutes a small but rapidly growing part of the approximately 2.01 billion metric tonnes of solid waste generated globally each year (Kaza et al., 2018). It is a waste stream that has a significant impact on the environment, society and human health, and that has become a growing challenge for the world of work.

What makes e-waste different from the waste streams of glass, paper, wood and other materials is that used electrical and electronic equipment (UEEE) contains hazardous substances as well as valuable materials, and thus requires special treatment. When managed well, e-waste offers opportunities for the generation of sustainable repair and recycling enterprises, and for the creation of green jobs in the circular economy.

As one of Africa's major generators of and destinations for e-waste, Nigeria adopted legislation to address the challenge of e-waste in 2011. Businesses, employers' associations, workers' and civil society groups have taken action to formalize the collection of e-waste and make recycling processes more sustainable. However, much remains to be done to protect the environment and human health and advance decent work in the sector.

This working paper presents an overview of the challenges and opportunities of advancing decent work in the management of e-waste in Nigeria. It captures the complexity of the e-waste value chain and its impacts, and outlines several policy solutions for addressing decent work deficits and seizing opportunities for sustainable enterprises and green jobs creation in the management of e-waste in Nigeria.

Alongside two complementary papers on decent work challenges and opportunities in the management of e-waste in Argentina and India, this paper is intended to enable policy makers and stakeholders to better understand the complexity of the e-waste challenge at the national level in different countries across the globe and to develop a knowledge base for making more informed decisions and taking action to advance decent work in the management of e-waste. The paper is a product of an extensive literature review and consultations with experts in Nigeria.

The International Labour Organization (ILO) is the United Nations (UN) specialized agency devoted to advancing opportunities for women and men to obtain decent and productive work in conditions of freedom, equity, security and human dignity. The ILO's Sectoral Policies Department (SECTOR) promotes decent work by supporting the Organization's tripartite constituents – governments, employers and workers – in seizing opportunities and addressing challenges in 22 different economic and social sectors, including electronics and e-waste. The Office in Nigeria was established as the first ILO African Field Office in 1959, and has provided policy advice and technical assistance to the tripartite constituents since then.

The present working paper is the result of the combined efforts of colleagues in SECTOR and the ILO Country Office for Nigeria, Ghana, Liberia and Sierra Leone.

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Abbreviations

DNA	Deoxyribonucleic acid
EPR	Extended Producer Responsibility
EEE	Electrical and Electronic Equipment
FEPA	Federal Environmental Protection Agency
GDP	Gross Domestic Product
ILO	International Labour Organization
LASEPA	Lagos State Environmental Protection Agency
LAWMA	Lagos Waste Management Administration
NARAP	Nigeria Association of Refrigerator and Air-condition Practitioners
NESREA	National Environmental Standards and Regulations Enforcement Agency
NETAN	National Electronics Technician Association of Nigeria
OSH	Occupational Safety and Health
PBDE	Polybrominated Diphenyl Ethers
POP	Persistent Organic Pollutants
PPE	Personal Protective Equipment
UEEE	Used Electrical and Electronic Equipment
WEEE	Waste Electrical and Electronic Equipment

1. E-waste: an overview

Advances in information and communications technology, technical innovations and increasing access to electronic and electrical products have benefitted countries, societies, enterprises and individuals across the globe. They are providing new opportunities in sectors such as health, education, entertainment and commerce, to name just a few. The number of people who connect to the global information society and digital economy and benefit from these new opportunities is growing rapidly.

The growth in e-waste is a consequence of the growing demand for electronic and electrical equipment, which is driven by population growth, rising disposable incomes in developing countries, urbanization, digitalization and other technological advances (Baldé et al., 2017). By 2020, it has been estimated that approximately 50 billion devices will be connected to the internet (Taylor, 2015) – that is more than six times the number of people on the planet today.

This rising demand is fueling a competitive and dynamic global electronics industry, which was estimated to employ 18 million people globally in 2010. Decent work challenges and opportunities in the industry – from the extraction of raw materials, to the manufacturing of electrical and electronic products, through to the management of e-waste – have been the subject of several ILO reports.

The 2019 Global Dialogue Forum on Decent Work in the Management of Electrical and Electronic Waste (E-waste) was the first time that ILO and its constituents – governments, employers’ and workers’ organizations – had discussed the challenges and opportunities relating to e-waste in an official ILO meeting. The ambitious recommendations in the points of consensus adopted by the Forum concerning the protection of workers and the creation of sustainable enterprises and green jobs are reflected in the key considerations presented at the end of this report (ILO, 2019).

1.1. Defining e-waste

The definition of e-waste has been a topic of debate for many years, and the absence of an agreed definition has contributed to the lack of a shared understanding of the size of the e-waste challenge.

At its 12th meeting, in 2015, the Conference of the Parties to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal adopted technical guidelines on transboundary movements of electrical and electronic waste and used electrical and electronic equipment (UEEE), which contain the following definition:

“Electrical or electronic equipment that is waste, including all components, subassemblies and consumables that are part of the equipment at the time the equipment becomes waste”.

The Solving the E-Waste Problem (StEP) initiative hosted by the United Nations University defines e-waste as “all types of electrical and electronic equipment (EEE) and its parts that have been discarded by the owner as waste without the intention of re-use”. Items qualify for inclusion if they have “circuitry or electrical components with power or battery supply” (United Nations University/Step Initiative, 2014).

A directive of the European Parliament and of the European Council (Directive 2012/19/EU) defines e-waste as electrical and electronic equipment (EEE), “including all components, sub-assemblies and consumables which are part of the product at the time of

discarding”. The Directive covers the following six categories of electrical and electronic equipment:

- i. temperature exchange equipment;
- ii. screens and monitors;
- iii. lamps;
- iv. large equipment (any external dimension more than 50 cm), such as household appliances, information technology and telecommunications equipment, and electrical and electronic tools;
- v. small equipment (no external dimension more than 50 cm), such as household appliances, luminaires, musical equipment and toys; and
- vi. small information technology and telecommunications equipment (no external dimension more than 50 cm).

Differing definitions mean that materials considered to be e-waste in one country may not be considered e-waste in another. Some countries define e-waste simply as electronic waste, whereas in other countries, it comprises both electronic and electrical waste (Baldé et al., 2015). Furthermore, definitions of e-waste often exclude certain products that contain electronic or electrical components. Cars, for instance, are not included, although they contain many different kinds of electrical and electronic components.

Indeed, the term “e-waste” itself can be misleading, since it overlooks the inherent value of the discarded products. In 2016, the total global value of all raw materials in e-waste – including gold, silver, palladium, copper, aluminium and iron – was estimated at €55 billion (Baldé et al., 2017).

1.2. Approaches to e-waste

Since the 1990s, discussion of e-waste has focused on actual and potential environmental damage, on major risks to human health, workers and communities; and on the flows of e-waste from developed to developing countries. Past policy recommendations have overwhelmingly focused on the introduction of environmental legislation and regulation. However, there is growing recognition that enterprises, cooperatives, employers, workers, ministries of labour or employment, and labour market policies all have key roles to play in advancing decent work in the management of e-waste.

There is also growing recognition that the prevailing linear model of “take, make, use and dispose” generates waste that could – and should – be reduced throughout the life cycle of electronic and electrical products. Designing such products to last longer, and recovering, reusing and recycling more e-waste throughout the life cycle, will reduce demand for virgin materials and mean that less waste is generated from the extraction of raw materials, packaging and transport (Figure 1).

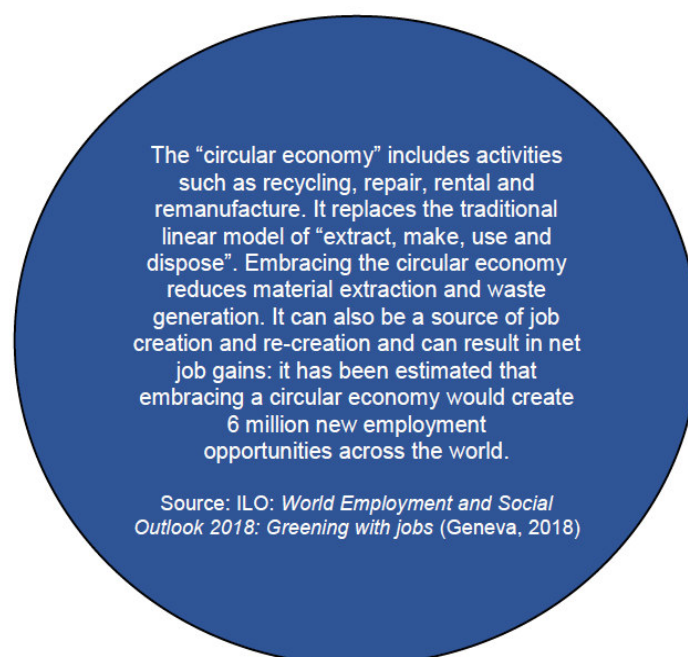
Figure 1. A typical product life cycle



Source: A Remmen et al. Life Cycle Management: A Business Guide to Sustainability (Paris, UNEP, 2007), p.12

Moreover, in applying a circular economy approach (Figure 2), e-waste comes to be seen as a resource that, if properly managed, can support livelihoods, generate employment, provide access to technology, enable technological upgrading, skills and knowledge transfer, and provide capital to produce second-hand commodities and to recover materials (Lepawsky, 2015).

Figure 2. The circular economy



With the adoption of the 2030 Agenda for Sustainable Development, the issue of e-waste management became part of the broader quest for sustainability, including through sustainable production and consumption and shaping a future that works for all at all stages in the circular economy. Advancing decent work in the management of e-waste is key to the achievement of a number of the Sustainable Development Goals – including those on good health (Goal 3), industry, innovation and infrastructure (Goal 9), sustainable cities and communities (Goal 11), responsible consumption and production (Goal 12) and partnerships for the goals (Goal 17) – but particularly Goal 8 to “promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all” (Figure 3).

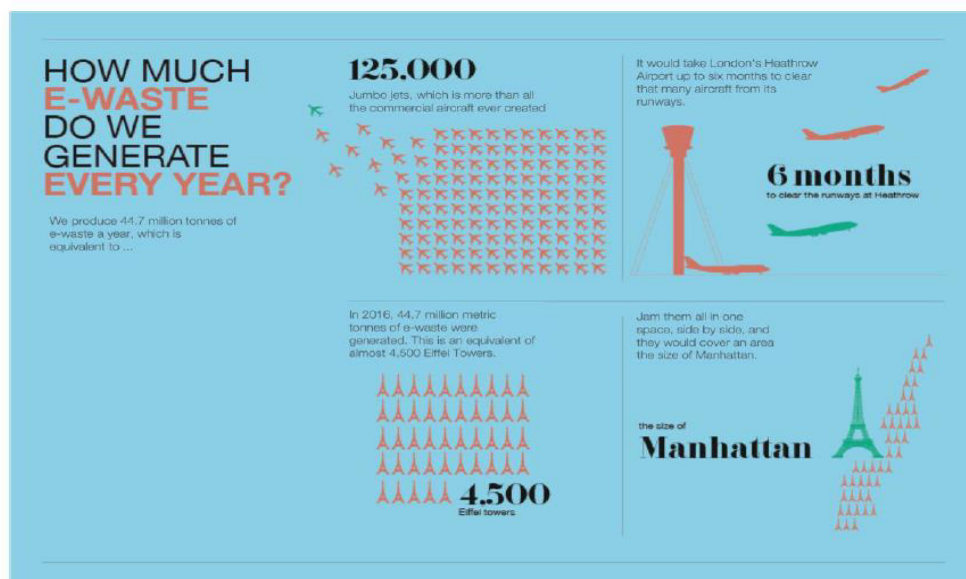
Figure 3. E-waste management key to the achievement of Sustainable Development Goals



1.3. Generation of e-waste globally

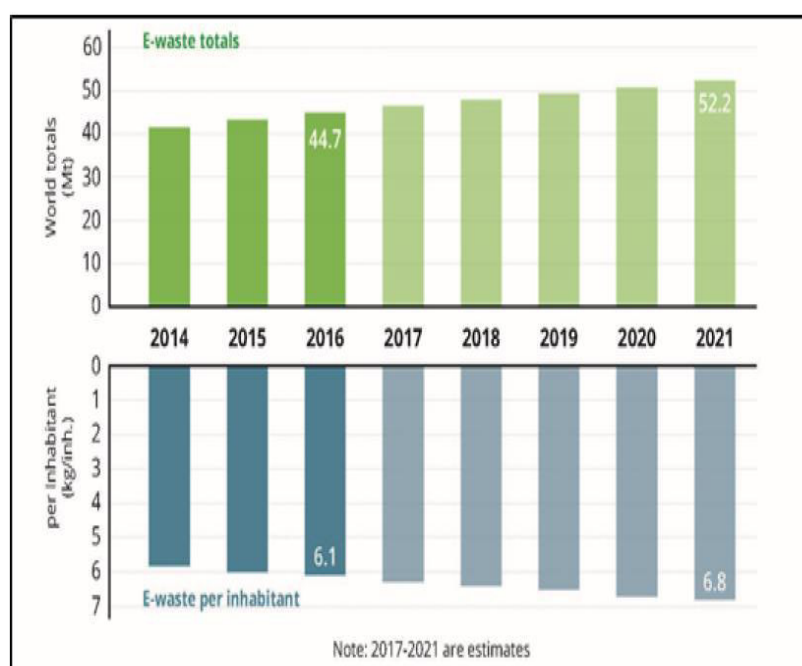
E-waste is generated by both the public and private sectors as well as by individual consumers. In 2016, a total of 44.7 million tonnes of e-waste was generated globally (Figure 4). E-waste is the fastest-growing waste stream, and is expected to grow to 52.2 million tonnes by 2021, at an annual growth rate of between 3 and 4 per cent (Figure 5).

Figure 4. E-waste generated globally



Source: G. Bel et al.: *A New Circular Vision for Electronics: Time for a Global Reboot* (Geneva, World Economic Forum, forthcoming).

Figure 5. Actual and projected growth in global e-waste generation



Source: Baldé et al.: *The Global E-waste Monitor 2017*, op. cit., p. 5.

The limitations of the statistics on e-waste include the fact that only 41 countries have collected data. Data is especially lacking on the amount of e-waste generated, managed

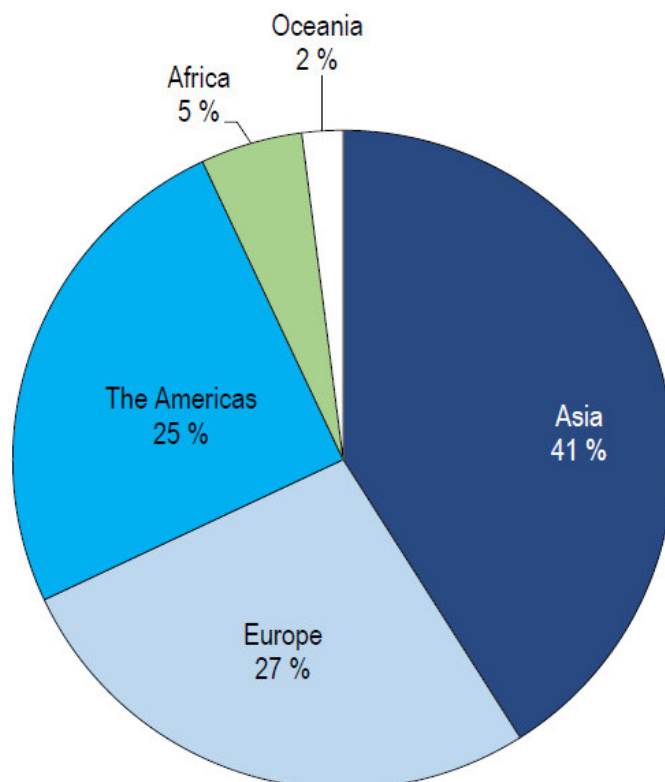
and traded. Furthermore, e-waste is commonly measured by weight, which provides no indication of a given product's propensity for ecological harm (Lepawsky, 2015; Liboiron, 2013).

It should also be noted that e-waste statistics generally do not account for the significant amount of waste and pollution generated in the extraction and transportation of raw materials for the production of EEE, or when such products are manufactured, distributed and sold. The life cycle of a mobile phone is a case in point: 80 per cent of total greenhouse gas emissions are generated from extraction and production of raw materials, compared to 14 per cent from mobile phone use, and just one per cent from end-of life treatment (Lepawsky, 2015; Liboiron, 2013).

1.4. Generation of e-waste by regions

As shown in Figure 6, Asia is the region that generates the largest share of the world's e-waste (41 per cent), followed by Europe (27 per cent) and the Americas (25 per cent). Africa generates approximately 2.2 million metric tonnes of e-waste, which accounts for just 5 per cent of the total. An estimated 50 to 85 per cent of the e-waste on the Africa continent is generated domestically, while the remainder is often illegally shipped to African countries from abroad (Baldé et al., 2017).

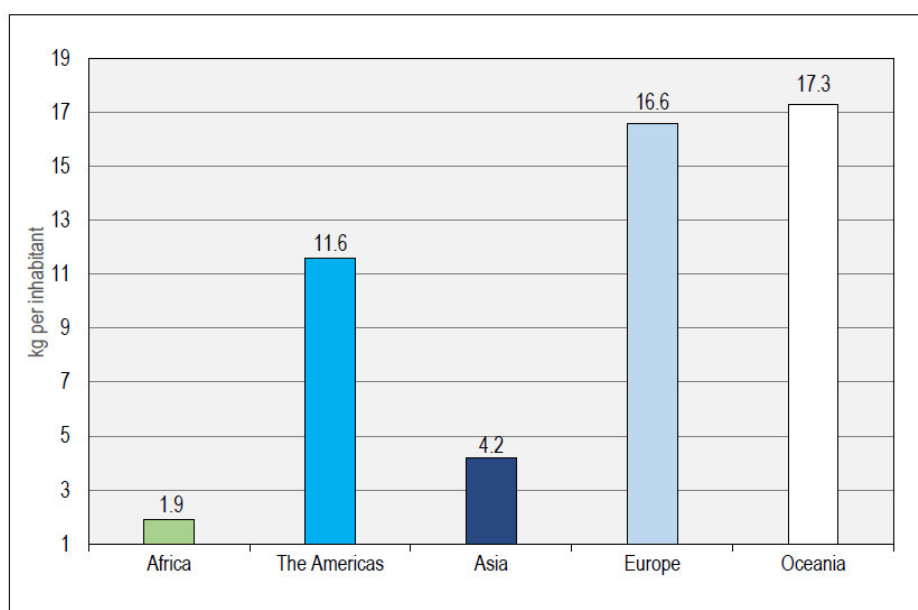
Figure 6. E-waste generated in 2016, by region



Source: Baldé et. al, 2017

The picture changes when e-waste is measured per capita: inhabitants in Oceania¹ generated more e-waste per capita than in Europe, the Americas, Asia and Africa (Figure 7). This is a reflection of how individual consumers, the public and private sectors in developed countries such as Australia and New Zealand generate more e-waste per inhabitant than developing countries. Africa currently has the lowest e-waste generation per inhabitant.

Figure 7. E-waste generated per inhabitant by region (kilograms per inhabitant)



Source: *ibid.*

Africa has the lowest e-waste collection rate for e-waste in the world, at only a little over zero per cent. Large generators of e-waste such as Europe and Asia have collection rates of 35 per cent and 15 per cent respectively (*ibid.*).

Most governments in Africa are now aware of the risks associated with e-waste. However, the legal, policy and infrastructural framework in many nations on the continent remains inadequate, and there is generally a lack of capacity and knowledge among key stakeholders as to how to manage e-waste through a circular economy approach (*ibid.*). Challenges in the region include low awareness among governments and civil society, lack of legislation, inadequate Extended Producer Responsibility (EPR) schemes, a large informal sector, and the absence of infrastructure and poor financing for waste management.

1.5. The Nigerian context

Nigeria is Africa's largest economy, accounting for 29.3 per cent of Africa's Gross Domestic Product (Odour, Verdier-Chouchane and Wafula, 2018). Its population of

¹ For the statistics discussed in this section, the Oceania region includes data from the following countries: Australia, Fiji, Kiribati, Federated States of Micronesia, New Zealand, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu.

approximately 191.8 million inhabitants makes it the most populous country in the continent. Nigeria's economic performance is crucial to the average growth performance of West Africa, and the country is one of the most prominent nations in the Economic Community of West African States (ECOWAS) (ibid.).

The Government of Nigeria has identified increasing security, tackling unemployment, increasing living standards, increasing climate resilience and economic diversification as key policy priorities (World Bank, 2017). These priorities were reflected in the ILO's Decent Work Country Programme (DWCP) for Nigeria (2012-15), which notes that low earnings, poor social indicators and disparities by income, gender and location are major obstacles to the country's development. It also notes that poverty reduction remains a major challenge, and that a significant percentage of the population has limited or no access to clean drinking water, basic healthcare, physical security, reliable infrastructure, decent housing and sanitation, or sustainable sources of livelihood (ILO, 2011).

Nigeria suffered from an economic downturn in 2016, but has since shown consistent signs of recovery, driven largely by growth in agriculture and the oil and gas sector. However, the recovery has not yet translated into job creation (Joseph-Raji et al., 2018). Nigeria has an unemployment rate of 18.8 per cent and the majority of unemployed women and men are between the ages of 15 and 24 (National Bureau of Statistics of Nigeria, 2018). The lack of decent work opportunities is a key factor in the country's increasing levels of inequality and poverty as well as social and political unrest (Ibid.). The ILO and the Nigerian Federal Ministry of Labour are working together on a national employment policy aimed at creating jobs.² Identifying areas for job creation for youth, including green jobs in the circular economy, is of key importance for Nigeria's inclusive growth, decent work and sustainable development.

Moreover, Nigeria has seen tremendous growth in its information and communications technology sector in the last two decades. The number of internet users grew from approximately 100,000 in 2000 to some two million users in 2004 (Osibanjo and Nnorom, 2007), and the consumption of electrical and electronic equipment (EEE) has increased rapidly as well. The number of Nigerians with access to a mobile phone grew from approximately 35,000 in 1999 to some 9.1 million in 2004. The number of phone subscriptions increased from approximately 20,000 in 1998 to some 6 million in 2004, and then grew further to an estimated 27 million by 2007 (ibid.).

1.6. The e-waste challenge in Nigeria

As a result of the economic and technological developments facing the country, the issue of e-waste is becoming increasingly important in Nigeria.

In the absence of adequate waste management systems and infrastructure, e-waste is usually dumped alongside other municipal waste, and awareness about health and environmental risks is generally low. Recent studies have found that the absence of proper infrastructure for e-waste disposal in Nigeria is a significant contributor to the lack of awareness among consumers about proper disposal and the environmental hazards associated with e-waste (Nduneseokwu, Qu and Appolloni, 2017).

² See more on: https://www.ilo.org/addisababa/countries-covered/nigeria/WCMS_619096/lang--en/index.htm

According to the International Telecommunication Union's *Global E-waste Monitor 2017*, Nigeria generated 277,000 tonnes of e-waste in 2016, making it the third largest generator of e-waste in Africa (with Egypt and South Africa generating 497,000 tonnes and 321,000 tonnes of e-waste respectively).

In 2014, the e-waste generated per inhabitant in Nigeria was only 1.3 kg, which was lower than the average for the continent. By 2016, this amount had grown to 1.5 kg per inhabitant, which indicates a significant growth in domestic e-waste generation, and this is expected to grow further and faster in the future (Baldé et al., 2017).

There is not currently any institutional or non-governmental entity collecting and updating data about e-waste to inform policymaking and action in Nigeria. While some statistics are available, the lack of data about e-waste continues to be an issue (Baldé et al., 2017; Odeyingbo, Nnorom and Deubzer, 2017).

The domestic generation of e-waste in Nigeria is compounded by large volumes of e-waste coming in from abroad. Recent reports provide detailed but widely diverging statistics on illegal shipments of e-waste to Nigerian ports from countries in the European Union (EU), the United States and China among others:

- According to Nnorom and Osibanjo (2010), approximately 468,000 metric tonnes of e-waste came from abroad between 2005 and 2010.
- The Secretariat of the Basel Convention's e-waste country assessment for Nigeria estimated that 600,000 tonnes of new EEE and 600,000 metric tonnes of UEEE came from abroad in 2010, and that 30 per cent of that UEEE comprised non-functional or 'e-waste'.

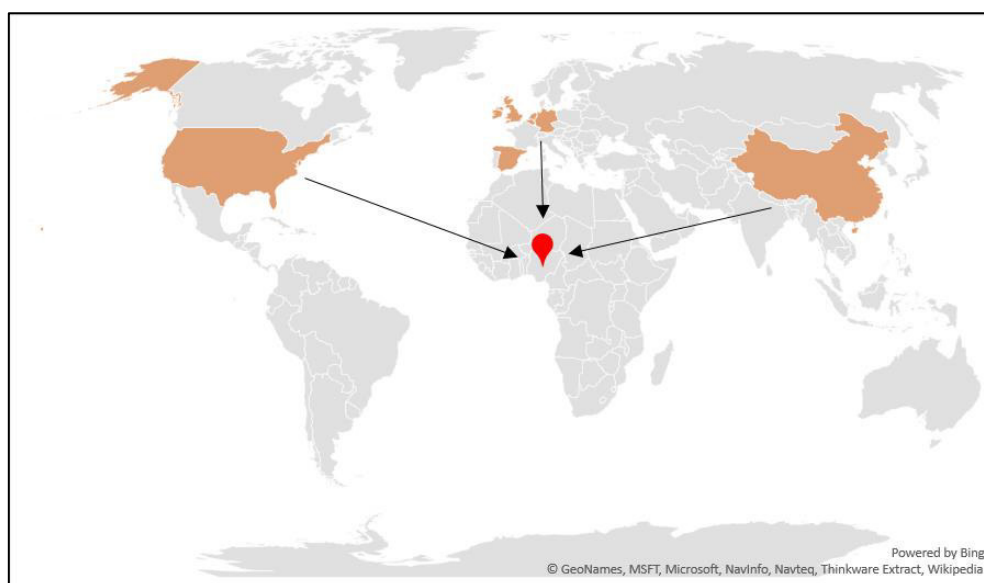
Previous reports observe that new EEE and UEEE enter Nigeria via its six major ports, airports and land (Figure 8):

- **Sea:** According to the findings of the StEP Initiative's Person-in-Port Project (PiP), approximately 60,000 tonnes of UEEE was brought into Nigeria in 2015-16, in containers, mixed in with other goods, and inside roll on/roll off vehicles, via its two major seaports in Lagos. The EU was the largest source of UEEE, accounting for 77 per cent of UEEE flowing into Nigeria. UEEE originating from ports in Belgium, China, Germany, Ireland, Spain, the Netherlands, United Kingdom and United States accounted for 85 per cent of UEEE flows into Nigeria.
- **Air:** Cargo e-waste arrive via Murtala Mohammed International Airport in Lagos and the Mallam Aminu Kano International Airport. EEE and UEEE arriving at the Nnamdi Azikwe International Airport of the Federal Capital Territory were primarily domestic shipments from Lagos and Kano. Due to the higher cost of air transportation, it is speculated that EEE arriving via air cargo would primarily be new (Ogungbuyi et al., 2012).
- **Land:** Studies have also observed that significant quantities of EEE and UEEE are transported by land from neighbouring countries. However, reliable data remains unavailable.

Although under the Basel Convention it is illegal to export e-waste, the PiP Project found that 20 per cent of all the UEEE imports via seaports were non-functional. This implies

that 20 per cent of these imports were e-waste and thus illegal. Such illegal flows of e-waste exacerbate the e-waste challenges faced by Nigeria.³

Figure 8. The largest flows of UEEE to Nigeria via seaports



³ This assessment was made with the disclaimer that, in the absence of further data, it was impossible to calculate a reliable range of these UEEE imports. The leaders of the project based their conclusions on observations made from inspection of containers and vehicles, and the review of import documents, associated with UEEE flows via the Tin Can Island Port Complex and the Lagos Port Complex Apapa, the two hubs for UEEE flowing into Nigeria, in 2015 and 2016. The person in the port (PiP) inspected 201 containers and 2,184 roll-on/roll-off (“RoRo”) vehicles with used electrical and electronic equipment (UEEE), and reviewed 3,622 import documents of UEEE in containers (Odeyingbo, Nnorom and Deubzer, 2017).

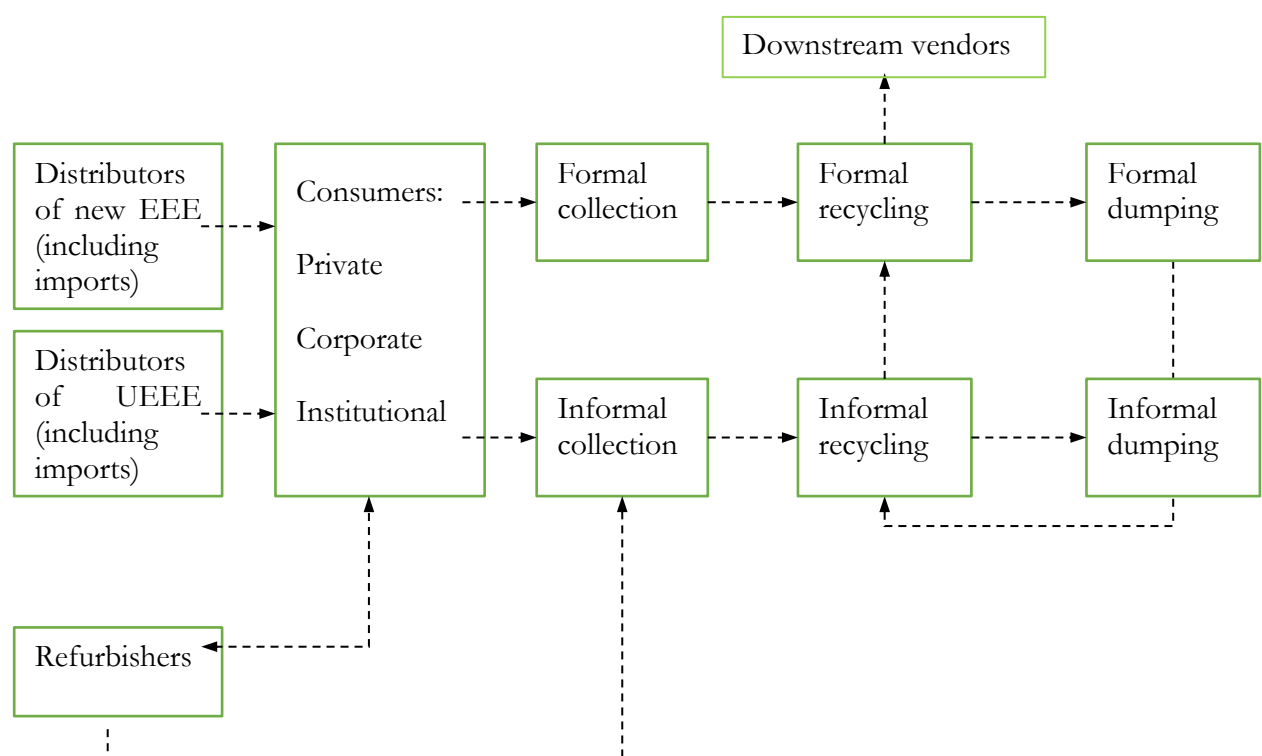
2. Mapping the e-waste value chain and its actors

The management of e-waste in Nigeria involves several actors along the different stages of the e-waste value chain outlined below (Figure 9). These include distributors, repairers/refurbishers, consumers, collectors, recyclers and final disposers.

Nigeria faces several challenges along the e-waste value chain. First and foremost, e-waste is not widely seen as a value chain, and both the Government and EEE manufacturers and distributors have yet to adopt a circular economy approach to better managing this fast-growing waste stream.

Other key challenges include the short lifespan of imported UEEE, improper disposal practices by consumers, improper recycling practices such as the open burning of cables, lack of formal recycling facilities, and inadequate capacity in existing formal waste management facilities. As mentioned earlier, the illegal shipment of externally generated e-waste into the country is a critical challenge for Nigeria. E-waste that is illegally shipped is often processed in the informal part of the value chain.

Figure 9. Overview of the actors in the e-waste value chain



This chapter provides an overview of the process, actors and the challenges of the e-waste value chain in Nigeria. The analysis and data presented draws on a variety of studies; however, it relies heavily on the Secretariat of the Basel Convention's *E-waste country assessment Nigeria* (Ogungbuyi et al., 2012) and Öko-Institut e.V., European Commission and the Secretariat of the Basel Convention's *Informal e-waste management in Lagos, Nigeria – Socio-economic impacts and feasibility of international recycling co-operations* (Manhart et al., 2011).

2.1. Distributors

Distributors are entities that buy EEE and UEEE from various sources and sell this equipment to consumers directly.

The Alaba International Market located in Ojo, Lagos state is the largest market for EEE and UEEE in Nigeria. The market brings together a large number of buyers and sellers with over 5,000 business outlets (Obioha, 2013). Another major EEE and UEEE market is the Computer Village located in the capital city of Lagos state, Ikeja. EEE and UEEE are channelled to other states of Nigeria from these major markets.

EEE and UEEE are also sold in major shopping malls in major cities such as ‘Game’ and ‘SHOPRITE’ in Kano and Abuja.

2.2. Consumers

Consumers of new EEE and UEEE can be divided into three categories: private, institutional and corporate consumers (see Table 1).

Table 1. E-waste consumer categories

Private Consumers	Institutional Consumers	Corporate consumers
• Households • Family businesses (predominantly agriculture)	• Public institutions Government • Health and education sector	• Large businesses • Industries • Small and medium enterprises (SMEs)

There is contradicting data as to which consumer category uses the most EEE and thus generates most e-waste. According to Ogungbuyi et al.’s (2012) country assessment, 95 per cent of the EEE in Nigeria was being used by private consumers or households. They were responsible for the generation of 90 per cent of e-waste in Nigeria.

In contrast, Nnorom and Osibanjo (2010) found that corporate and institutional consumers were the major domestic generators of e-waste and that households only generated approximately 15 per cent of the e-waste in Nigeria. Given these conflicting statistics, it is not currently possible to determine which category of consumer generates the most e-waste.

Twenty-six per cent of EEE no longer used by private consumers was donated and 21 per cent was sold to second hand dealers. This indicates that almost 50 per cent of UEEE disposed of by private consumers was donated or sold for re-use with or without being refurbished. Seventeen per cent of UEEE was ‘disposed of’ by merely storing it at home, 18 per cent was disposed of with household waste, 16 per cent was sold to scrap dealers, and one per cent was disposed of on the street. The survey conducted by Ogungbuyi et al. (2012) also found that the amount of EEE in a household varied by the household’s income class, and that households in urban areas generally possessed more EEE and generated more e-waste than households in rural areas.

Government institutions and ministries stored some 80 per cent of the EEE that needed to be disposed of and donated some 20 per cent. When asked about the management of e-

waste, 11.1 per cent of respondents from government institutions indicated that they were interested in introducing an internal policy for the proper disposal of e-waste.

Private, institutional and corporate consumers are aware of the environmental risks of e-waste, however, there does not seem to be a uniform understanding of disposal practices of e-waste across society. Government institutions stored a lot of their e-waste in comparison to private consumers. Government institutions also donated much more of their UEEE compared to private consumers. Additionally, the survey showed that consumers had little awareness of health risks associated with improper disposal of e-waste (Ogunbuyi et al., 2012).

2.3. Refurbishers

Refurbishers extend the lifetime of both new and used EEE. In doing so, they also invariably generate e-waste from UEEE that cannot be repaired.

As mentioned above, large volumes of UEEE are imported into Nigeria, often in poor condition, which provides a large market potential for refurbishers in the country. Service centres provided by manufacturer representatives and importers, as well as other repair shops found in places such as the Ikeja Computer Village, fall under this category. According to Ogunbuyi et al.'s (2012) country assessment, approximately 52,000 persons were involved in the refurbishing sector, almost all of whom were male (Ogunbuyi et al., 2012).

Another study found that the Ikeja and Alaba markets together have 5,500 enterprises with sales personnel and approximately 15,000 technicians. They had higher levels of education compared to other workers in the e-waste value chain, including through apprenticeships in micro and small e-waste enterprises. Compared with other actors in the e-waste value chain, the work of refurbishers was generally more formal than informal, as many paid taxes and were registered with the relevant authorities (Schleup et al., 2012).

Refurbishers are also better organized than other e-waste value chain actors. Examples of refurbishers' organizations are the Nigeria Association of Refrigerator and Air-condition Practitioners (NARAP) and the National Electronics Technician Association of Nigeria (NETAN). It should be noted that refurbishers in Nigeria are organized around the different types of EEE they repair. For example, refurbishers that engage in the repair of refrigerators will normally not be repairing laptops. According to Ogunbuyi et al.'s (2012) country assessment, 62.5 per cent of refurbishers were engaged in the repair of household goods, 25 per cent refurbished mobile phones, and 12.5 per cent repaired computers and computer related accessories.

New and used EEE that cannot be refurbished or repaired ends up as e-waste. It was found that only 66-68 per cent of EEE brought to refurbishing workshops was functional. Around 12 to 25 per cent of refurbishers disposed of e-waste along with regular waste, while 66 per cent of refurbishers sold e-waste to collectors. Each refurbishing shop generated almost six kilograms of e-waste per week (Ogunbuyi et al., 2012).

2.4. Collectors

In Nigeria, the collection of e-waste is largely an informal economic activity, and collectors are referred to as "scavengers". They make a living from collecting different types of recyclable waste simultaneously, making it difficult to identify how many collectors work with e-waste specifically.

In 2010, it was estimated that approximately 80,000 people were engaged in the collection of recyclable waste, including e-waste and metal scraps, and that 80 per cent of these collectors operated in the informal sector and 20 per cent worked in the formal sector (ibid.). While refurbishing in Nigeria is male dominated, it was observed that approximately 30 per cent of collectors in Nigeria were female. This contrasts to Ghana, where it was found that e-waste was collected by young children (mostly male) and women (Osibanjo, 2015).

The women and men engaged in this activity collected anywhere between 144 kilograms to 1,985 kilograms of e-waste, mixed with metal scraps, per week. Formal collectors transport e-waste using large vehicles, such as trucks, whereas informal collectors use equipment such as handcarts. It was also found that between 60-83 per cent of collected e-waste was bought by collectors from households and businesses while 17-40 per cent was collected for free at dumpsites, landfills or from the street (Ogungbuyi et al., 2012). Collectors then sold their e-waste to refurbishers or recyclers for a fee.

The formal organizations involved in e-waste collection in Lagos are the Lagos Waste Management Administration (LAWMA) and the Lagos State Environmental Protection Agency (LASEPA), who both contract private companies to help manage waste. LAWMA is in charge of the overall collection of municipal and industrial waste from households and commercial and/or industrial facilities across the state with organized pick up days from household to household. They also collect waste dumped in neighbourhood bins in selected communities where door-to-door pick up is not physically possible.

According to the e-waste country report of 2010, the e-waste managed by LAWMA (in particular the Olusosun landfill), is kept apart in a section of the dump site, but is subsequently sorted and separated by somewhere between 600 and 4,000 informal collectors working in the landfills. These collectors then go on to sell valuable materials and metals to metal scrap dealers or UEEE components to refurbishers for repair at the Ikeja Computer Village (EJ Atlas, 2017).

2.5. Recyclers

Recyclers can be defined as any individual or organization that dismantles, separates components and recovers metals from e-waste. Fractions that are dismantled and separated by recyclers are sold to suppliers of manufacturing industries as secondary raw materials. Recyclers are primarily interested in aluminium, copper and steel fractions. For example, informal economy recyclers interested in copper wires acquire waste cables and burn these in the open to retrieve the copper. As there are large amounts of fractions that are of no economic value, informal recyclers generate a large amount of waste, which is often disposed of improperly in an uncontrolled environment.

Most recyclers in Nigeria work in the informal sector, as there are only very few registered recycling facilities. However, in February 2018, the Government of Nigeria approved the establishment of its first formal e-waste recycling facility in Ojota, Lagos state, which is run by Hinckley Recycling (Okeke, 2018). In the absence of publicly financed or managed e-waste systems and infrastructure, private enterprises such as Sunray Ventures and E-terra Technologies Ltd. play an increasingly important role in e-waste management in Nigeria.

Sunray Ventures (2018) focuses on the creation of high-growth businesses that aim to create a positive environmental and socio-economic impact. It operates Green Compass Recycling, which is an e-waste recycling company that sets up formal collection networks and introduces best practices in the management and recycling of e-waste in Nigeria. Its

efforts to promote jobs with decent working conditions and environmentally safe practices are outlined in Box 1.

Box 1. Green Compass Recycling

Green Compass Recycling aims to ensure that all the participants in their value chain work in environmentally safe conditions and receive decent wages. The company has registered 40 informal collectors to date and aims to scale-up to 500 collectors. By helping its registered informal collectors to open bank accounts, they are promoting financial inclusion.

The company plans to arrange vocational training for 550 members and expects to be able to provide educational assistance to approximately 250 children who are dependants of collectors.

However, the company also faces several challenges because it is difficult to disrupt old practices and because it is difficult to convince investors about the potential of the industry. Furthermore, prices in the sector are not clearly defined, and the lack of transparency about importing and exporting e-waste system in the country also generates extra cost. The company also indicated that a lack of enforcement of legislation and gaps in e-waste related data remain an issue.

Source: Sunray Ventures, 2018

Another private enterprise in the formal e-waste sector is E-terra Technologies Ltd., which operates in partnership with the Federal Ministry of Environment and LASEPA to provide solutions for better e-waste management to organizations that partner with or become clients of E-terra. This includes raising awareness about the risks of improper handling and disposal of e-waste. It has two e-waste drop off centres in Lagos for its clients and aims to expand the number of drop off centres nationwide.⁴

2.6. Downstream vendors

Downstream vendors purchase the e-waste components that have been separated, dismantled and recovered by recyclers. A vast range of industries engage in this activity, most of whom operate in the formal economy. Popular destinations for recycled e-waste components in Nigeria are Lagos, Kano, Onitsha and Warri.

Several categories of e-waste are also exported. For example, printed wiring boards and copper wires have been exported to China and other Asian countries.

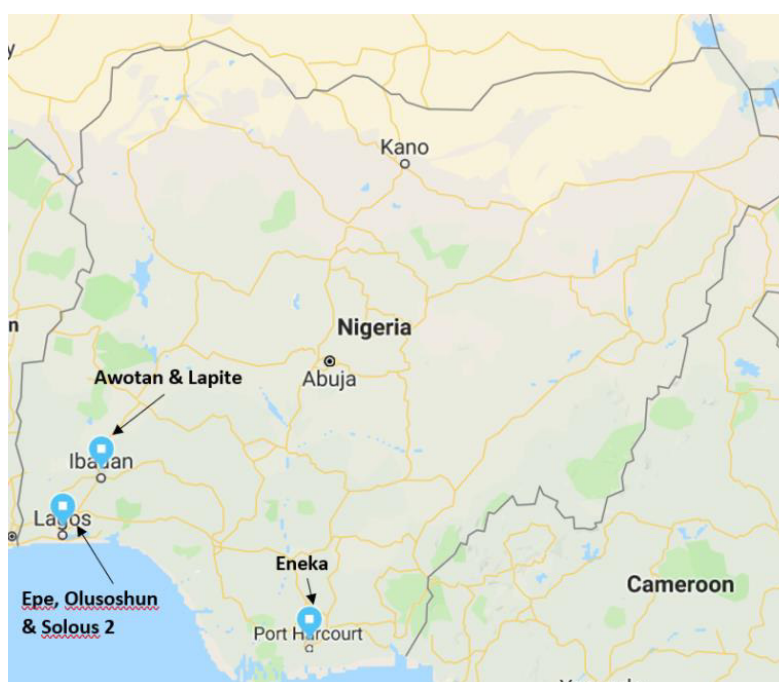
2.7. Dumpsites and final disposers

As mentioned above, e-waste that cannot be repaired or recycled is disposed of with municipal waste or dumped at undesignated or uncontrolled areas.

According to the Waste Atlas 2014 Report (D-Waste, 2014), Nigeria is home to six of Africa's 18 largest waste dumpsites and landfills: Awotan (Ibadan), Eneka (Port Harcourt), Epe (Lagos), Lapite (Ibadan), Olusoshun (Lagos), and Solous 2 (Lagos).

⁴ For more information see <http://www.etterra.com.ng/>

Figure 10. Geographical location of Nigeria's main waste deposits



Source: created on Google Maps using own research, 2018

The three sites in Lagos state are managed by LAWMA. Collectors working for LAWMA dump the e-waste collected from households and corporate consumers at these specific sites.

The e-waste value chain in Nigeria is a complex system. It provides livelihoods for tens of thousands of workers, including several actors operating in both the formal and informal economy. The challenge and opportunity for Nigeria is how to generate decent jobs and foster an enabling environment for sustainable enterprises in e-waste management.

3. Decent work dimensions of e-waste

The ILO's decent work agenda serves to advance economic and working conditions that give all workers, employers and governments a stake in lasting peace, prosperity and progress. In 2013, the International Labour Conference identified waste management and recycling as one of three economic sectors (alongside agriculture and construction) which present a significant opportunity and need to advance decent work.⁵

The decent work agenda is highly relevant to the management of e-waste, as it includes employment generation, support for small and medium enterprises, addressing informality, securing better working conditions and safety and health, and freedom for people to express their concerns, organize and participate in the decisions that affect their lives, with gender equality as a cross-cutting concern.

3.1. Employment

In 2017, approximately 85 million people were part of Nigeria's labour force. Although the number of people joining the labour force has been increasing, Figure 11 below shows a steady increase in the unemployment rate over time. In the third quartile of 2017, the unemployment rate was 18.8 per cent (National Bureau of Statistics, 2018). Increases in the number of school graduates are currently not being matched by increases in job opportunities.

Figure 11. Unemployment in Nigeria



Source: National Bureau of Statistics, 2018

According to 2011 estimates, 50 per cent of the labour force was employed in agriculture, 29 per cent in largely informal household enterprises, eight per cent in the private wage sector, and the remainder in public services (Favara et al., 2015).

⁵ See *Report V: Sustainable development, decent work and green jobs* (ILO, 2013) https://www.ilo.org/wcmsp5/groups/public/---ed_norm/---relconf/documents/meetingdocument/wcms_207370.pdf

As discussed above, there is no reliable data on employment in the e-waste value chain in Nigeria. The estimates of employment shown in

Table 2 are the only information available.

Table 2. Estimates of e-waste workers in Nigeria

Refurbishers
• 52,000 (21,600 in Lagos) • Male dominated • Higher skills required
Collectors
• 80,000 • Rural to urban low skill migrants • 30 per cent female • 80 per cent informal
Recyclers
• Several thousand (no clear estimate) • Mostly informal

As the waste management sector in Nigeria develops, new skills will be required, including in sorting, identifying the value and recognizing the hazards of different types of waste. In order to benefit from the potential for employment creation in the sector and to avoid skills shortages in the future, it is important to invest now in the skills for a circular economy.

3.2. Micro, small and medium sized enterprises

There is little to no data available on the number of micro-, small- and medium-sized enterprises in the e-waste value chain in Nigeria. However, it has been observed that most e-waste enterprises focusing on waste collection, gathering and sorting, separation, recycling and refurbishing operate predominantly in the informal sector.

The above-mentioned examples of Hinckley Recycling, Green Compass Recycling and E-terra Technologies Ltd reflect the opportunities available for new sustainable enterprise creation to better manage e-waste, particularly if an enabling environment is created for such enterprises to grow and create value.

3.3. Informality in the e-waste value chain

It has been estimated that approximately 90 per cent of the Nigerian labour force is employed in the informal sector, in jobs that tend to have low productivity. While wage workers in the informal sector do receive a wage, they are self-employed and work without contracts and social security, whether health or unemployment insurance (Ogungbuyi et al., 2012).

The ILO Transition from the Informal to the Formal Economy Recommendation, 2015 (No. 204), provides guidance to governments, employers and workers on how to promote employment and income opportunities as well as rights and social protection for the millions involved in the transition to the formal economy, including in the management of e-waste. A key challenge in formalizing e-waste management will be transforming existing networks of e-waste management to improve the safety and health, working conditions and rights of workers while ensuring that existing livelihoods are preserved and improved.

Despite the absence of reliable data, it has been estimated that approximately 80 per cent of the women and men in the e-waste value chain work in the informal sector. This has an impact on working hours, wages and social security of workers, which are further discussed below.

3.4. Working hours

In their 2011 study of e-waste workers in Lagos, Manhart et al. found that the working day typically began at 8 am and ended at 5 or 6 pm. This included public holidays and weekends. Overall, e-waste workers – including collectors, intermediaries and recyclers, but excluding refurbishers – worked approximately 255 to 285 hours per month. The workers only took one break of 30 minutes a day and took Friday or Sunday off depending on their religious beliefs. Refurbishers generally did not work on Sundays (Manhart et al, 2011).

Although in excess of the 48 hour per week limit established by the ILO's Hours of Work (Industry) Convention, 1919 (No. 1) and Hours of Work (Commerce and Offices) Convention, 1930 (No. 30), the working hours of e-waste workers in Nigeria were shorter than those of e-waste workers in Ghana, where a 2015 study found that e-waste recyclers in Ghana worked 300-360 hours a month and that refurbishers worked 210-260 hours a month (Osibanjo, 2015).

3.5. Wages

Due to the high incidence of informality in this sector, information about the wages of workers in the e-waste value chain is not openly available. The large fluctuations in the value of the Naira also make it challenging to compare figures presented in reports from different years.

The incomes of collectors and recyclers correlate generally with the amount of scrap that is collected and recycled. The e-waste country report conducted in 2010 in Lagos found that collectors who have the resources to purchase scrap tend to generate a larger income than the collectors who rely on free waste (Ogunbuyi et al. 2012), as they can access higher quality UEEE and often have the resources or equipment to better segregate or separate materials.

Three different levels of wages can be seen in refurbishing activities. The largest incomes were received by the owners of the refurbishing workshops, followed by employees and then apprentices. Apprentices typically received a small stipend that covered their food and transport. After four to five years of work, apprentices in turn received a large sum of money that would help them start their own workshop (Manhart et al, 2011).

According to another recent survey conducted in Lagos, collectors and recyclers in the informal sector expressed no intention to change jobs due to the income they were able to generate from e-waste. The workers surveyed mentioned that the informal business was thriving, but said the lack of alternative livelihoods was also a factor.

The current minimum wage in Nigeria is 18,000 Naira, which is equivalent to some US\$50. This amount was not perceived by those who were surveyed to be sufficient to switch to working in the formal sector (Isemekhai, 2016).

3.6. Occupational safety and health

As discussed in greater detail in Chapter 4, e-waste can have detrimental impacts on human health. Individuals working throughout the e-waste value chain face several occupational safety and health (OSH) hazards and risks.

Workers in the repair or refurbishing sector in Nigeria tend to work in small workspaces with improper ventilation. Since one of their main tasks is to engage in hand soldering using solder paste containing lead, workers are exposed to lead fumes for several hours a day. Refurbishers report suffering from itchy eyes as a result of exposure to these fumes. They are also prone to respiratory diseases, skin and eye irritation, incessant cough and coryza, fatigue, fever, and pains due to exposure to toner dust when engaging in the repair of photocopiers and laser printers. They also report minor injuries such as shocks, cuts and burns when repairing equipment.

Examples of hazardous workspaces were observed in Lagos, where refurbishers were observed to have several millimetres of toner dust on the surfaces of their workspace. Moreover, the use of generators which is prevalent due to power outages, can create excessive noise pollution and exhaust gas emissions that can be harmful for workers (Manhart et al., 2011).

It has also been observed that workers involved in scrap collection in Nigeria suffer from aches, weakness or fatigue, irritation of the digestive system, spinal injuries and cuts. Collectors handle heavy materials and transport them over long distances using a handcart, resulting in physical strain. Informal collectors working under especially arduous conditions – for example, by carrying waste on their backs instead of using vehicles of handcarts – are much likely to suffer from spinal injuries and cuts. Collectors in congested areas such as Lagos might also face safety risks related to frequent participation in heavy road traffic.

Individuals working as recyclers absorb hazardous substances via skin contact or inhalation when burning cables to recover copper wire. Open burning of cables to retrieve copper and burning of plastic to reduce the amount of waste leads to significant emissions of persistent organic pollutants. Recyclers also report injuries such as cuts from sharp fractions and other injuries from breaking tubes. Recyclers are exposed to lead fumes, which puts them at risk of kidney and respiratory system malfunction, as well as lung cancer. They are often exposed to halogenated chemicals such as polybrominated diphenyl ethers (PBDEs), which can have endocrine disruptive properties (ibid.).

Lack of personal protective equipment (PPE) is also a concern for all workers in the e-waste value chain. There are several factors that contribute to the inadequate use of PPE in the sector:

1. There is a lack of awareness about hazards and risks among e-waste workers. One study found that approximately 88 per cent of e-waste workers in the informal sector were unable to mention at least one harmful chemical when working with e-waste. Only 43 per cent of e-waste workers could identify one route to exposure. Overall, the study found that only 12 per cent of e-waste workers compared to 76 per cent of the workers in a control group had good knowledge of OSH issues. The study draws attention to the relatively greater lack of awareness regarding OSH issues among e-waste workers in the informal sector compared to workers in other sectors of a similar socio-economic status (Ohajinwa et al., 2017). Illiteracy also contributes to the lack of awareness on health hazards associated with e-waste (Ogburu and Akintunde, 2013).

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2. While information on training and skills for this sector is lacking, a general analysis of training in the country shows that formal training is limited to workers in the formal sector and tends to be costly. Public training systems have been shown to be inadequate (Favara et al, 2015) and workers in the informal sector tend to receive training via apprenticeships, particularly in the refurbishing part of the value chain.
 3. Informal workers are less likely to spend on Personal Protective Equipment (PPE) when they are unable to afford food, decent clothing and other basic necessities.

To address the risks faced by waste collectors, in 2010 the ILO developed the Work Adjustment for Recycling and Managing Waste (WARM) training methodology, which aims to use simple, low-cost improvement measures to improve the safety, health and efficiency of waste collection work. It has recently been adapted for use in the informal e-waste economy in India (Kawakami and Khai, 2010).

3.7. Child labour

According to the ILO's Minimum Age Convention, 1973 (No. 138), which was ratified by Nigeria in 2002, the minimum age for employment is 15 years and the minimum age for hazardous work is 18 years.

Data regarding child labour in the e-waste sector in Nigeria is not available. According to Manhart et al. (2011), field observations indicated that child labour was not a large issue in the refurbishing sector. Child labour was more common in collection and recycling, and most children working in this sector were over the age of 12.

In contrast, another case study in Lagos found children as young as seven years old working as collectors. The children surveyed stated that they worked as collectors after school, weekends and during school holidays (Isemekhai, 2016). According to various articles, the children who live in the settlements that have sprung up on top of Lagos' landfills tend to work in waste picking alongside their parents (The Washington Post, 2017; The Economist, 2014; EJ Atlas, 2017).

3.8. Social dialogue

Social dialogue with representative organizations of employers and workers is critical in the development of inclusive policies and integrated sectoral strategies to ensure a just transition towards environmental sustainability, greening of enterprises, social inclusion and the promotion of green jobs in e-waste. The ILO's 2015 *Guidelines for a just transition towards environmentally sustainable economies and societies for all* call on governments to "provide opportunities for the participation of social partners at all possible levels and stages of the policy process through social dialogue and foster consultations with relevant stakeholders".

Consultations with e-waste workers and employers and their respective organizations is particularly important for the recognition of workers, the formalization of their activities and the promotion of decent work. The respect, promotion and realization of the fundamental principles and rights at work through the Freedom of Association and Protection of the Right to Organise Convention, 1948 (No. 87), and the Right to Organise and Collective Bargaining Convention, 1949 (No. 98), are crucial in this regard.

3.8.1 Freedom of association

However, due to the informal nature of most work in e-waste and an absence of workers' and employers' organizations in the sector in many countries, the vast majority of e-waste workers and employers face considerable challenges in practice. As previously mentioned, there are only two main market associations in the e-waste sector in Nigeria: the Nigerian Association of Refrigeration and Air Conditioning Practitioners (NARAP) and the National Electronics Technician Association of Nigeria (NETAN). These associations represent the interests of workshop owners in the refurbishing sector.

The Scrap Metal Dealers Association of Nigeria represents a fraction of collectors and recyclers in Lagos. All municipal waste workers in general have organizations in Lagos and Abuja (Mbah and Nzeadibe, 2017):

1. Scavengers Association of Nigeria at Olusosun.
2. National Association of Scavengers in Mabushi and Gosa.
3. Gwan Cooperative Society.

Since e-waste workers in Nigeria are in general unorganized, they are prevented from gaining sufficient knowledge of sectoral dynamics and safety and health risks, from forming organizations, from contributing to national policies and strategies related to e-waste, and from establishing relations – including in terms of membership – with representative workers' and employers' organizations, which would have secured their representation in sectoral dialogue with other stakeholders in the e-waste value chain.

4. The impact of e-waste

The risks that e-waste poses to human health and the environment are outlined in the 2012 ILO report *The global impact of e-waste: Addressing the challenge*. This chapter describes the environmental, health and socio-economic impacts of e-waste.

4.1. Environmental impacts

Several chemical substances and pollutants are present in various types of EEE (Table 3). When disposed of improperly, these can lead to air pollution as well as to soil and water contamination.

Table 3. Pollutants in various types of EEE

EEE	Pollutant
Computers	Lead, mercury, cadmium and beryllium
Batteries (disposable, rechargeable, and lithium)	Cadmium, cobalt, lead, lithium, mercury, nickel, silver and zinc
Mobile phones	Lithium, copper, tin, cobalt, indium, antimony, silver, gold, and palladium
Photocopiers	Mercury, selenium
Circuit boards	Silver, lead, copper, cadmium, brominated flame proofing agent, PCBs (polychlorinated biphenyls) and arsenic
Light emitting diodes (LED)	Arsenic
Cathode ray tubes (CRT)	Cadmium, lead
Liquid crystal displays (LCD)	Mercury

Source: Omole et al., 2015

Activities related to e-waste recycling in Nigeria include dismantling, uncontrolled or improper dumping and pyrolytic processes, which can have significant negative environmental impacts. There are also indications of negative impacts from hydrolytic processes, such as leaching of metals from printed circuit boards. Other activities such as refurbishing and collection can have some negative impacts. However, these are significantly less harmful than the impacts from dismantling, dumping and pyrolytic processes.

Pyrolytic processes, such as burning of cables to retrieve copper wire or burning of plastic, release emissions of ashes and fumes that contain heavy metals and flame retardants or polybrominated diphenyl ethers (PBDEs). These emissions travel over medium and long distances and some deposit as bottom ash. Eventually, this ash can enter the water and soil system, and negatively impact on the plant and animal life in the area.

Moreover, the burning of cables is a major source of dioxin emissions in Nigeria. Dioxins and furans, some of the most hazardous anthropogenic pollutants, are also produced during uncontrolled burning of lead. Insulating foam from refrigerators, primarily

chlorofluorocarbons (CFC) containing polyurethane, is often burned in Nigeria (Ogungbuyi et al., 2012). This leads to the contamination of burning sites and the emission of greenhouse gases.

Emissions of heavy metal and PBDEs also occur during the process of dismantling e-waste. Depending on weather conditions and the size of the particles, the dust particles may travel medium or long distances and eventually enter the water and soil system. Particles can also deposit near the source of the emission. When e-waste is improperly disposed of, toxic substances such as heavy metals and PBDEs can leach into the water and soil system (Manhart et al., 2011; Ogungbuyi et al., 2012).

4.2. Impact on health

The negative impacts of toxins found in e-waste are not just limited to workers, but can also have detrimental impacts on human health in general. Humans are exposed via ingestion, inhalation or dermal contact. Table 4 summarizes some of the toxic substances found in e-waste and the adverse effects that these substances can have on human health.

Table 4. Toxic substances in e-waste and their effect on human health

Materials	Effect on human health
Antimony	Severe skin problems
Cadmium	Damage to kidney and bone structure, elevated blood pressure. Cadmium is a carcinogen.
Lead	Short term exposure can initially cause malaise, muscle pain and headache. Long term exposure can lead to irreversible damage to the nervous system, particularly in children.
Mercury	Short term exposure can initially cause lung damage, nausea, diarrhoea, skin rashes, and high blood pressure. Long term exposure damages the central nervous system and kidneys.
Nonylphenol	Damages sperm function and deoxyribonucleic acid (DNA).
Polybrominated diphenyl ether	Affects immune system, interferes with growth hormones, sexual development and brain development. Children exposed to this display increased risk of thyroid disease and neurobehavioral disease.
Polychlorinated biphenyls	Suppresses immune system, damages liver and nervous system, promotes cancer, causes behavioural changes, and damages male and female reproductive system.
Polychlorinated naphthalene	Can impact skin, liver, nervous and reproductive system.
Triphenyl phosphate	Contact dermatitis, endocrine disruptor.

Source: Kumar et al., 2017; Grant et al., 2013

Children working in the e-waste sector are a particularly vulnerable group, as they are prone to absorbing toxic substances more rapidly than adults. The concentration of copper,

lead, zinc and tin is almost 100 times higher in places like the Alaba market in Lagos when compared to typical background levels. Since their bodies are still developing, children are much more vulnerable to health risks and irreversible damage from exposure to hazardous materials.⁶ Children's hand-to-mouth behaviour puts them at high risk in areas with soil and dust contaminated with lead. Exposure to lead could cause intellectual impairment (Osibanjo, 2015).

E-waste poses a threat not just to workers involved in the e-waste value chain, but also to women and men living in cities near recycling sites. A comparative study on the environmental and health impacts of e-waste in China and Nigeria observed significant DNA damage to populations that were exposed to the processing of e-waste (Alabi et al., 2012).

4.3. Socio-economic impact

In 2011, the formal refurbishing sector in Lagos generated US\$50.8 million, which corresponds to approximately 0.015 per cent of country's Gross Domestic Product (GDP). However, the largely informal nature of the e-waste sector means its contribution is not reflected in official GDP figures.

Some parts of the sector do make direct contributions to the national budget. Refurbishers are subject to taxes in the form of company tax, income tax, and fees for trade permits. In Lagos, the formal refurbishing sector generated approximately 62 million Naira or US\$419,000 in tax in 2010. As collection and recycling are largely informal, and recycling activities do not require registration, collectors and recyclers do not pay any form of tax (Manhart et al., 2011).

The e-waste sector makes a substantial contribution to employment creation in both the formal and informal sector. However, it is also clear that a circular economy approach and integrated policies are needed in order for the industry to make a much greater contribution to the creation of sustainable enterprises and decent jobs.

As mentioned in earlier chapters, the e-waste sector is male dominated and predominantly employs males aged 15-35. Females were found working as collectors, but accounted for only 30 per cent of the total number of collectors. The involvement of women in this sector in Nigeria is lower than the e-waste sector in Ghana, where collectors are predominantly females and young boys. This indicates that there may be scope for more women to work in this sector in Nigeria, but only if working conditions and the safety and health of the sector are improved. Since the sector predominantly employs young people, it has potential to help address the issue of youth unemployment.

Informal recycling provides employment and livelihoods to rural migrants who move to large cities in search of employment (Ogunbuyi et al., 2012). However, informal recycling and informal waste management workers in general are considered to be at the bottom of the waste value chain. They are often excluded from economic and social policy making procedures. Informal waste workers have been subject to persecution, a lack of integration and social rejection. Due to the lack of recognition of the informal waste

⁶ For more information see the World Health Organization's webpage on electronic waste: http://www.who.int/ceh/risks/e_waste/en/

economy in Nigeria's urban policy, informal waste workers remain a vulnerable group that require special attention (Mbah and Nzeadibe, 2017).

The sector also helps create other jobs that support e-waste recycling in local communities. For example, residents near e-waste related operations can work as suppliers of food and water, be employed as security guards for collected scraps, and assist in the loading and transportation of scraps to e-waste recyclers (Ogungbuyi et al. 2012).

However, the e-waste sector can also lead to conflict or general dissatisfaction among local communities. For example, residents and businesses around large markets such as the Ikeja Computer Village have called for its relocation due to its proximity to residential areas. Another example is the complaints registered against waste pickers and recyclers living at the Olusosun dumpsite using public facilities in nearby quarters (Manhart et al., 2011).

5. E-waste governance

5.1. International and regional instruments

5.1.1. *International Labour Standards*

According to the ILO Declaration on Fundamental Principles and Rights at Work and its Follow-up, even if they have not been ratified, all member States of the ILO have an obligation to respect, to promote and to realize, the principles concerning the fundamental rights which are the subject of the eight fundamental Conventions.⁷ Additionally, the following ILO Conventions and Recommendations as well as conclusions and guidelines, are particularly relevant to advancing decent work in e-waste management:

- the Transition from the Informal to the Formal Economy Recommendation, 2015 (No. 204);
- the Labour Inspection Convention, 1947 (No. 81); the Occupational Safety and Health Convention (No. 155) and Recommendation (No. 164), 1981; and the Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187);
- the Chemicals Convention (No. 170) and Recommendation (No. 177), 1990;
- the Job Creation in Small and Medium-Sized Enterprises Recommendation, 1998 (No. 189);
- the Promotion of Cooperatives Recommendation, 2002 (No. 193);
- the Employment Relationship Recommendation, 2006 (No. 198);
- the Guidelines for a just transition towards environmentally sustainable economies and societies for all (2015), including Annex 1, which lists international labour standards and resolutions that may be relevant to a just transition framework;
- the Conclusions concerning the promotion of sustainable enterprises, adopted by the International Labour Conference at its 96th Session (2007); and
- the Points of Consensus adopted at the Global Dialogue Forum on Decent Work in the Management of Electrical and Electronic Waste (e-waste), from 9-11 April 2019.

⁷ (1) Freedom of Association and Protection of the Right to Organise Convention, 1948 (No. 87); (2) Right to Organise and Collective Bargaining Convention, 1949 (No. 98); (3) Forced Labour Convention, 1930 (No. 29) (and its 2014 Protocol); (4) Abolition of Forced Labour Convention, 1957 (No. 105); (5) Minimum Age Convention, 1973 (No. 138); (6) Worst Forms of Child Labour Convention, 1999 (No. 182); (7) Equal Remuneration Convention, 1951 (No. 100); (8) Discrimination (Employment and Occupation) Convention, 1958 (No. 111).

Nigeria has ratified all core conventions and key OSH conventions, which demonstrates the country's intention to move away from poor, discriminatory, exploitative and unsafe working conditions and promote decent work.

5.1.2 United Nations environmental conventions and frameworks

E-waste management is governed by a framework of United Nations conventions and instruments, including but not limited to those below.

The Basel Convention

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, adopted in 1989, aims to protect human health and the environment against the adverse effects of transboundary movements and disposal of hazardous waste, including by applying the prior informed consent procedure (shipments made without consent are illegal). Parties are expected to minimize the quantities that are moved across borders, to treat and dispose of wastes as close as possible to their place of generation, and to prevent or minimize the generation of wastes at source. The creation of this Convention was largely influenced by the Koko incident in Nigeria in 1988, where two foreign firms entered an agreement with a Nigerian citizen to dump hazardous waste. Nigeria signed the Basel Convention in 1990 and subsequently ratified and accepted it in 1991.

An amendment to the Convention, the Basel Ban, was adopted in 1995 but has not yet entered into force. The aim of the Basel Ban is to prohibit all transboundary movements of hazardous wastes from member countries of the Organisation of Economic Co-operation and Development (OECD) which are destined for final disposal operations in non-OECD member countries. Nigeria ratified the Basel Ban on 24 May 2004. The amendment is crucial for Nigeria's e-waste governance as the illegal import of e-waste remains a large issue for the country.

The Bamako Convention

The Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa entered into force in 1998. The Convention uses language similar to that of the Basel Convention, but is in some respects stronger in that it prohibits all import of hazardous waste from non-Parties and includes radioactive wastes, which has been cited as a limitation of the Basel Convention. The Bamako Convention also promotes clean production. Although Nigeria is a signatory to the Bamako Convention, it has not yet ratified it.

Other Relevant Conventions

Also relevant to the management of e-waste is the 1998 Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, revised in 2017. The Rotterdam Convention promotes shared responsibility between exporting and importing countries of hazardous chemicals. Additionally, the 2001 Stockholm Convention on Persistent Organic Pollutants, as most recently amended in 2015, requires countries to take measures to eliminate or reduce the release of persistent organic pollutants into the environment.

5.2. National e-waste and related environmental legislation

Nigeria is structured as a federal republic. It comprises 36 states, the Federal Capital Territory and 774 municipalities. The country's current constitution was adopted in 1999, and the country's capital has been Abuja since 1991.

A review of the existing legislative framework in Nigeria shows that some progress has been made to address the issue of e-waste in the country. Nigeria has several environmental laws, as well as laws specific to e-waste. The key concern is the limited enforcement of these laws and regulations related to e-waste, which is partly rooted in limited capacity and resources of the responsible government agencies. While some progress has been made in terms of reducing the illegal shipment of e-waste into Nigeria, it is crucial to tackle other limiting factors, such as corruption and political will, in order to effectively stop the smuggling of e-waste into the country.

Beyond enforcement of the existing waste management instruments and framework, the Government of Nigeria is taking some steps to provide adequate waste management infrastructure and facilities. However, investments in infrastructure and systems will have to be scaled up considerably if the public sector is to keep pace with the growing amounts of e-waste that will be produced in years to come. In the meantime, it becomes even more critical to create an enabling environment to allow the private sector to set up recycling facilities and to protect and formalize the informal workers in the e-waste value chain in the country.

Below is a review of some of the policies and tools currently available in Nigeria that help govern e-waste management in the country.

5.2.1. Harmful Waste (Special Criminal Provisions) Act Cap HI, 1988 and updated in 2004

The Harmful Waste (Special Criminal Provisions) Act Cap HI, 1988 prohibits carrying, depositing and dumping of harmful waste on any land, territorial waters and matters relating thereto. The Act includes provisions for penalties including life imprisonment and forfeiture of any carrier used to transport harmful waste into Nigeria. This legislation came about due to the Koko incident in Nigeria in 1988, where two foreign firms entered an agreement with a Nigerian citizen to dump hazardous waste.

5.2.2. The National Environmental (Sanitation and Waste Control) Regulation 2009

The National Environmental (Sanitation and Waste Control) Regulation 2009 prohibits any person to engage in any activity that is likely to generate hazardous waste without permit from the National Environmental Standards and Regulations Enforcement Agency (NESREA, 2019). According to this regulation, a generator of waste must ensure a secured means of storing and treating their waste using acceptable methods. Transit of any hazardous waste through Nigeria requires a permit and prior consent from NESREA. The regulation imposes punitive fees of 5,000,000 Naira and/or calls for five years of imprisonment for any person who fails to comply with the obligations set out in the regulation.

5.2.3. The National Environmental (Electrical/Electronic Sector) Regulations 2011

Prior to 2011, there was no environmental regulation specific to e-waste in Nigeria. The first International Summit on Regulation and Management of E-Waste (EKO E-Waste Summit) was held in 2011 in Lagos. The purpose of the summit was to draw attention to the poor management of e-waste in the country and to provide a platform to share experiences and the environmental and health-related impacts of e-waste in Nigeria. As a result of the summit, the National Environmental (Electrical/Electronic Sector) Regulations 2011 were established, aiming to minimize pollution from all operations and related activities in the electrical/electronics sector.

The Regulations take a life-cycle approach and are based on the five “Rs” principle of the circular economy. The five “Rs” refer to Reduce, Repair, Reuse, Recycle and Recover. The Regulations outline the responsibility of various stakeholders and ensures the practice of environmentally sound management of waste.

The Regulations also prohibit the burning of e-waste, disposal of e-waste alongside domestic waste, disposal of e-waste in landfills, water bodies, etc., improper breaking of cathode ray tubes and leaching of metals from printed wired boards.

Box 2. NESREA controls e-waste imports

In an effort to tackle the issue of illegal imports of e-waste into Nigeria, NESREA is working with the Nigerian Customs Service via the Nigeria Integrated Customs Information System to monitor imports of EEE. In a 2018 press release in the *Vanguard Maritime Report*, a NESREA official stated that some e-waste shipped to the country was sent to Nigerian recycling centres. However, large shipments were repatriated to the origin country of the container. Between 2010 and 2013, approximately 14 containers and 12 trucks of e-waste were repatriated. In its continued efforts, NESREA and the Nigerian Customs Service repatriated four containers in the first two quarters of 2018.

Source: Vanguard, 2018

The Regulations adopt the “polluter pays” principle, which means that UEEE importers require a permit for their activities. The Regulations also require a valid transboundary movement permit issued from the Federal Ministry of Environment for the export and transit of e-waste.

Guide for Importers of UEEE into Nigeria

In line with the 2011 regulations on e-waste, NESREA also developed a guide for importers of UEEE. The guide outlines that Nigeria allows the importation of EEE and UEEE, but bans the importation of e-waste and near end-of-life EEE. The guide requires every UEEE importer to register with NESREA, and explains that any e-waste imported into Nigeria will be sent back and punitive fees imposed on carriers that mix e-waste with UEEE in their shipment.

5.2.4. Extended producer responsibility

National e-waste laws and regulations are often based on the principle of EPR. The OECD defines EPR as “a policy approach under which producers are given a significant responsibility – financial and/or physical – for the treatment or disposal of post-consumer products”. Assigning such responsibility to producers could in principle provide incentives to prevent waste at the source, promote product design for the environment, and support the achievement of public recycling and materials management goals.

Box 4. Responsibilities of manufacturers and producers under Nigeria's Electrical/Electronic Sector Regulations, 2011

- Collect any e-waste generated during the manufacture of EEE and ensure that e-waste is channelled for recycling or disposal.
- Provide a unique serial number or individual identification code for all EEE to track products in the e-waste management system.
- Collect e-waste generated from their products and ensure that such e-wastes are channelled to NESREA accredited/registered recyclers.
- Set up collection centres or a take-back system.
- Establish, finance and organize an individual or collective financial system for Environmentally Sound Management of e-waste.
- Facilitate return of used EEE by providing details of dealers and authorized collection centres to consumers.
- Create awareness on proper collection and recycling of e-waste.

EPR is an integral part of the National Environmental (Electrical/Electronic Sector) Regulations 2011. EPR requires electronics producers to take financial responsibility for the disposal of the products they manufacture. The policy principle includes voluntary or mandatory take-backs, recycling fees and fees on disposal. Its aim is to shift production to less toxic equipment that is easier and cheaper to recycle.

Guidelines regarding EPR in the Regulations require private individuals, retailers, refurbishers, distributors, producers and recyclers to partner with NESREA in establishing an EPR programme. It asks importers and manufacturers to submit an EPR programme proposal for the implementation of a scheme for the collection, handling, transportation and final treatment of post-consumer EEE. Along with the programme, they are also required to submit an annual report that includes the amount of EEE sold, repaired, re-used, collected, processed, stored, treated, and recycled. The responsibilities of manufacturers and producers under Nigeria's Electrical/Electronic Sector Regulations are outlined in Box 3. It is important to note that under these guidelines, the term 'producers' also includes importers of EEE.

NESREA has engaged in discussions about implementing EPR with original equipment manufacturers such as Dell, HP and Phillips. According to NESREA, the EPR programme is expected to create job opportunities and tackle the environmental impacts related to e-waste in Nigeria (Premium Times Nigeria, 2017).

Despite the possible benefits of EPR, in many countries it has proven challenging to implement in practice. Moreover, there are concerns that EPR initiatives by individual brands or companies may do more harm than good if they are not well coordinated with overall national waste management policies. Some have argued that in certain situations, EPR can discourage the repair and refurbishment of products (ILO, 2019).

5.2.5. Environmental legislation

Nigeria also has regulations that set down standards for air, land and water. These regulations are not specific to e-waste management but are related to mitigating the negative impacts that e-waste can have on the environment. These regulations include the National Environmental (Ozone Layer Protection) Regulations S.1 No 32 of 2009, the National Environmental (Mining and Processing of Coal, Ores and Industrial Minerals)

Regulations S.1 No 31 of 2009, the National Guidelines and Standards for Environment Pollution Control in Nigeria (March, 1999) and the Air Quality Standards (FEPA, 1991).

5.2.6. State-level legislation

In Nigeria, states also have the power to formulate laws to safeguard the environment. Given the highly challenging environmental and e-waste-related risks faced by the state of Lagos, it has adopted several environmental laws, including the Lagos State Sanitation Law, 2002 and the Lagos State Urban and Development Regional Planning and Development Law Of 2005. The first of these promotes healthy living in view of also increasing the country's productivity, sets up a framework for waste management (classification and responsible management) and penalties for non-compliance. However, the law has proved difficult to implement in practice and many parts of the city do not benefit from public waste disposal services.

5.2.7. National and state-level institutions

The apex organization for environmental regulation in Nigeria is the Federal Ministry of Environment. Since Nigeria is a federation, environmental regulation applies to all 36 states including the Federal Capital Territory. Additionally, states have their own state-level regulatory bodies for environmental protection, physical planning and solid waste management.

NESREA was established under The National Environmental Standards and Regulations Enforcement Agency (NESREA) Act No. 25 of 2007 under the Federal Ministry of Environment. According to the provisions of this Act, NESREA is responsible “for the protection and development of the environment, biodiversity conservation and sustainable development of Nigeria’s natural resources in general and environmental technology including coordination and liaison with relevant stakeholders within and outside Nigeria on matters of enforcement of environmental standards, regulations, rules, laws, policies and guidelines.” (NESREA, 2018).⁸

Other agencies such as National Emergency Management Agency (NEMA), the National Space Research and Development Agency (NASRDA) and the Nigeria Customs Service are also involved in national e-waste governance.

The agencies responsible for enforcement of the Lagos state laws and waste management in the state are the Lagos State Environmental Protection Agency (LASEPA) and The Lagos State Waste Management Authority (LAWMA). Responsibilities of LAWMA include registration of e-waste, ensuring that e-waste is not disposed of with other waste, and educating people about the dangers of burning e-waste in the open. LAWMA manages three official dumpsites in Lagos, including by contracting waste collectors for the transportation of e-waste.

NESREA and state environmental protection agencies must confront and address a number of challenges, which go against the best environmental enforcement efforts. Despite having a good number of legislative instruments and policies, Nigeria’s environmental conditions have continued to deteriorate due to lack of resources and know-how for effective environmental enforcement. According to a study on legal issues and environmental sanitation in Nigeria (Tawfiq Ladan, 2015), enforcement decisions are not

⁸ For more on NESREA see <http://www.nesrea.gov.ng/our-functions/>

sufficiently multi-stakeholder in nature and have not been delegated to the lowest level where these issues can be effectively managed. Working relations have not been formed with the various agencies and departments whose activities influence environmental enforcement. In addition, penalties under most laws are uniformly low and seldom enforced.

Others factors contributing to poor enforcement of environmental laws in Nigeria include the presence of influential individuals and groups, industries with environmentally unacceptable technology, conflicts of roles between ministries, departments and local agencies and the need for capacity building. Also important to note is the need for adequate monitoring, evaluation and reporting, and accessibility of updated information to relevant government entities at various levels, waste management actors and civil society. Unfortunately, in Nigeria today, such environmental information is generally not readily available. Moreover, civil society generally lacks awareness and information on environmental management and the importance of having the right to a healthy environment; and private companies also lack awareness on current environmental and sanitation laws, and on how to comply with them (Tawfiq Ladan, 2015).

5.3. National labour legislation

Nigeria has issued a number of legislative instruments to promote labour rights and decent work throughout its economic sectors. However, as with the environmental laws, lack of resources and capacity of government agencies limit enforcement. In the area of e-waste management, it is particularly difficult to enforce OSH regulations among informal actors.

5.3.1. General statutes

The Labour Act, 1974, as amended in 2004 (Labour Act (Cap L1 LFN 2004)), and the Trade Disputes Act, 1976, are the most important statutes regarding labour issues in Nigeria. These regulations address freedom of association and the right to collective bargaining, forced labour and child labour, employment creation and poverty alleviation, the legal status of migrants including issuing of work permits and the termination of employment.

5.3.2. The Factories Act, Cap. F1, Laws of the Federation of Nigeria 2004

The Factories Act is the main OSH legislation in Nigeria. It covers registration of factories, health, safety, welfare, investigation of accidents and diseases, legal proceedings, penalties and other general provisions related to OSH. The Act also includes seven subsidiary legislations.

The Act also covers instances where workers are working in premises that are not owned by their employer. However, the definition of factories under this Act means that large sections of the informal economy and self-employed individuals are not covered. In contrast, the Labour Safety, Health and Welfare Bill of 2012 applies to all workplaces, employers and employees, including those that are self-employed.

5.3.3. Employees' Compensation Act, 2010

The Employee's Compensation Act of 2010 is another key OSH-related law in Nigeria. The act makes comprehensive provisions for compensation to employees who have sustained occupational injuries at the workplace or suffer from occupational diseases. The Act aims to: provide an open and fair system for guaranteed and adequate compensation;

provide rehabilitation for those who have sustained occupational injuries or suffered from occupational disease; establish and maintain a compensation fund; provide fair and adequate assessments for employers; provide a fair appeal procedure; and combine efforts and resources to prevent workplace disabilities.

5.3.4. Labour administration

The apex organization on labour issues in Nigeria is the Federal Ministry of Labour and Employment. The Ministry has state offices in the 36 states of Nigeria and Federal Capital Territory, six zonal offices and five parastatals. The Ministry supervises issues related to employment and wages, trade union services and industrial relations, productivity measurement and standards, skills development and certification, social security and occupational safety and health.

Labour inspectors are deployed throughout the 36 states and the Federal Capital Territory to ensure compliance with labour laws. Factory inspectors are personnel concerned with the implementation of OSH measures. There are two types of factory inspectors in Nigeria: occupational safety officers and occupational health officers (ILO, 2016).

In 2015, there were a total of 660 labour inspectors, with 258 factory inspectors and 402 labour officers (United States Department of Labour, 2017). The number of labour inspectors had significantly decreased compared to 2013, when the Ministry employed 882 labour inspectors. According to the ILO's benchmark for labour inspectors, there should be one labour inspector for every 15,000 workers in Nigeria. This means that Nigeria should employ at least 3,830 labour inspectors to be able to control for good OSH practices (Ibid.).

5.3.5. Enforcement of OSH regulations

The Ministry of Labour and Employment's National Policy on Occupational Safety and Health came into force in 2006. It aims to ensure that workers in all sectors of economic activity receive OSH services, prevent work-related injuries or diseases, and provide a general framework for improving working conditions and working environment in the country. The policy covers both the formal and the informal sectors.

Along with the OSH department in the Federal Ministry of Labour and Employment, OSH enforcement also falls under the responsibilities of the Federal Ministry of Health and the Federal Ministry of Environment. However, there is no formal OSH management system in Nigeria. The Federal Ministry of Labour and Employment, in collaboration with ILO, is working to develop a baseline national profile on occupational safety and health to stimulate effective management of safety and health at work in Nigeria, which it is hoped would also improve working conditions in the e-waste management sector. An OSH profile was prepared and adopted by the tripartite partners in 2016 (ILO, 2016).

6. Key considerations

Due to significant flows from other countries into Nigeria, and because of the nations' increasing demand for electrical and electronic equipment and devices, e-waste has become one of the most rapidly growing waste streams in Nigeria. As recycling and reuse rates are low, e-waste poses a severe threat to human health and the environment. Unless urgent measures are taken, workers handling e-waste, their families and those living near disposal sites will continue to be exposed to hazardous substances.

E-waste differs from other streams of waste in Nigeria as it contains highly hazardous substances, alongside valuable materials, and also materials without current resale value. It is becoming an increasingly important resource for all economic units regardless of their size and for informal workers along the e-waste value chain who recover, repair, refurbish, reuse, repurpose and recycle used electrical and electronic equipment, bring innovative services and products to the market and facilitate a transition to the circular economy.

With the right infrastructure, regulations, incentives, policies and processes in place to manage e-waste in Nigeria in ways that advance decent work and protect the environment, UEEE has the potential to fuel the generation of sustainable enterprises and the creation of decent employment opportunities. This would be a significant step towards inclusive growth and decent work, more sustainable production and consumption, and achieving the 2030 Agenda for Sustainable Development.

Given the ILO's normative approach and unique tripartite structure, the Organization and its constituents can make an important contribution to advancing decent work in the management of e-waste, helping e-waste actors capture the value of e-waste materials and improving the sector's productivity. Social dialogue in all its forms is essential to engaging governments and employers' and workers' organizations in the formulation and revision of laws, regulations and policies, and to ensuring that they are effectively coordinated and implemented in practice.

Capacities should be strengthened in the various branches of Nigeria's Government that are engaged in ensuring decent work in e-waste management, and coordination should be enhanced between key ministries and agencies at the federal, state and municipal levels. Strengthening the capacity of labour and environmental inspection should be an integral part of any future investment in e-waste systems. The capacity of trade unions to organize and employers' organizations to provide services, including more effective organization and convening of all relevant actors in the e-waste sector, should also be enhanced.

The considerable risk of injury and disease, including from the absence of appropriate PPE, tools and processes, which lead to the inappropriate handling of e-waste and exposure to its hazardous substances, should be addressed as a matter of urgency. This includes developing of specialized equipment and processes, raising the awareness of e-waste workers about the hazards and risks that they face, and developing of inclusive learning and training tools and methodologies for e-waste workers, including those in the informal economy.

The high incidence of informality poses a major challenge for the enforcement of legislation, the growth of sustainable, productive and efficient enterprises, the improvement of the livelihoods and working conditions of e-waste workers, and the realization of their rights at work. The ILO's Transition from the Informal to the Formal Economy Recommendation, 2015 (No. 204), and Guidelines for a just transition towards environmentally sustainable economies and societies for all (2015) provide guidance for governments and employers' and workers' organizations to help move informal e-waste workers and micro, small and medium-sized enterprises into the formal economy, while ensuring that livelihoods are preserved and improved.

In this regard, cooperatives and other social and solidarity economy organizations and enterprises perform a key role in e-waste management in many countries. They have promoted the rights of informal workers, advocated their inclusion and recognition, and created formal and decent work opportunities. While this is not the case in Nigeria, cooperatives could be explored as a means of better organizing informal e-waste workers.

As mentioned above, sustainable e-recycling enterprises have great potential to ensure that e-waste is managed better. The conclusions concerning the promotion of sustainable enterprises, adopted by the International Labour Conference in 2007, should be used by the Government of Nigeria as well as by Nigerian employers' and workers' organizations to foster an enabling environment for such enterprises to grow and to harness the potential of micro, small and medium-sized enterprises to create decent jobs, introduce new technologies, bring innovative business models to the market and contribute to productivity growth, thereby advancing decent work and environmental sustainability.

There is an urgent need to raise awareness about the growing challenge posed by e-waste management and effectively engage all relevant stakeholders, such as governments, employers, producers, workers and consumers, to promote sustainable production and consumption, advance decent work and protect the environment during the entire life cycle of electrical and electronic equipment, in particular through e-waste recovery, reuse and recycling. There is a need for more reliable, consistent and gender-disaggregated data and statistics, analysis and research about ways to effectively address decent work challenges, particularly in the informal economy.

In April 2019, representatives of governments, employers and workers met in Geneva to discuss ways to advance decent work in the management of e-waste (ILO, 2019). Building on the Points of Consensus they adopted, recommendations for future action by the Government of Nigeria in collaboration with Nigerian employers' and workers' organizations could include the need to:

- (a) Collect data, generate knowledge and raise awareness on decent work in the management of e-waste, including a better understanding of the functioning of the e-waste value chain.
- (b) Increase and promote investment in waste management infrastructure and systems at all levels in order to manage the rapidly growing flows of e-waste in ways that advance decent work.
- (c) Implement and enforce labour laws and regulations to ensure that the fundamental principles and rights at work and the international labour Conventions that Nigeria has ratified protect and apply to all workers engaged in the management of e-waste.
- (d) Engage in all forms of effective social dialogue at all levels to advance decent work in e-waste management and support a just transition towards environmental sustainability in e-waste management.
- (e) Protect the safety and health of all e-waste workers and improve their working conditions through labour inspection and other measures.
- (f) Support the formalization of enterprises, cooperatives and workers in the informal e-waste economy.
- (g) Extend the coverage of social protection to e-waste workers and their families.

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- (h) Promote cooperatives and other social and solidarity economy organizations and enterprises in the e-waste sector.
 - (i) Create an enabling environment for micro, small, medium and large enterprises that provide sustainable services and products along the e-waste value chain and that enhance productivity growth.

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