SUSTAINABLE RECYCLING INDUSTRIES

Solutions for Problematic Fractions from WEEE in Egypt

Study on current handling of problematic fractions, available solutions, and opportunities for improvement

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SRI SUSTAINABLE RECYCLING INDUSTRIES

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Turning waste into resources for development

SRI builds capacity for sustainable recycling in developing countries. The programme is funded by the Swiss State Secretariat of Economic Affairs (SECO) and is implemented by the Institute for Materials Science & Technology (Empa) and the World Resources Forum (WRF). It builds on the success of implementing e-waste recycling systems together with various developing countries since more than ten years.

Acronyms

BFR	Brominated Fire Retardant
CAPMAS	Central Agency for Public Mobilization and Statistics (CAPMAS) – Statistical Data
CEDARE:	Centre for Environment and Development for the Arab Region and Europe
CRT	Cathode Ray Tube
EEE	Electrical and Electronic Equipment
EoL	End of Life
EEAA	Egypt Environmental Affairs Agency
ESIA	Environmental Social Impact Assessment
IEC	International Electro Technical Commission
LCD	Liquid Crystal Display
MFA	Mass Flow Analysis
MoE	Ministry of Environment (Egypt)
MCIT	Ministry of Communication and Information Technology
POP	Persistent Organic Pollutant
RoHS	Restriction of Hazardous Substances
UPS	Un-Interrupted Power Supply
WEEE	Waste Electrical and Electronic Equipment
WMRA	Waste Management Regulatory Agency

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Executive summary

The current study provides an in-depth analysis of the management of hazardous fractions from waste electrical and electronic equipment (WEEE) in Egypt, focusing on the identification of gaps existing in both the regulatory and technological dimensions. These gaps shall be addressed in priority in order to improve the management of e-waste in a systemic and sustainable manner.

The study finds that the legislations related to electronic waste management in Egypt are still in their initial stages, and there is neither a specific law nor regulation about electronic waste management except for the control of the auctions of the main producers that require Environmental Permits to transport and recycle the WEEE. The Waste Management Regulatory Authority (WMRA), with the committee formed by the relevant ministries, is responsible for activating the requirements of the executive regulations of Law 202 / 2020 to implement the integrated management system for hazardous materials and waste, which must include the environmentally sound management of electronic waste.

The study also discusses an Extended Producer Responsibility (EPR) Scheme for WEEE, which was suggested by the Hazardous Waste Sector Action Plan. The EPR system adds the costs of proper waste collection and management to the market price of that product. The calculation of the environmentally sound disposal cost is provided in this document. EPR may take the form of a reuse, buy-back, or recycling program. The producer may also choose to delegate this responsibility to a third party, a so-called producer responsibility organization, which is paid by the producer for used-product management.

In the next section, the study identifies all waste holders and their generation percentages from this waste. The waste flow from each holder is presented to show the possession percentage, average end of life, fate of equipment, and end disposal. These main actors play the greatest role in controlling the WEEE penetrating the market, especially the informal sector.

The study further categorizes the recycling facilities into three categories. Category 1 includes the full stages of recycling, starting from receiving the waste up to precious metal extraction. Category 2 includes no extraction of precious metals, and the process ends after mechanical processing, including the lead batteries handling to lead smelters. Category 3 includes manual dismantling, external power cables processing, and batteries handling. The survey results based on the site visits and questionnaire outputs revealed that most of the formal facilities have licenses for the full processing of WEEE (Category 1), but not all of them have the capabilities to operate the facility according to design or standard due to various challenges. These challenges include a lack of best available technologies and practices, limited area for storing raw materials, products, and hazardous waste, and lack of raw materials supply leading to slow batch production, as more than 80% of generated waste goes to the informal sector.

The study also describes the existing practices for managing problematic fractions and the assessment of available solutions and gaps prioritization. It proposes environmentally sound disposal solutions both inside and outside of Egypt and shows the positive impact of proper management and recycling of hazardous fractions.

Finally, the report concludes that although there are environmentally sound solutions for some problematic fractions, challenges still exist for others, such as lithium-ion batteries, capacitors containing hazardous materials, BFR-containing plastics and CRT screens. The report recommends the proper storage of these fractions until they can be exported for environmentally sound disposal in dedicated facilities outside Egypt. An EPR system is proposed for imported equipment, and the report suggests that a system be approved and supervised by both EEAA and WMRA.

Introduction

Like most of the developing countries, Egypt is facing the problem of addressing the issue of problematic fractions found in WEEE and identifying locally adapted solutions for their safe treatment, as legislations and guidelines for proper WEEE management are yet to be developed. However, the Egyptian Government endeavours to formalize the WEEE recycling sector through many trials in collaboration with international organizations, but still a lot is to be done.

The SRI programme is one of the initiatives that supports Egypt with the overall objective of enabling the development of a sustainable recycling industry for E-waste and related waste streams. In specific, the programme is focusing on governance and technology aspects that allow for an optimal recovery of secondary raw materials and the safe management of hazardous substances.

Following the Assessment of the Problematic Fractions, based particularly on the hazard of the E-waste fractions evolving from the most important equipment recycled in Egypt, which was submitted as one of the deliverables of the current assignment; the present report will tackle an Opportunity Study on Available Solutions Including Impact Assessment. The study includes 9 sections (as shown in the Table of content) structured to analyse the current situation in Egypt and to provide an environmentally sound sustainable solution for WEEE management.

1 Management of Hazardous WEEE Fractions in Egypt

1.1 Legislations Governing the Management of Hazardous Fractions from WEEE

The legislations governing the management of hazardous waste in general were presented in deliverable 1 of this task. A further insight is discussed in the following section to pinpoint the actual situation regarding the WEEE management in Egypt in general and the hazardous fractions in particular aiming at recommending any further actions required for the implementation of solutions for the safe management of hazardous fractions.

1.1.1 Law 4/1994 and its Amendment by Law 9/2009

The law regulated Hazardous Waste regarding:

- Engendering hazardous waste
- Collecting and Storing Hazardous Waste
- Transporting Hazardous Waste
- Treatment and Disposal of Hazardous Waste

The Law also prohibits to construct any establishment for the purpose of treating hazardous waste except with a license issued by the competent authority after consulting the EEAA, the Ministry of Health, the Ministry of Labour and Manpower, and the ministry concerned with the type of waste. The Law does not address the E-waste in particular.

1.1.2 Law 202/2020 for Waste Management

The Waste Management Regulatory Agency (WMRA) regulates, follows, and oversees all waste management processes at both central and local levels, aiming at improving the environmentally safe management of such waste. WMRA is also strengthening Egypt situation regarding all ratified international treaties. On the local level, it attracts and promotes investments in the collection, transport, treatment and disposal of wastes; in view of that, it did work as the technical arm of the Ministry of Environment and the Government of Egypt to promulgate the Egyptian Law number 202 / 2020. The main goals of the Law are to:

- Develop an integrated management of municipal, industrial, agricultural, demolition and construction waste as well as their safe disposal.
- Reduce waste generation.
- Promote reuse.
- Work to ensure the recycling, treatment, and final disposal of waste; and
- Manage waste in a way that reduces damage to public health and the environment.

This Law does not address specifically e-waste and its hazardous fractions. It, however, considers this type of waste a “hazardous waste of a special nature” and approves the organization of committees from different ministries with tasks including:

- Develop and issue lists of hazardous materials and waste,
- Set handling requirements and integrated management of hazardous materials and waste
- Identify the concerned ministry or entity responsible for issuing licenses for handling and integrated management of hazardous materials and waste.

These committees are not working yet. However, WMRA issued specific rules regarding the auctioning of electronic waste for the purpose of recycling (see Annex 1)

1.1.3 Ministerial Decree No 113/2022 for Integrated Hazardous and Non-Hazardous Waste Management

As per decree 113/2022, all companies related to waste management including WEEE recycling facilities should apply for new license from WMRA to able to operate their facilities. The process includes inspection for each facility to ensure their compliance with regulations, management system, machines, and capacity. The decree gave the authority to WMRA to stop the licenses of non-complying facilities. A copy of the decree is available in Annex 2.

1.2 Efforts to Improve the Management of Hazardous Fractions from WEEE

Several projects and activities were implemented in Egypt to improve the management of e-waste. A selection of projects is described thereafter.

1.2.1 Medical and Electronic Waste Management Project (2017-2022)

The Government of Egypt (GoE), represented by the Ministry of Environment (MOE) in coordination with the Ministry of Foreign Affairs (MoFA), and the technical support of the United Nations Development Program (UNDP), obtained a package of grants from the Global Environment Facility (GEF) to implement a five-year project, started in 2017, entitled "Medical and Electronic Waste Management Project -MEWM". The overall objective of MEWM Project was to implement an integrated management system for E-Waste in Egypt through establishing a strong and reliable formal sector to manage this industry.

The major project achievements included but not limited to the following:

Creating a WEEE Management Formal Sector

- In cooperation with the Waste Management Regulatory Agency (WMRA), affiliated to the Ministry of Environment (MoE), the MEWM supported many of the informal WEEE dealers, recyclers and collectors to become formal entities subject to Egyptian Laws and Regulations through developing Environmental Social Impact Assessment (ESIA) studies and provide adequate technical and administrative support to issue the operational industrial licenses. These dealers established recycling facilities and obtained environmental permits from EEAA to work in a legal environmental framework.
- The project supported WMRA to regulate the process of obtaining the E-waste from producers' trough Auctions. The handover of the waste is subject to the review and permitting of WMRA based on the environmental permit obtained after the submission of an ESIA study for the facility.

Developing a Baseline Assessment on Persistence Organic Pollutants (POPs), Unintentionally Produced Persistent Organic Pollutants (UPOPs), and associated hazardous releases (mercury, lead, cadmium) from E-waste processing.

One of the task deliverables was: ***"The Guidelines for the Segregation, Sorting, Pre-treatment and Storage of E-waste Components Containing Heavy Metals and POPs***" **[1]**. The Guidelines include details that provide the minimum practical requirements to be followed in the management of E-Waste on all spheres. It helps decision makers to promulgate any requirements to rule and regulate the WEEE management sector on both formal and informal levels. This guidance should be used by any organization that sets up and/or manages the collection, transportation and storage of any type of WEEE which includes collecting and transporting WEEE from:

- Permanent collection points at business sites such as retail premises
- Permanent collection points at publicly accessible sites such as transfer stations
- Collection and transport from auctions of corporate companies or governmental entities
- Transfer between users
- Disposal after use (hazardous materials disposal in specific landfills)
- Activities related to WEEE movement between two points such as storage, supply, movement for processing, etc.

The objective of these guidelines was to provide guidance for the identification of various sources of waste electrical and electronic associated with equipment; they also prescribe procedures for WEEE management in an environmentally sound manner. Moreover, these guidelines provide guidance on the segregation, sorting, pre-treatment and storage of e-waste components containing heavy metals and prescribe procedures for management and handling in an environmentally sound manner; they shall be used by all those who handle E-waste.

1.2.2 Sustainable Recycling Industries (phase 1: 2016-2018, phase 2: 2020-2023)

The Sustainable Recycling Industries (SRI) programme is funded by the Swiss State Secretariat of Economic Affairs (SECO) and implemented in Egypt by the Center for Environment and Development for the Arab Region and Europe (CEDARE) and DSS Sustainable Solutions Switzerland (dss$^+$). Key partners also include the Ministry of Communications and Information Technology (MCIT) and the Egyptian Ministry of Environment (MOE).

The overall development objective of the programme is that **favourable framework conditions enable the development of a sustainable recycling industry for e-waste and related waste streams**.

The programme is focusing on governance and technology aspects that allow for an optimal recovery of secondary raw materials and the safe management of hazardous substances. In all its activities, SRI strives for inclusive approaches, aiming at beneficial economic conditions for both the private industry and the informal sector. SRI leverages the concept of a circular economy and contributes to actions on climate change mitigation through a reintegration of secondary raw materials into industrial processes. To maximize and measure the positive impact of the programme, metrics for sustainability and the environmental benefits of implemented changes will be developed and applied.

SRI in Egypt was conducted in two phases. Phase 1 took place between 2016 and 2018, Phase 2 started in 2020 and will last until the end of 2023.

Main achievements of SRI Phase I

The SRI project has achieved the following highlights during its first phase in Egypt:

- The constitution of a National Take-Back Committee under the leadership of MCIT by a ministerial decree. This committee provides an institutional platform taking ownership for the management of e-waste in the country.
- The development of technical standards and the training of 20 auditors from the Central Department for Inspection and Environmental Conformity of the Ministry of Environment. Based on the audits, a letter was sent by the Ministry of Environment to governmental agencies and private sector listing the formal accredited recyclers to whom all auctioning of e-waste should be limited to, resulting in a stabilized business for the recyclers.

- The verbal commitment by the Egyptian government to cover the costs of collection and safe recycling for all government generated e-waste. This initiative is supported by the SRI pro-gram with a cost-calculator tool allowing to better understand the financial model that should be scaled-up to the entire country on the long term.
- The incubation of 4 entrepreneurial ventures through the e-Khodra program, contributing to the development of the e-waste management ecosystem in the country.

The first phase of SRI has achieved some significant progress by supporting the creation of important building blocks for an organized e-waste management system in Egypt. Key challenges however remained, in particular:

- The development of a national policy and legislation on e-waste management
- Ensuring the enforcement and follow-up of the accreditation process
- Identifying an adapted financial model beyond the governments voluntary commitment to cover collection and recycling costs for government generated e-waste.
- Ensure the continued capacity building in the field of recycling and the development of the e-waste management ecosystem.
- The scaling-up of best practice to the private sector and households.

Objectives of SRI Phase II

The activities planned for the phase II of the SRI programme in Egypt aimed at addressing the challenges described above. They can be summarized as follows:

- Developing a national e-waste policy that will clearly define the different steps that are necessary for the environmentally sound management of e-waste. This will include the creation of a legal framework, definition of stakeholders responsibilities, elaboration of technical guidelines, development of financing mechanisms and take back systems based on extended producer responsibility and creation of awareness.
- Ensuring that the normative process is sustained and institutionalized in the Egyptian context by reviewing the current normative requirements and broadening their scope, developing guidelines for both recyclers and auditors and supporting the building of auditing capacity in the private sector to stimulate competition and create high-level jobs.
- Ensuring the continued capacity building in the field of recycling and the development of the e-waste management ecosystem by implementing a national trainee program for e-waste, possibly together with the Information Technology Institute (ITI) and Network and Telecommunication Institute (NTI). Further activities include a second round of incubation through the Youth Incubator Programme as well as continuing the support to existing SMEs recyclers and players from the emerging recycling sector in Egypt in general to represent their industry's interests in the stakeholder dialogue.
- Demonstrating the optimization of the recycling chain with the set-up of a pilot take-back programme. This pilot will provide an opportunity to test all the components supported by the SRI programme (normative, business, technical), to learn lessons and take corrective measures before extending to a larger territory and to identify an adapted financial model beyond the governments voluntary commitment to cover collection and recycling costs for e-waste from the governmental collection programme. The pilot will also serve as a basis for the scaling-up of best practice to the private sector and households.

- Addressing specifically the issue of problematic fractions and identifying locally adapted solutions for their safe treatment, benefiting from studies and solutions already developed for other countries participating in the SRI project.

1.3 National Policy Framework for the Management of Electronic Waste [2]

This framework is an effort of the "Medical and Electronic Waste Management Project"; it came into many parts, the first of which provided an overview of examples of international practices for E-waste management systems. It was concluded with an outline of a proposed E-waste management system applicable within the Egyptian context and market structure.

Based on the results of the first part, the second part included a set tools and policies that were developed to promote the proper management of the E-waste. These were developed based on a number of governing principles that were discussed and agreed upon with the project and the National Committee for E-waste and other stakeholders. The effort of the project identified the different concerned parties and their roles in the policies implementation. These policy tools have been proposed in line with the proposed short-term vision for E-waste management. This part was concluded with identification of a set of activities that need to be developed to support the implementation of the policies.

Part three includes a number of necessary measures to implement the policies, whereas each concerned entity will be required to take the necessary action for policy operationalization.

And finally, the fourth Part of the document, an E-waste Policy Framework was proposed including:

1. Outline of a Proposed E-waste Management System
    - Major/Strategic Decisions
    - Other relevant issues
    - Which Producer Responsibility system for E-waste Management in Egypt
2. Effective Monitoring of E-waste, from generation to disposal
3. Recovered Material Price Support
4. Establishment of Collection/disposal Centres
5. Proper Dismantling and Recycling Operations
6. Maximum Formalization Possible
7. Proposed Policy Framework

As shown above, the proposed policy framework is a comprehensive approach that needs an extensive effort from the Government to implement in order to establish a sustainable WEEE management industry. This will require to start with additions and modifications of the Law of the solid waste. To date, no serious steps were taken regarding this subject, as the executive regulation of the Waste Law was issued with no amendments related to the E Waste management.

1.4 EPR Scheme for WEEE Suggested by the Hazardous Waste Sector Action Plan

Extended producer responsibility (EPR) is an environmental protection strategy aimed at decreasing total environmental impact from a product, by ensuring that the producers of the product take responsibility for the entire lifecycle of their products especially in the take-back, recycling, and final disposal of the product. This, in turn minimizes the waste generation and its associated negative impacts.

Among the targets of the Hazardous Waste - Sector Action Plan (HHW-SAP) for Egypt are the development, promoting and initiating the concept of EPR schemes focusing upon specific priority hazardous waste

streams such as E-waste. Approaches include developing “deposit refund” and “take-back”” recycling systems and facilities. The achievement of these targets will be monitored and updated by WMRA on a yearly basis.

The HW-SAP intends to make a start by identifying ‘sectors’ of industry to initially focus on. Industry sectors that have taken responsibility for designing Extended Producer Responsibility (EPR) schemes in other countries, and it is hoped that they can extend their experience and practices to Egypt.

The main activities for this purpose will include the following:

- Establish stakeholder working groups within each priority ‘waste’ sectors targeted for EPR, which presently comprises: E-waste, tyres, batteries/accumulators and waste oils.
- EPR schemes should be developed following buy-back and take-back concepts tailored to the Egyptian context.
- Develop and enact EPR legislation – to be started by WMRA in coordination with Ministry of Environment.
- Discuss and conclude studies on preferred EPR system designs including organizational and reporting structures, roles & responsibilities, targets and supporting framework provisions.
- Develop/implement an awareness and educational programme promoting the EPR concept along with appropriate tools and materials, making use of social media, radio, TV and printed press.
- Enhance technical capacity of inspection staff supported by sufficient logistics, in particular motor-vehicles to enable them to get into the field to visit commercial and industrial premises.
- Introduce and use the circular economy or lifecycle management principle for producers to maximize the collection and recovery of products at their end-of-life. It can also lead to better life-cycle management of hazardous materials.

This scheme may place a significant responsibility of the post-consumer phase on producers, which assume significant responsibility—financial and/or physical—for the treatment or disposal of post-consumer products. However, advantages include:

- Reduction of wastes,
- Enhancement of product design for the environment,
- Supporting the achievement of public recycling and materials management goals,
- Theoretically this principle ensures effective end-of-life collection,
- Environmentally sound treatment of collected products and improved re-use and recycling.

On the other hand, EPR adds the costs of waste collection & treatment to the market price of that product. EPR may take the form of a re-use, buy-back or recycling program. The producer may also choose to delegate this responsibility to a third party, a so-called producer responsibility organization, which is paid by the producer for used-product management.

1.5 Required Effort from WMRA

Despite the continuous effort of the Egyptian government to transfer the informal sector of WEEE management to formal, yet there are still gaps of precise information about the exact management flow of this waste and particularly about the handling, storage, processing and final disposal of hazardous elements in each fraction of the WEEE. In addition, the sustainable management of WEEE needs a set of regulations to control this industry starting from the collection process passing by the transport to the recyclers and ending by the environmentally sound recycling and processing especially in that the waste contains a multiple of components including the precious metals as well as the toxic hazardous substances and other resources.

These resources vary significantly by product having adverse impacts on human health and environment if not handled properly, especially with the expected sharp growth in WEEE generation. Moreover, this is aggravated by the fact that the electronic equipment life span is decreasing over years while accompanied by consumer behaviour that tend to acquire newer products attributed to technological progress in the market that offers better services to end-users.

Electronic waste regulation is still in its initial stages in Egypt. To date, there is neither a specific law nor regulation about electronic waste management except the control of the auctions of the main producers that requires the Environmental Permits to transport and recycle the WEEE. WMRA, with the committee formed by the relevant ministries, are fully responsible for activating the requirements of the executive regulations of Law 202 / 2020 in order to implement the integrated management system for hazardous materials and waste, which must clearly include the environmentally sound management of electronic waste.

As shown from the above presentation, the management of hazardous waste fractions has not been yet materialized at all levels of the Egyptian Government, and there is no integrated system to regulate not only the hazardous fractions found in electronic waste, but there is no such system for the integrated management of this electronic waste, which is the source of these fractions.

2 Main Actors and Processes along WEEE Recovery Chain

2.1 Waste Holders

2.1.1 Households

According to the latest announcement (November 2021) of the Central Agency for Public Mobilization and Statistics (CAPMAS) the total population inside Egypt reached 102'662'103 inhabitants [3]. The Agency also announced that the number of Egyptian households, according to population estimates on the first of January 2022, reached 25.5 million. It also confirmed that 55.3% of the total number of households reside in the rural side of Egypt (14.1 million families), while 44.7% of the total number reside in urban areas (11.4 million households) [4]. The waste generation from households shall be discussed in the following section. The Egyptian households generate 23 percent of the E-Waste, according to the statistics of Egypt's Ministry of Environment.

Desktops (PCs)/ Laptops

According to a survey conducted between 2019 and 2020, the proportion of households with computers (PC and Laptops) in urban Egypt was 73.9 percent [5]. This was higher than the share of households in rural areas that owned a computer as shown in the next Figure. The average percentage of computer ownership in Egypt is 64% from the households which is 25.5 million [6].

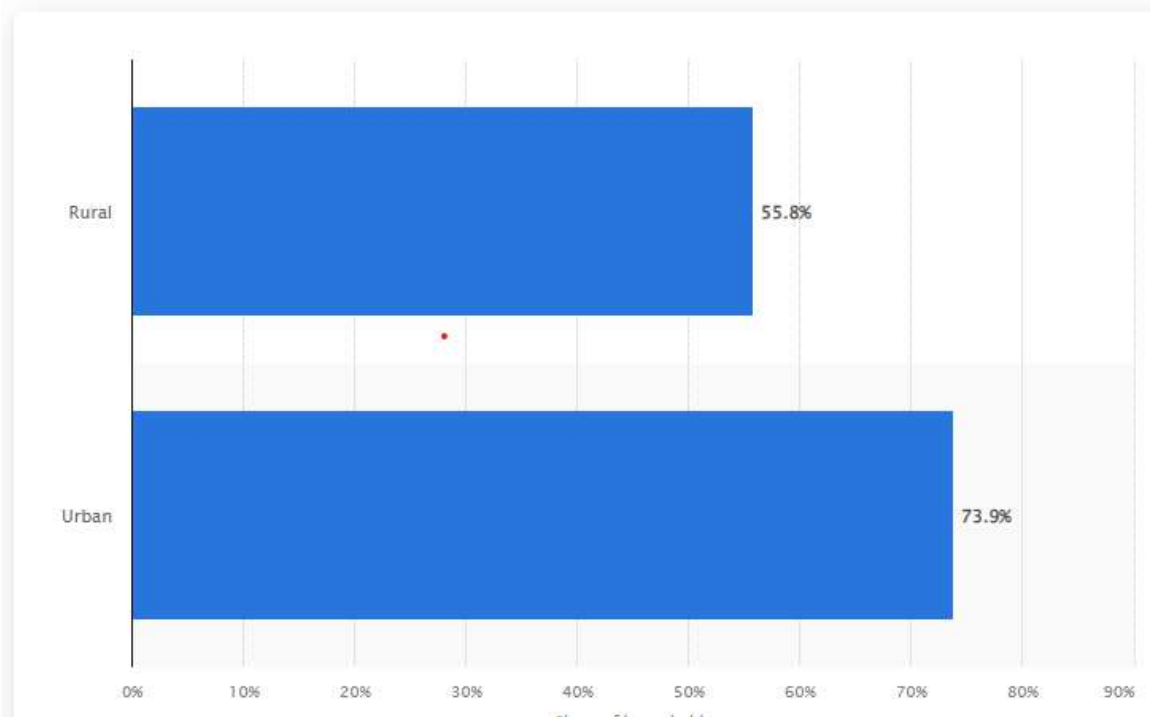


Figure 1: Share of Households with Computer in Egypt between 2019 and 2020, by Area [6]

The majority of the households use this type of Equipment for about 10 years before discharging it as waste. They sell their used desktops to second hand equipment dealers (informal sector), which in turn sell them, as a second hand, to maintenance workshops or sell them to informal recyclers.

Mobile Phones

The ICT indicators report (2017 – 2021) reported that the mobile subscription in 2017 was 101.27 million and in 2021 was 103.45 Million at a penetration rate of 111.64 and 99.78 (source Ministry of Communication and Information Technology) respectively [7]. The average rate of mobile change is 4 – 5 years, which means that the 2017 penetration is currently considered as waste. The household share of this penetration is about 98%.

The majority of the households sell their used mobiles to secondhand equipment dealers (informal sector), which in turn sell them as a second hand, for maintenance workshops or sell to recyclers (the majority are informal). Part of the dismantled fractions, such as plastic parts may end up in municipal landfills.

The following Figure shows the subscription and the rate of penetration of mobiles between 2017 and 2021.

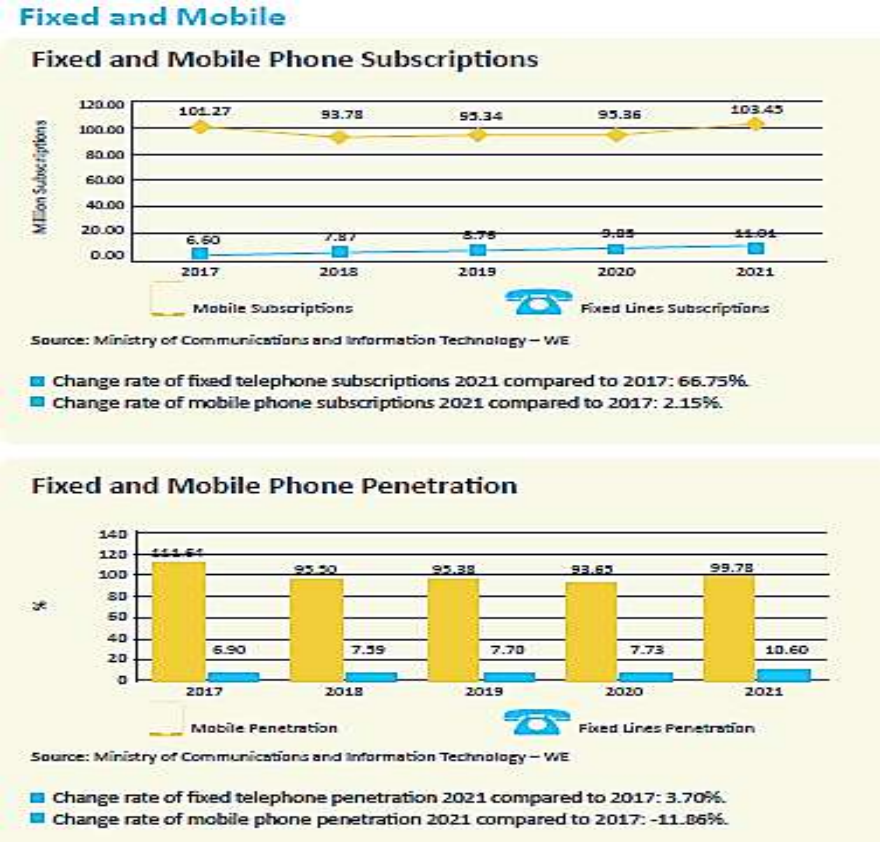


Figure 2: Mobile Subscription and Penetration 2017 – 2021 [7]

LCD

The households use the LCD mainly as televisions or screens for other equipment such as laptops and desktops. It was reported that 41% of the households use LCD [8]. When reaching the end of life, which is about 10 years, the equipment is sold to the informal collectors or directly to refurbishers for resale as second hand or for dismantling for spare parts maintenance. The formal sector recyclers have nearly no access to this type of equipment from households unless they source from informal collectors.

CRT

CRT is an obsolete electronic equipment; its production was ceased in 2012; at this time 59% of the households used CRT monitors (as reported in reference 6). The average end of life of this equipment is 12 to 15 years. Before 2012, the households' CRTs used to sell the CRT for informal dealers to dump them in the municipal landfill.

It is worth noting that an inventory of the cathode ray tubes (CRT) accumulated in various Egyptian ports due to illegal dumping, has been completed in 2020. The Medical and Electronic Waste Management Project supported re-exporting the 930 tons of CRTs from seven Egyptian ports namely (Alexandria, Dekheila, Damietta, Port Said, Suez, Safaga and Aswan) to registered waste management facilities as per EU Directives in Greece for final safe disposal.

The following Table shows the actual practice in Egypt regarding the flow of most of the electronic waste from households to the final fate.

Table 1: Household electronic waste flow.

	Equipment	Possession Percentage – Share of Households	Average End of Life (Years)	Fate of Equipment	End Disposal
Households	Mobile	98.00%	4-5	Secondhand equipment dealers (informal sector)	• Dismantling for maintenance (informal) • or sell to recyclers (the majority are informal)
	Desktops/ Laptops	64% (average of Urban and Rural)	10	Secondhand equipment dealers (informal sector)	• Dismantling for maintenance (informal) • or sell to recyclers (the majority are informal)
	LCD	41%	10	Secondhand equipment dealers (informal sector)	• Secondhand sale (informal) • or sell to recyclers (the majority are informal)
	CRT	59%	12 - 15	Secondhand equipment dealers (informal sector	• Informal Dealer • or Dumping site

2.1.2 Public Sector

The public sector is one of the E-Waste generator in Egypt, it produces 14% of Egypt Electronic Waste [9]. The sector includes many types of organizations including but not limited to:

- Governmental banks
- Hospitals
- Universities
- Schools
- Public SME (industrial and others)
- Public large enterprises
- Governmental organizations, public establishments, etc.
- Ministries and their affiliates
- Others

All these organizations use desktops, laptops, LCDs, servers' network including UPS and other equipment.

According to the information provided by CAPMAS, Egypt includes about 300 large public sector and about 500 SME organizations and 11 public banks. All the end-of-life equipment of the public sector should pass through the procedure of the General Authority of Government Services (GAGS), which is considered one of the economic entities assigned with the following tasks:

- Procuring the supply commodities, within the framework of subsidy plan adopted by the state.
- Playing its role to keep the local market balanced by the way of controlling the quantity and price of home trade, so as to prevent monopoly practices.
- Supplying, whether by importation or by local procurement, basic commodities decreed by the ministry of supply and internal trade along with any other commodity monopolized within the local market.
- Acting through the subsidies made available by the ministry of finance, on the commodities commissioned to secure. Subsidy sum is the difference between the cost of product and its marketing price.

In addition to the above-mentioned tasks, it manages all auctions related to the public sector; accordingly, all end of life equipment generated by the sector should be auctioned. The companies entering the auction to obtain the equipment should be from the formal sector of E-Waste Recyclers, and subject to environmental conditions set forth by the Waste Management Regulatory Agency WMRA [10]. Table 2 below shows waste flow from the public sector.

2.1.3 Private Sector

The private sector is the main generator of E-Waste in Egypt, as it is responsible of 58 % of this waste. It includes many types of organizations but not limited to:

- Telecommunication enterprises such as:
  - Landline telephony service Telecom Egypt
  - Cellular communication service: Orange, Vodafone, Etisalat, Telecom Egypt, and WE
- Private Banks (27 banks – registered with the Central Bank of Egypt)
- Private Hospitals
- Private Universities
- Private Schools
- Private SMEs (industrial and others)

- Private large enterprises
- Others

The generated waste from above mentioned organizations is circulated through the following:

- Trade in of equipment with the producers
- Auction as per WMRA requirements especially the telecommunication enterprises such as Orange, Vodafone, Etisalat, Telecom Egypt, and WE
- Direct sale to recyclers (limited)

The following Table shows the waste flow from private sector.

Table 2: Waste flow from the public sector

	Equipment	Average End of Life (Years)	Fate of Equipment	End Disposal
Public Sector	Desktops/ Laptops	7 to 8	Auction held by GAGS	Formal sector recyclers subject to WMRA conditions
	LCD	7	Auction held by GAGS	Formal sector recyclers subject to WMRA conditions
	Servers' Components	10	Auction held by GAGS	Formal sector recyclers subject to WMRA conditions

Table 3: Waste flow from private sector

	Equipment	Average End of Life (Years)	Fate of Equipment	End Disposal
Private Sector	Desktops/ Laptops	7 to 8	Auction Trade in Direct Sale to recyclers	Formal sector recyclers subject to WMRA conditions
	LCD	7	Auction Trade in Direct Sale to recyclers	Formal sector recyclers subject to WMRA conditions
	Servers' Components	10	Auction Direct Sale to recyclers	Formal sector recyclers subject to WMRA conditions

2.2 Collectors and Recyclers

2.2.1 Formal Sector

Following is the updated list of formal recyclers obtained from MWRA; this list was used to prepare for the recyclers meeting and site visits.

List of Formal Recyclers

Table 4: Updated list of Formal Recyclers

#	Facility Tittle	Scope of Work	Location
1	International Technology Group -ITG	WEEE Recycling	6 of October Industrial Area – Zone 6 – Giza Governorate
2	Green Core for Recycling	WEEE Collection, Recycling and Metals Extraction	May Industrial Zone – Helwan – Cairo Governorate
3	El Arayshy for Industry and Trade	Dismantling and Shredding of WEEE	May Industrial Zone – Helwan – Cairo Governorate
4	Triple REE for WEEE Recycling		6 of October Industrial Area – Storage Zone – Giza Governorate
5	Recycle Key for WEEE Recycling	WEEE Sorting and Recycling	Sadat City – Small Industries Compound- Developers Zone- Menoufeya Governorate
6	Green Plus	WEEE Collection and Recycling	6 of October Industrial Area – Youth Workshops – Giza Governorate
7	Egyptian Electronic Equipment Recycling Company -EERC	WEEE Recycling and Precious Metals Extraction	6 of October Industrial Area – Youth Workshops – Giza Governorate
8	Egyptian Company for Metals Working (Aly Hefzy Factory)	Recycling of Electrical and Telephone Waste Cables – Copper Smelting and Copper Bars Manufacturing	Industrial Zone - Helwan – Cairo Governorate
9	Hussein and Ahmed Abou Soilman for Trade Company	Sorting, Categorizing and Recycling of WEEE – and WEEE Scrap Copper Smelting	Tebbin Zone for Technological Projects - Helwan – Cairo Governorate
10	Extreme Company for Contractual and Supply	WEEE Recycling and Copper Alloys Production	Tebbin Zone for Technological Projects - Helwan – Cairo Governorate
11	REMET Company for recycling	Sorting, Categorizing and Recycling of WEEE – and WEEE Scrap Copper Smelting	Ataka Industrial Zone Extension – North Suez Gulf Development – Suez Governorate
12	Energy Co	WEEE Recycling and Precious Metals Extraction	6 of October Industrial Area Abou Rawash – Industrial Zone - Giza Governorate
13	ARABIAN WEEE	WEEE Recycling and Precious Metals Extraction	6 of October Industrial Area – Youth Workshops – Giza Governorate
14	El Ferdous Recycling	Sorting, Categorizing, Recycling of WEEE, PCBs Secondary Treatment and Precious Metals Extraction	El Wehda El Wataneya Area -Abou Rawash – Industrial Zone - Giza Governorate
15	El Amal For Trade and Supply	Recycling of PV modules, Boards dismantling and recycling and metals extraction	6 of October Industrial Area – Storage Zone – Giza Governorate

Categorization of Egyptian Formal Recyclers

The following chart shows the optimum process activities that are included in a typical successful E-waste recycling facility.

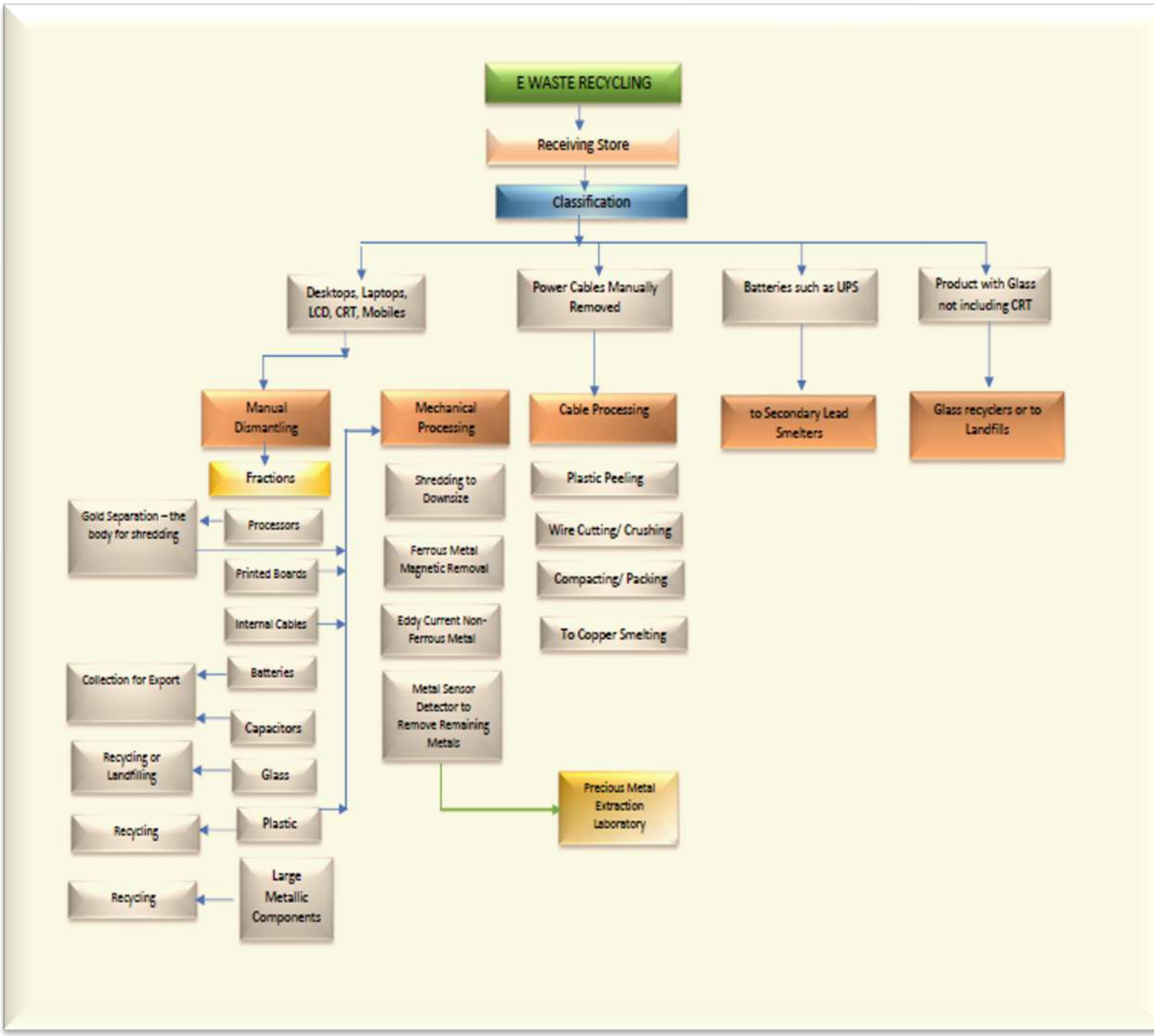


Figure 3: E-waste Recycling Process Stages

The survey revealed that the formal sector is not fully developed yet. The recycling facilities could be divided to several categories as follows:

Category 1:

In such category, the recycling facility includes the full stages of recycling starting from receiving the waste up to the precious metal extraction as shown in the previous Figure.

Category 2:

This category includes no extraction of precious metals and the process ends after the mechanical processing, and it includes the lead batteries dismantling and sorting activities to lead smelters. No chemical processes to extract precious metals.

Category 3:

In this case, the facility includes the manual dismantling and the external power cables processing, it also includes the batteries dismantling and sorting activities. No mechanical or chemical processes.

Survey Results

Our survey results based on our site visits and questionnaire outputs revealed that most of the formal facilities have licenses for full processing of WEEE "Category 1" but not all of them have the capabilities to operate the facility according to design or standard due to the following challenges:

- Lack of best available technologies and practices as the existing recycling equipment such as the chemical treatment units are yet to be developed.
- All facilities have very limited area (200-1000 m^2) which is not sufficient to install a full processing line for WEEE treatment with available area for storing raw materials, products and hazardous waste.
- Lack of raw materials supply leading to slow batch production, as more than 80% of generated waste is going for informal sector (according to survey results and interviews with recyclers).

The following section shall elaborate the outputs of the survey carried out among the formal sector for WEEE recycling in Egypt.

Several meetings were held with the stakeholders as shown in the next Table. A questionnaire was prepared (Attached) and distributed to all recyclers.

Table 5: List of Meetings

Stakeholder	Meeting Date	Attendees	Main Subject discussed	Remarks
WMRA	28/8/2022	• Dr. Shaimaa El Sayed – Director of Disposal Department at WMRA • Eng. Essam Abdel Aziz General Manager of Hazardous Substances and Waste	• Status of the formal electronic waste sector • Updated List of recyclers • Latest regulations governing the sector • Initiative of WMRA to support the sector	Minutes of meeting available on demand.
Triple RE Recycler	22/9/2022	Eng. Ahmed Hassan	Review the status of the facility to evaluate its recycling capacity and performance	Questionnaire available on demand.

Energy Co. Recycler	24/9/2022	Mr. Hagag Hassan	Review the status of the facility to evaluate its recycling capacity and performance	Questionnaire available on demand.
Arabian WEEE	18/9/2022	Eng. Tarek Tag El Deen	Review the status of the facility to evaluate its recycling capacity and performance	Questionnaire available on demand.
EERC	3/10/2022	Eng. Ahmed Salem	Review the status of the facility to evaluate its recycling capacity and performance	Questionnaire available on demand.
ITG	3/10/2022	Eng. Mohamed El Khodary	Review the status of the facility to evaluate its recycling capacity and performance	Questionnaire available on demand.
Green Core	The owner apologized as they are in the process to transfer the facility to another location			
El Arayshy for Industry and Trade	16-10-2022	Mr. Tamer Ahmed Marzouk	Review the status of the facility to evaluate its recycling capacity and performance	Questionnaire available on demand.
Hussein and Ahmed Abou Soilman for Trade Company	We sent questionnaire forms to the facility and tried to perform a site visit but the facility owner was not co-operative			
Extreme Company for Contractual and Supply	We sent questionnaire forms to the facility and tried to perform a site visit but the facility owner was not co-operative			
REMET Company for recycling	We sent questionnaire forms to the facility and tried to perform a site visit but the facility owner was not co-operative			
El Ferdous Recycling	We sent questionnaire forms to the facility and tried to perform a site visit but the facility owner was not cooperative			
El Amal For Trade and Supply	We sent questionnaire forms to the facility and tried to perform a site visit but the facility owner was not co-operative			
Recycle Key for WEEE Recycling	We sent questionnaire forms to the facility and tried to perform a site visit but the facility owner was not co-operative			
Green Plus	We sent questionnaire forms to the facility and tried to perform a site visit but the facility owner was not co-operative			

Category 1 Facilities

The category 1 facilities are described herein in:

1. Energy Co: The facility footprint is 1320 m^2 of design production rate 1200 ton/year, operated by 15 workers, and include a full recycling line starting from receiving and dismantling of WEEE up to precious metals extraction (full details are shown in the attached questionnaire). Used capacity is about 600-700 t/y.

Figure 4: Shots from Energy Co Facility

2. Triple Re: The facility consists of two stories of 300 m^2 footprint each operated by 10 workers; the designed production rate is 1000 ton/year. It includes a full recycling line starting from receiving and dismantling of WEEE up to precious metals extraction (full details are shown in the attached questionnaire). Used capacity is about 600 t/y.

Figure 5: Shots from Triple Re Facility

Category 2 Facilities

The category 2 facilities are described herein in

1. Arabian WEEE: The facility consists of two stories of 300 m^2 footprint each, operated by 12 workers, and includes a full recycling line starting from receiving and dismantling of WEEE up to mechanical processing. They also have a precious metals extraction operation however it is not operational yet. The facility is not fully operated yet, as they store and dismantle the equipment only. The rest of the production line is not operating till now due to shortage of material. Their installed capacity is of 1000 tons per year.

Figure 6: Shots from Arabian WEEE Facility

2. International Technology Group ITG (the oldest facility in the formal sector in Egypt): The facility footprint is 1500 m^2 of design production rate 1200 ton/ year, operated by 20 workers, and includes a full recycling line starting from receiving and dismantling of WEEE up to precious metals extraction. The current production process of the facility includes only storage and dismantling processes, the rest of line is not currently working due to shortage of material.

Figure 7: Shots from ITG Facility

3. EERC: The facility footprint is 300 m^2 of design production rate 600 ton/ year, operated by 10 workers, and include a full recycling line starting from receiving and dismantling of WEEE up to precious metals extraction. The current production process of the facility includes only storage and dismantling processes, the rest of the line is not currently operating due to shortage of material.

Figure 8: Shots from EERC Facility

4. El Arayshy for Industry and Trade: The facility footprint is 375 m^2 of design production rate 1000 ton/year, operated by 10 workers, and include a full recycling line starting from receiving and dismantling of WEEE up to precious metals extraction. The current production process of the facility includes only storage and dismantling processes, the rest of the processes is not currently working due to shortage of material.

Figure 9: Shots from El Arayshy Facility

The rest of formal facilities did not co-operate, as they did not allow for a site visit and did not return back the survey questionnaires; this may be attributed to the difficulty to operate these facilities as a result of many challenges, the most important of which is the lack of equipment.

Management of problematic fractions at all Facilities

The management of the problematic fractions at the facility includes:

- The Ni-Cd batteries are sent to Nasreya
- The plastics are sent to certified facilities (as per WMRA list) for recycling
- Lead-acid batteries are sent to certified lead smelters
- Lithium-ion batteries are stored until any environmentally sound solution is identified (this shall be discussed further in this document)
- Capacitors are stored until any environmentally sound solution is identified (this shall be discussed further in this document)

3 Available solutions for the management of hazardous fractions

3.1 Management of Portable Batteries

Batteries that are safely managed and disposed of in Egypt include lead-acid, non-rechargeable nickel-cadmium, and lithium-ion. Most of the batteries except the lead acid batteries could be end-processed in Egypt according to the Egyptian Environmental Affairs Agency (EEAA)'s requirements at Al-Nasreya hazardous waste landfill.

Currently, there is a take-back system for lead acid batteries adopted by local producers certified from WMRA as detailed in the next section.

3.1.1 Lead-acid Batteries

The only applicable technology for lead acid battery recovery in Egypt is the pyro-metallurgical technology, as it is the most commonly used in international facilities.

As per received from WMRA, the following list shows the licensed recycling facilities in Egypt:

1. Egyptian Company for Lead Smelting, Refining and Manufacturing
2. Chloride Company for Batteries Production
3. El Nisr (Varta) Company for Batteries Production
4. United Company (El Motaheda) for Batteries Production
5. Germany Company for Batteries Production
6. El Sharq Company for Batteries Production
7. Exact Company for Batteries Production
8. El-Wahab in Beni-Suef

The treatment and disposal of lead acid batteries in Egypt by pyro-metallurgical technology is performed through the following steps. Also, the following Figure shows the process flow diagram of the recycling of lead – acid batteries in Egypt.

Pyro-metallurgical technology steps:

1. Discharging: The acid is discharged from the batteries and collected for re-sale and further treatment.
2. Crushing: After reaching the recycling facility, the battery is fragmented into small pieces in a hammer mill.
3. Separation: The fragmented pieces are separated by density through a water bath, where heavy metals and lead are segregated from the plastic.
4. Sieving: The plastic fragments are scooped out of the water bath leaving behind the lead and other heavy metals. Plastic pieces are washed then lifted up for further manufacturing that might result in new battery casings. They can also be sold to plastic product manufacturers as raw materials.
5. Pyro-metallurgical processes (secondary lead smelting):
    - The sorted lead plates and fragments are smelted in rotary furnaces at a temperature of 1300°C to obtain lead bullion to be casted as lead ingots to be used as raw materials in many industries.
    - The rotary furnace is equipped with pollution control system (bag filters) to clean the air resulting from the secondary smelting process.

- The slag resulting from the secondary smelting is disposed of in hazardous waste landfill as it contains hazardous materials.
- The resulting lead is then refined through aqueous chemical treatment and cleaning to eliminate any impurities and to obtain lead alloy of high mechanical properties that could be used in many applications such as reproduction of lead – acid batteries.

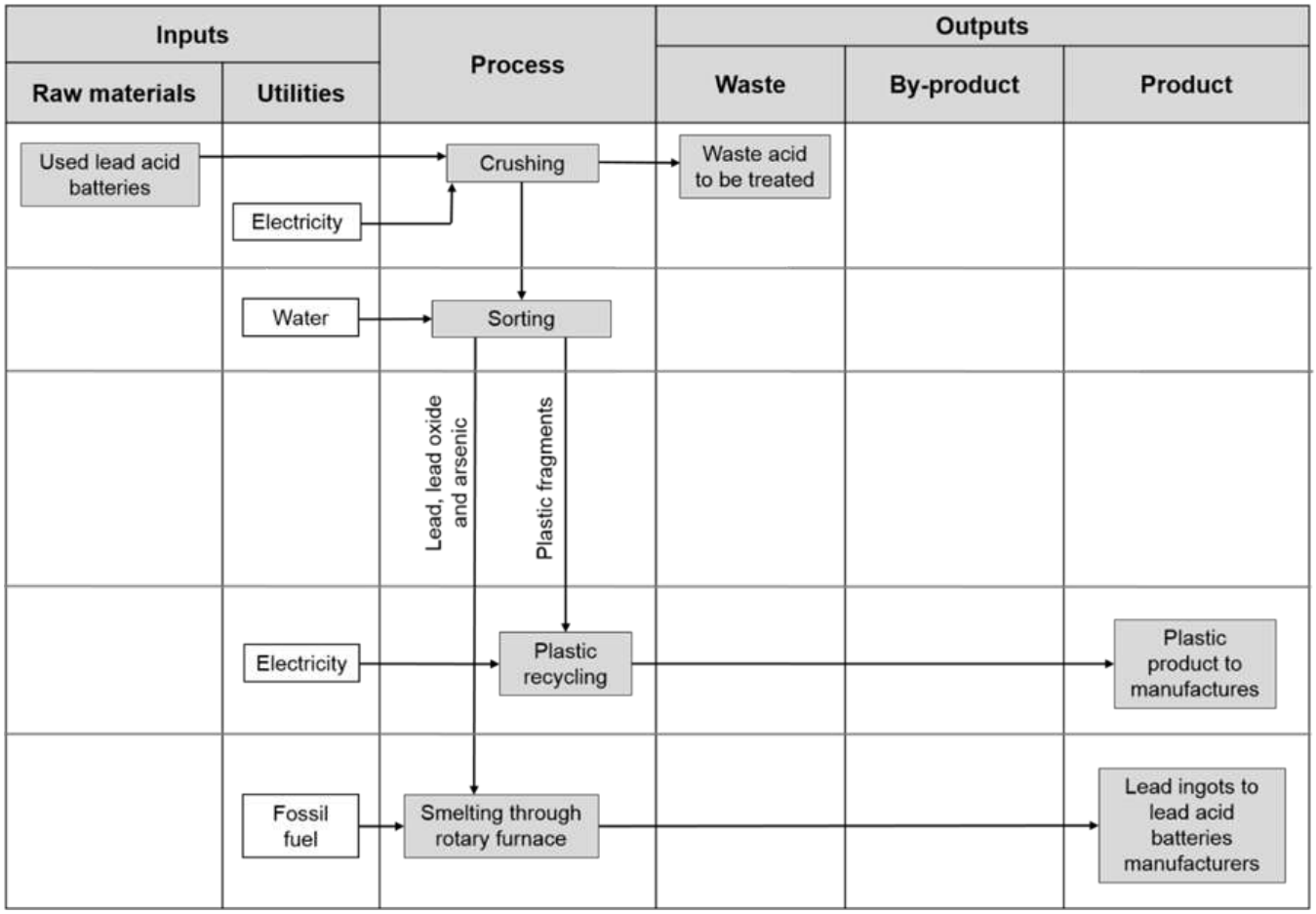


Figure 10: Process flow diagram of lead-acid batteries recycling in Egypt [11].

The following Figures show some of ElMotahda Facility process for secondly recycling lead acid batteries as an example for lead acid battery recycling, however, most of the above listed facilities follow the same procedure.

Figure 11: Broken batteries at ElMotahda Facility

Figure 12: Lead plates separation at ElMotahda Facility

Figure 13: Rotary furnace for lead smelting at ElMotahda Facility

Figure 14: Bag filter at ElMotahda Facility

Figure 15: Plastic crushing for recycling at ElMotahda Facility

3.1.2 Ni-Cd Batteries

Re-chargeable and non-rechargeable Ni-Cd batteries are environmentally sound managed and disposed of in Al-Nasreya landfill. The batteries are transported through certified transporting facility to Al-Nasreya hazardous waste landfill, and then they are solidified in concrete molds to avoid leaching of cadmium as it is a toxic heavy metal. The last step is the disposal of in special cells within Al-Nasreya landfill. The following Figure shows the solidification unit in Al-Nasreya landfill.

Figure 16: Solidification unit according to site visit to Al-Nasreya landfill.

3.1.3 Lithium-ion Batteries

Lithium-ion batteries are commonly used in different devices and equipment such as mobile phones, electrical vehicles, etc. The common practice in Egypt is to dispose this type of batteries in hazardous landfill at Al-Nasreya hazardous waste landfill.

The following steps describes the environmentally sound disposal of lithium-ion batteries at Al-Nasreya hazardous waste landfill.

1. Discharging: The batteries are firstly discharged. The main purpose of discharging the batteries is to reduce the reactivity of the batteries so that it is close to being inert. Afterwards, the discharged batteries are directly landfilled.
2. Transportation: Batteries are transported to Al-Nasreya hazardous waste landfill. These batteries should be drilled and punctured before being landfilled.

The alternative solution in Egypt is to collect a certain amount of batteries in order to export to recycling facilities outside the country.

3.1.4 Other Batteries

Alkaline, Silver Oxide, and Mercury Batteries are collected and disposed in special cells at Al-Nasreya hazardous waste landfill after solidification in concrete molds using a solidification unit to avoid leaching of manganese dioxide, zinc, alkaline, silver oxide, and mercury as they are toxic and hazardous materials.

3.2 Management of Plastics Containing BFR (POPs)

3.2.1 Printed Circuit Boards Plastic

<u>WEEE factories/facilities in Egypt</u>

Printed Circuit Boards are manually dismantled from electronic devices using special hand tools at the formal recycling facility. Then, they are fed to an automatic dismantling machine by applying heating at 120°C where the tin melts and the electric components such as chips and processors will fall of the Printed Circuit Boards. The following Figures show the dismantling machines used inside WEEE factories in Egypt for removing the electric components from PCBs.

Figure 17: Arabian WEEE Dismantling Machine

Figure 18: Triple RE Dismantling Machine.

The dismantling machine includes a pollution control system through which exhaust gases are collected in a dust collector and sent to an activated carbon adsorption equipment to be filtered and meet the environmental standards. Afterwards, the separated electric components go into a different recycling phase.

These phases include:

- Chips: they are crushed and grinded in a small piston and sent to an electrostatic separator to dismantle aluminium and plastic. Afterwards, they are placed in a nitric acid solution to recover gold.
- Processors: they are sent to wet chemistry baths and placed in a diluted nitric acid and distilled water bath to recover silver and other precious metals.
- Dismantled Printed Circuit Boards: Electric crusher is used to crush the boards in order to generate a mix of copper and plastic powders. The copper is separated from the plastic inside the crusher based on density differences. Later, crushed copper is sold to copper secondly recycling facilities.
- Printed Circuit Boards plastic until 2021 were sent to Al-Nasreya landfill, but this practice is currently stopped. The situation in 2022 will be discussed in the next sections.

The following Figure shows process flow diagram of Printed Circuit Boards recycling in most of the recycler facilities in Egypt.

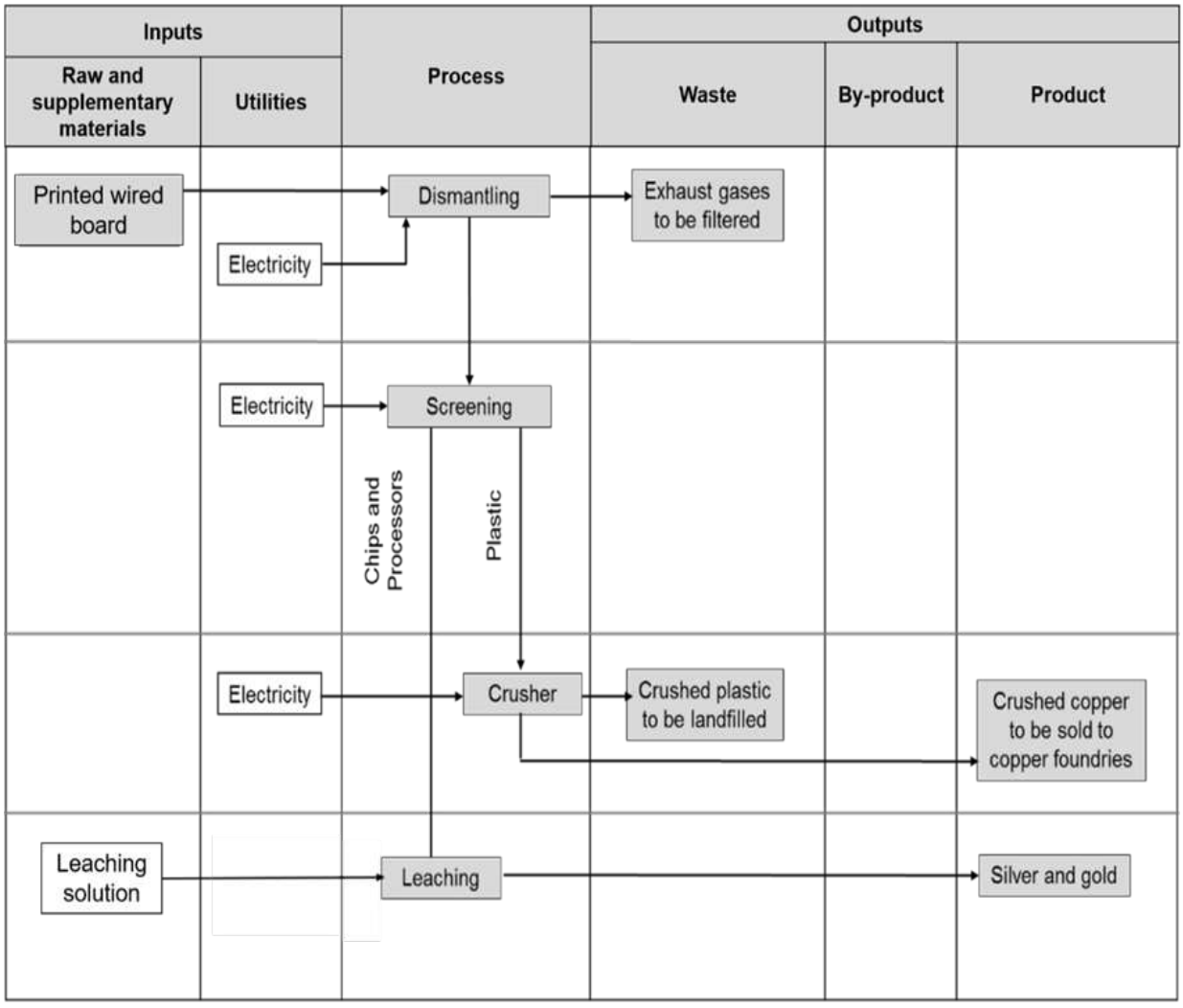


Figure 19: Printed Circuit Boards Process Flow Diagram [11].

Exporting Printed Circuit Boards to foreign facilities

There are companies that have an approval to collect and export Printed Circuit Boards. These companies are collecting certain amounts inside designated and licensed stores in preparation for export such as Green Plus Company.

3.2.2 Plastic of Equipment Casings

Regarding plastics that do not contain BFR, the WEEE recyclers sell to WMRA certified recycling factories for re-use. The following list shows examples of the certified factories approved by WMRA for recycling plastic that does not contain flame retardants. The full list of certified plastic recyclers is annexed (Annex 3).

- Wen Yan Group for Industries.
- Fatthalla for Industries and Trade.
- Mahrous Haneen Asaad for Industries.
- El-Amal General Group for Industries.
- M A M Plast.
- Elif Global Packaging S.A.E.

Regarding the PVC, and the plastics containing BFR in components other than printed circuit boards, they were accepted in the hazardous waste landfill at Al-Nasreya Landfill.

The following Figure show the plastic crushing unit previously used at Al-Nasreya landfill.

PVC and plastic containing BFR were accepted at Al-Nasreya landfill until 2021, but this practice is currently stopped. The situation in 2022 will be discussed in the next sections.

Figure 20: Al-Nasreya Landfill Plastic crushing unit for hazardous waste treatment

3.3 Management of Other Problematic Fractions

3.3.1 CRT Screens

In Egypt, there is no legislation to recycle CRTs, hence, the only way of disposal is landfilling. However, Al-Nasreya landfill accepts CRTs from recyclers only after being dismantled by removing plastic casings, boards and metallic components. CRTs are placed in cells then crushed by a loader to minimize its size then land-filled. According to information provided by the operators of Al-Nasreya landfill, the CRT is not dismantled, and the phosphorus powder contained in the CRT is not removed. The CRT is normally crushed by loader inside a specific cell.

3.3.2 Mercury-Containing Lamps

Used lamps are recognized as hazardous waste and require special attention to their disposal. It is well known that the mercury contained in fluorescent tubes is hazardous since it has an adverse effect on the nervous system, mouth, gums teeth; high exposure over long periods which may cause brain damage and death.

As reported in the first deliverable of this project, fluorescent lamps are processed in a special unit in Al-Nasreya Landfill since 2011. So far, Al-Nasreya landfill has recorded in 2021 a safe disposal of 41 ton of fluorescent lamps containing mercury as hazardous waste in its facility as shown in the next Figure.

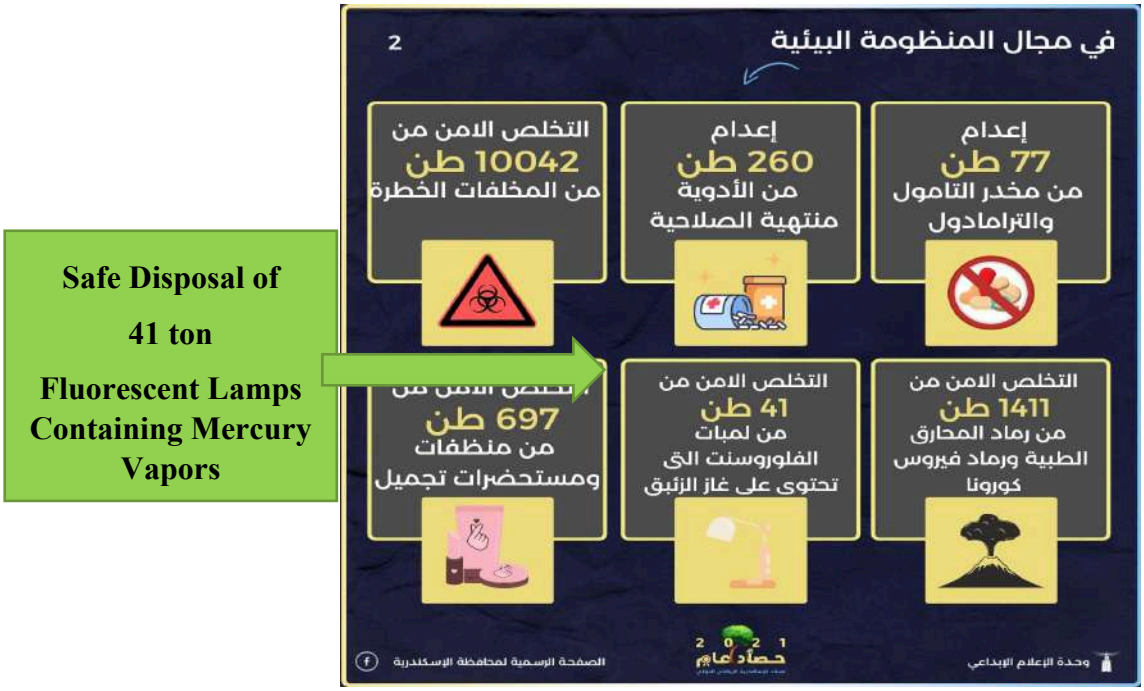


Figure 21: Al-Nasreya 2021 Report.

This unit is still operating and receive all types of mercury lamps for safe disposal in accordance with the requirements of EEAA.

3.3.3 PCB-Containing Capacitors

In Egypt, the small size capacitors used are landfilled at Al-Nasreya landfill after solidification, while the big sized types are collected and stored to be exported for final treatment.

3.4 Assessment of Available Solutions and Prioritization of Gaps

The following Table contains the problematic fractions discussed in the previous sections, the available solutions/practice in Egypt, assessment, and the proposed opportunities.

Problematic Fraction	Available Practice in Egypt for Treatment /Disposal	Assessment	Proposed Opportunities	Prioritization of Gaps
Lead acid batteries	Pyro-metallurgical technology in formal secondary lead smelters as nominated in the Table of the previous section.	Environmentally sound solution	To proceed with the current available practice in Egypt	The practice in Egypt is ongoing in an environmentally sound procedure under the EEAA and WMRA control. No gaps in this practice
Ni-Cd batteries	Disposal at hazardous waste landfill after solidification.	Environmentally sound solution	To proceed with the current available practice.	The practice in Egypt is ongoing in an environmentally sound procedure under the EEAA and WMRA control. No gaps in this practice
Lithium-ion batteries	Alternative 1: Disposal at hazardous waste landfill after perforation.	**Not** Environmentally sound solution	Export to foreign recycling facility following Basel Convention requirements.	***The Gap*** The export to foreign country is yet to be developed through the following: • A collection center is to be constructed and managed under WMRA supervision • The center shall store the batteries in an environmentally sound process • The center shall be certified to export the batteries for environmentally sound disposal following Basel Convention requirements • The center must deal with the external facilities that use BAT and BEP for the batteries disposal
	Alternative 2: Exporting to foreign recycling facility.	Environmentally sound solution		
Alkaline batteries	Disposal at hazardous waste landfill after solidification.	Environmentally sound solution	To proceed with the current available practice.	

Silver Oxide batteries	Disposal at hazardous waste landfill after solidification.	Environmentally sound solution	To proceed with the current available practice.	
Mercury batteries.	Disposal at hazardous waste landfill in specially constructed cells.	Environmentally sound solution	To proceed with the current available practice.	
Printed circuit boards plastic containing BFR.	Disposal at hazardous waste landfill till 2021	Not Environmentally sound solution	Collecting system for exporting to treatment facility such as Tredi.	***The Gap*** The export to foreign country is yet to be developed through the following: • A collection center is to be constructed and managed under WMRA supervision • The center shall store the plastic in an environmentally sound process • The center shall be certified to export the plastic after packing in accordance to the UN Packing requirements for environmentally sound disposal following Basel Convention requirements • The center must deal with the external facilities that use BAT and BEP for the batteries disposal
Plastic of equipment casing containing BFR.	Disposal at hazardous waste landfill till 2021	Not Environmentally sound solution	Collecting system for exporting to treatment facility such as Tredi.	
CRT screen.	Disposal at hazardous waste landfill	Not Environmentally sound solution	Exporting to environmentally sound recycling facilities as previously done by Medical and Electronic Waste Management Project.	WMRA should follow the process recommended by the Medical and Electronic Waste Management Project for a successful disposal
Mercury containing lamps	Disposal at hazardous waste landfill.	Environmentally sound solution. There is a special equipped facility at Al-Nasreya landfill.	To proceed with the current available practice.	The practice in Egypt is ongoing in an environmentally sound procedure under the EEAA and WMRA control. No gaps in this practice

PCB containing capacitors	Disposal at hazardous waste landfill	Not environmentally sound solution	Collecting system for exporting to treatment facility such as Tredi.	***The Gap*** The export to foreign country is yet to be developed through the following: • A collection center is to be constructed and managed under WMRA supervision • The center shall store the capacitors in an environmentally sound process • The center shall be certified to export the capacitors after packing in accordance to the UN Packing requirements for environmentally sound disposal following Basel Convention requirements • The center must deal with the external facilities that use BAT and BEP for the batteries disposal

4 Potential Solutions to Improve Management of Problematic WEEE Fractions

4.1 Proposed Solutions

4.1.1 Extended Producer Responsibility

Since 2014 there has been successive efforts to introduce EPR as an environmental policy in Egypt regarding following the promulgation of the Egyptian Waste Management Law 202 in December 2020, continuous efforts are ongoing to support E-Waste policy development process in Egypt. The peak of these efforts has been the enclosure of a specific EPR article 17 of the latest waste law (202/2020), which stipulates that the Prime Minister shall issue a decree specifying which priority products shall be subject to EPR schemes, what procedures shall be applied in this regard and what financial compensation producers shall pay to the responsible administrative entities for the safe disposal of their products at the end of their life.

An EPR Scheme for WEEE in Egypt was suggested in a dedicated report [12]. The report delineated the potential implementations of an EPR system in Egypt. Two different options are reported in details and an implementation is suggested.

Option 1

In this case, a system that would be managed by WMRA as a governmental entity having the authority for this implementation. This option will allow WMRA control over the system implementation and regular adjustments. However, there are imperative challenges to implement the system, which implies that WMRA should have a mechanism such as implementation. A main concern here is that most of the WEEE is circulated among informal sectors (more than 80%); this represents a load on WMRA to start with transforming this sector into a formal one. These challenges are listed herein but not limited to:

- Transforming the informal sector to formal
- Full arrangement to all actors' approach to increase the rate of WEEE collection
- Continuous revision of the EPR principle using the WEEE
- Arrangement of collection procedure
- Adoption of a range of supporting measures
- Properly report and recycle WEEE
- Revision of the collection target calculation methods.

Option 2

The second option would be a producer-led system. Here, the simpler administration for WMRA or the stronger involvement of the producers would certainly speak in favour. The challenges here would be the implementation of the financial issue (why to WMRA and not directly to the Producer Responsibility Organization).

The following section shall present and discuss the implementation procedure of the EPR system of the ICT products in Egypt and the associated challenges.

Proposed EPR Procedure Implementation

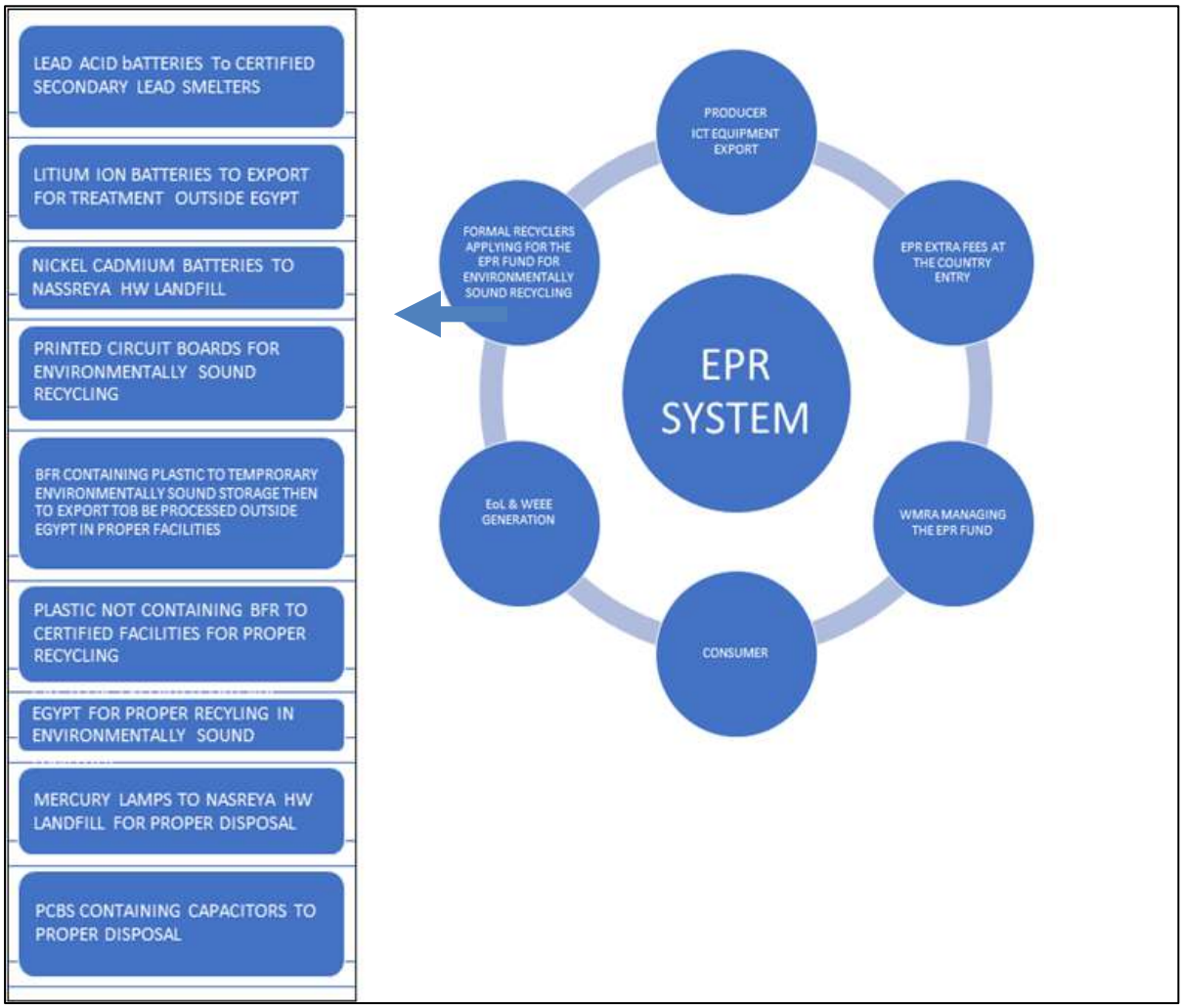


Figure 22: Proposed EPR System for WEEE

The following presents the calculation of the disposal cost of each fraction as identified in deliverable 1. Information was collected from several sources such as the Nasreya landfill, projects that disposed hazardous waste outside Egypt and hazardous waste certified transportation companies. The calculation output might help in identifying the cost of environmentally sound recycling of problematic fractions that shall be used during implementing the EPR system. The calculated cost shall be added to the equipment cost before reaching the user. An entity shall collect this cost of fund, and WMRA shall manage this fund to regulate the management of WEEE and provides an opportunity for implementing best available practices of this waste management.

The next Table indicates the final disposal cost for each unit of equipment. This cost might fluctuate with the exchange rate of the foreign currency especially for the imported equipment.

ERP Disposal Cost							
Fraction	**Weight (Kg)**	**no of units**	**Disposal Cost per Kg in EGP**	**Disposal cost per unit in EGP**	**Transportation Cost in EGP**	**Admin Cost in EGP**	**Total Cost per unit in EGP**
Desktops							
Ago Button cell	0.01	1	10	0.1	0.07	0.01	250
BFR Plastic	1.365	1	100 (export)	136.5	95.55	13.65	
Capacitors	0.01	25	10	2.5	1.75	0.25	
Laptops							
Plastic casing containing BFRs	0.9546	1	100 (export)	95.46	66.822	9.546	182
Capacitors	0.007	1	10	0.07	0.049	0.007	
LCD glass panel	0.4028	1	10	4.028	2.8196	0.4028	
Fluorescent lamp (CCFL Tubes)	0.2247	1	7.5	1.68525	1.179675	0.168525	
LCD Panel Display							
Monitor housing containing BFRs	1.178	1	100 (export)	117.8	82.46	11.78	269
Capacitors	0.012	1	10	0.12	0.084	0.012	
Fluorescent lamp (CCFL Tubes)	0.124	1	7.5	0.93	0.651	0.093	
LCD glass panel	3.038	1	10	30.38	21.266	3.038	
Non-rechargeable mercury button cell	0.003	1	10	0.03	0.021	0.003	
Mobile Phone (Smart phones)							
Plastic casing	0.02	1	100	2	1.4	0.2	4
LCD panels	0.02	1	10	0.2	0.14	0.02	

4.1.2 Recycling in Certified Facilities in Egypt

The recycling process in certified facilities was described in section 4.

4.1.3 Exporting to Environmentally Sound Treatment Facilities

Problematic fractions that cannot be handled properly in Egypt, such as plastic containing BFR, shall be collected, stored in properly designed storage areas and exported outside Egypt to dedicated facilities for environmentally sound treatment. The exporting process shall be executed over several steps as described herein:

Step 1: Licensing Procedure

After deciding to export the problematic fraction for safe disposal outside Egypt, WMRA should choose a licensed local or international shipping and transporting company. The disposal process shall follow the next steps:

- The notification for the export of the waste in accordance with Basel Convention is to be submitted to Basel focal point in order to obtain the approval to start the shipment procedure.
- The notification files should be reviewed by the competent authorities and signed, then sent back to the shipping and transporting company to proceed through a route that include transit countries.
- The routes of the shipping line to the disposal facility shall be identified and transit countries shall be approached and notified to obtain their consent for the shipment transit
- The transporter shall obtain the consent of the shipment receiving country before handing over the shipment to the disposing company.

Step 2: Safeguard Procedure

An HSE Plan of the project shall be prepared before the actual commencement of the packaging and shipping procedure. A training session of the site specific Environmental, Health and Safety Procedures, Work Plan, Emergency Response Plan, Risk Assessment, is to be held on site. The session shall involve explanation of safety and PPE requirements, explanation of the rules for the movement of workers and materials between different zones on site, instructions on the site organization, description of the hazardous waste handling procedure, description of the store specific Risk Assessment & Task Based Risk Assessment procedures and description of the waste along with hazards arising from it and its safe handling. The Task Based Risk Assessments shall include:

- Inspection of all packages/waste. Assessment of status and preparation for re-packing
- Re-packing of hazardous waste in appropriate UN approved packaging and labelling of packaging
- Palletization, stacking & inspection of packages
- Loading of waste for transportation and export
- Loading of waste into Shipping Containers Units (SCUs)
- Transporting of SCUs to the export port.

Step 3: In-land Transport of Shipment

- Before transportation, training to drivers regarding emergency response equipment is to be carried out.
- Transport planning, documentation and labelling are to be conducted in accordance with the HSE plan.
- The waste shall be stacked into a suitable size SCU (20 or 40'' feet container); the containers shall be loaded to inspected trucks. Emergency response equipment and procedures shall be in place during the loading process.

- The route to the export port shall be identified and the inland procedure shall be carried out through a certified transporting company that possesses a permit from EEAA.

Step 4: Export to Final Disposal Facility

The export procedure involves:

- Booking of containers shall be provided from the Egyptian Competent authority
- Labelling and weighing of safeguarded waste
- Loading of safeguarded waste into the containers and placarding and sealing of containers
- Signing of all the export documents from the Project Manager and transporting the containers to the export port
- Provision of the export documents to the local customs authorities is to be done for custom clearance
- Upon arrival at the country of disposal, containers are to be cleared from customs and transported with licensed transporters to the incineration facilities.

Clearance of safe disposal shall be obtained from the disposal facility in due time.

4.1.3.1 Example of environmentally sound treatement facility: Tredi Saint Vulbas (France)

Tredi is considered one of the unique facilities in the world to incinerate waste that contains high concentration of hazardous materials. This facility operates with an annual capacity of 35,000 tons. The treatment process is carried out through either incineration, treatment or extraction of materials from hazardous waste.

The disposal process is carried out through the technique shown in the following Figure.

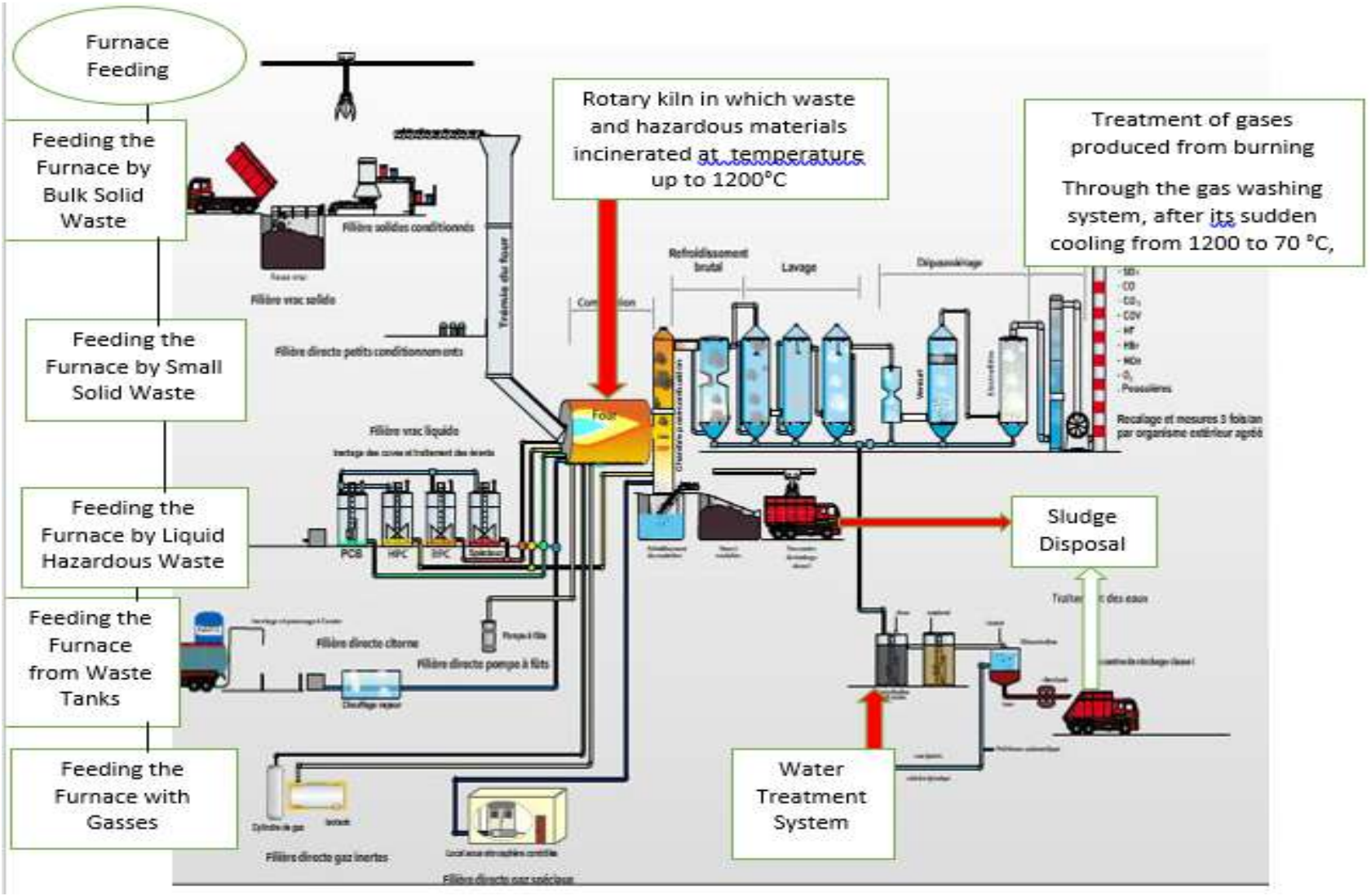


Figure 23: Process scheme for burning the waste in the rotary kiln and the treatment of the products of the incineration

Disposal steps:

1. Begins with feeding the rotary kiln (annual capacity 24 tons) and the feeding is carried by:
   - Rams to feed bulk solids
   - Belt conveyor to feed materials packed in small bales
   - Feeding from tanks containing liquids with graduated contaminants (which is what happens in the case of Pure PCBs)
   - Feeding from tanks filled with pollutants
   - Feeding from gas tanks
2. The burning continues in the rotary kiln for varying times depending on the type of waste and temperatures that allow the burning of the resulting hazardous gases (in case of waste including Dioxin & Furan the furnace temperature reaches 1200 °C).
3. The gases are suddenly cooled (Quenched) from 1200 to 70 °C so that no Furan & Dioxin is formed after the initial combustion
4. A complete gas washing is carried out in a special scrubber of multiple stages until the contaminants concentration (mainly Dioxin & Furan reaches the permissible limits)
5. The washing and cooling water is treated in a special water treatment plant until the water quality reaches the limits to allow the discharge of such water into the nearest river
6. The sludge resulting from the sudden cooling process and industrial water treatment is collected and sent to the company's hazardous waste landfill.

4.1.4 Disposal in Proper Landfills

Nasreya Hazardous Waste Landfill is the only facility that receives the hazardous waste in Egypt. Following is a background on this facility.

Figure 24: Nasreya Landfill Status in 2022.

New cells were lately constructed for hazardous waste landfilling at the Nasreya Hazardous Waste landfill. It is the only facility in Egypt, while the government is looking to establish other facilities in some governorates to relieve pressure on Alexandria.

The facility receives 39 types of hazardous waste from sources that generate waste from all governorates of Egypt from Alexandria to Aswan.

The facility establishment started within the framework of an agreement concluded on February 22, 1999, between the Finnish government and the Egyptian government, with 10 million pounds in funding from the Finnish government.

The main project site was planned on an area of 37 acres in Nasreya area, where the main cells were constructed on an area of 14,000 square meters lined with insulating lining layers to get rid of solid inorganic waste. This was followed by the establishment of evaporation basins on an area of 5,200 square meters to evaporate the liquid, in accordance with European standards, and the establishment of a chemical laboratory equipped with the chemical equipment needed for analysis. Training a team of the unit's employees to collect, transport and treat hazardous industrial waste and the facility started on June 29, 2005.

The second phase of the project started in 2006 during which the physicochemical unit specialized in dealing with liquids, acids and hexa-chromium was established, as well as a solidification unit to treat some types of hazardous waste before disposing into the burial cell.

The third phase in 2009 during which two incinerators were installed and operated with a thermal treatment of organic waste, and a waste management unit containing mercury "Fluorescent Lamp" was established. This project is the product of co-operation between the Egyptian government and South Korea with the aim of separating and collecting mercury from waste Fluorescent bulbs, and the operation of the unit was officially completed in 9/19/2011. The operating capacity of the unit is 750 kph, with hydraulic presses to press the iron drums after washing and to ensure that they are free from hazardous waste.

The fourth phase began in 2020 during which the largest burial cell in Egypt was established, with a foot print of 15 thousand square meters, at a total cost of 17 million pounds, as well as the construction of 4 lakes of an of area 40 m by 40 m each and a depth of 1 meter.

Regarding WEEE, as previously mentioned, the disposal in the hazardous waste landfill of Nasreya includes the following:

- Disposal of Ni-Cd Batteries after solidification in the landfilling facility.
- Disposal of mercury lamps after being processed in the facility
- Disposal of any heavy metals contaminated soil

The facility stopped the landfilling of BFR contained plastic in 2020 due to technical reasons (shortage of landfilling capacity).

4.1.5 Co-processing in Cement Kilns

The Co-processing of plastic containing BFR in cement kilns hasn't been implemented in Egypt, and electronic and household equipment fractions are included in the list of banned materials provided Geocycle (Lafarge Environmental Consultant) (see below). Under certain conditions, it can however be a suitable technology to handle BFR-containing plastics in a environmentally sound manner.

Banned List

- Non-stabilized Explosives
- Radioactive Waste
- Free Asbestos Fibers
- Infectious Hospital Waste
- Industrial or household waste including mercury e.g. batteries and electric lamps
- Non-ferrous industrial waste e.g. electronics
- High acidic or alkaline waste
- Operations waste with hazardous specifications and cannot be recycled e.g. clinical waste

geocycle

5 Impact Assessment of the Proposed Solutions

5.1 Impact of Improper Management of WEEE

The negative impact of the WEEE mismanagement results in direct health and safety consequences due to the uncontrolled exposure of the human or environment to many hazardous materials (solid or liquid) evolved during collection, recycling and residue disposal. The negative impact is a direct consequence of the following:

- Improper collection procedure that may expose the collectors to the direct contact to hazardous fractions
- Inappropriate dismantling during which the workers may inhale or digest the hazardous substances incorporated in the fractions
- Random disposal of the waste fractions in dumping sites or even in the open areas causing an imminent threat to groundwater due to the seepage of hazardous leachate that finds its way to the soil and underground water
- Open burning of the cables and plastic containing BFR intensively emits Dioxins and Furan to the ambient air
- Wastewater discharged in water channels or directly into abundant areas.

5.2 Benefits of Proper Management and Recycling of E-waste Management

The Integrated E-waste Management process is an approach that mitigates all negative impacts of the uncontrolled management of such hazardous waste described in this section. Following deliverable 1 of this project, the most hazardous fractions were the batteries of all kinds and the plastic including BFR, in addition to the CRTs that include hazardous metals such as lead. The proper handling of such fractions shall relief the human and the environment for the burden of exposure to toxic and hazardous materials. The following Table shows the positive impact of proper management and recycling of such waste.

Table 6: Benefits of Proper Management of E-waste

Procedure Causing the Negative Impact	Associated Hazard due to Mismanagement	Proper Management Procedure	Remarks
Improper collection procedure	Expose the collectors to the direct contact to hazardous fractions	• Controlled collection process in closed containers • Trained staff using PPE during the collection process	The collection process should be allocated to dedicated hazardous waste collection companies
Inappropriate dismantling	Workers may inhale or digest the hazardous substances incorporated in the fractions	• Controlled manual and automatic dismantling lines • The lines shall be equipped with pollution control equipment • Trained workers shall be trained to wear the PPEs	
Random disposal of the waste fractions in dumping sites	Causing an imminent threat to groundwater due to the seepage of hazardous leachate that finds its way to the soil and underground water	• Lead acid batteries shall be sent to certified secondary lead smelters • Ni-Cd batteries shall be sent to Nasreya for proper disposal • Printed circuit boards shall be crushed to extract the precious metals while the BFR containing plastic shall be separated • Other plastic shall be sorted and packed	
Open burning of the cables and plastic containing BFR	Intensively emits Dioxins and Furan to the ambient air	• Cables shall be treated in specific machines to peal the plastic and ship the copper • Printed circuit boards crushed BFR containing plastic shall be sent to the proper facilities for disposal • Other plastic shall be sent to a certified company for recycling	
Wastewater discharge in water channels or directly into abundant areas	Causing contamination to the underground water	• Discharged wastewater shall be treated in a wastewater treatment facility	The facility could be built in or the water could be stored in containers and sent to a public treatment facility.

6 Conclusions and Recommendations

The work carried out in this document including the full investigation of the WEEE recycling industry in general and the formal sector in particular revealed that there are environmentally sound solutions in Egypt for some problematic fractions such as:

- Lead-acid batteries
- Ni-Cd batteries
- Mercury-containing Lamps
- BFR-free pastics

However, despite the effort exerted by all stakeholders of this industry, yet many challenges exist especially the environmentally sound management of some problematic fractions such as:

- Lithium-ion Batteries
- Capacitors containing hazardous materials
- BFR-containing plastics

No solution for the management of theses fractions exists in Egypt; Hence, accordingly they should be properly stored in a proper way until it is exported for environmentally sound disposal in dedicated facilities outside Egypt. This requires the organization of a system approved and supervised by both EEAA and WMRA.

An EPR system is proposed to be applied on the imported equipment, the EPR adds the costs needed for waste management to the product price; the calculation of the environmentally sound disposal cost is provided in this document. EPR may take the form of a reuse, buy-back, or recycling program. The producer may also choose to delegate this responsibility to a third party, a so-called producer responsibility organization, which is paid by the producer for used-product management.

7 References

[1] The Guidelines for the Segregation, Sorting, Pre-treatment and Storage of E-waste Components Containing Heavy Metals and POPs, Report, September 2019.

[2] Medical and Electronic Waste Management Project, National Policy Framework for the Management of Electronic Waste, Com-piled Final Report, March, 2021.

[3] https://www.capmas.gov.eg/Pages/StatisticsOracle.aspx

[4] CAPMAS survey 2020.

[5] https://www.statista.com/statistics/1004709/egypt-share-households-computer-by-area.

[6] Survey of ICT usage in household and individuals," conducted by the Ministry of Communications and Information Technology (MCIT) in cooperation with the Central Agency for Public Mobilization and Statistics (CAPMAS), 2019-2020, included 15000 households.

[7] Egypt ICT Annual Report, 2017 – 2021.

[8] Assessment of WEEE Management in Egypt, submitted to "Protect human health and the environment from unintentional releases of POPs originating from incineration and open burning of health care and electronic waste" Project - Global Environmental Facility (GEF)United Nation Development program (UNDP), 2017.

[9] Medical and Electronic Waste Management Project -2015- 2021.

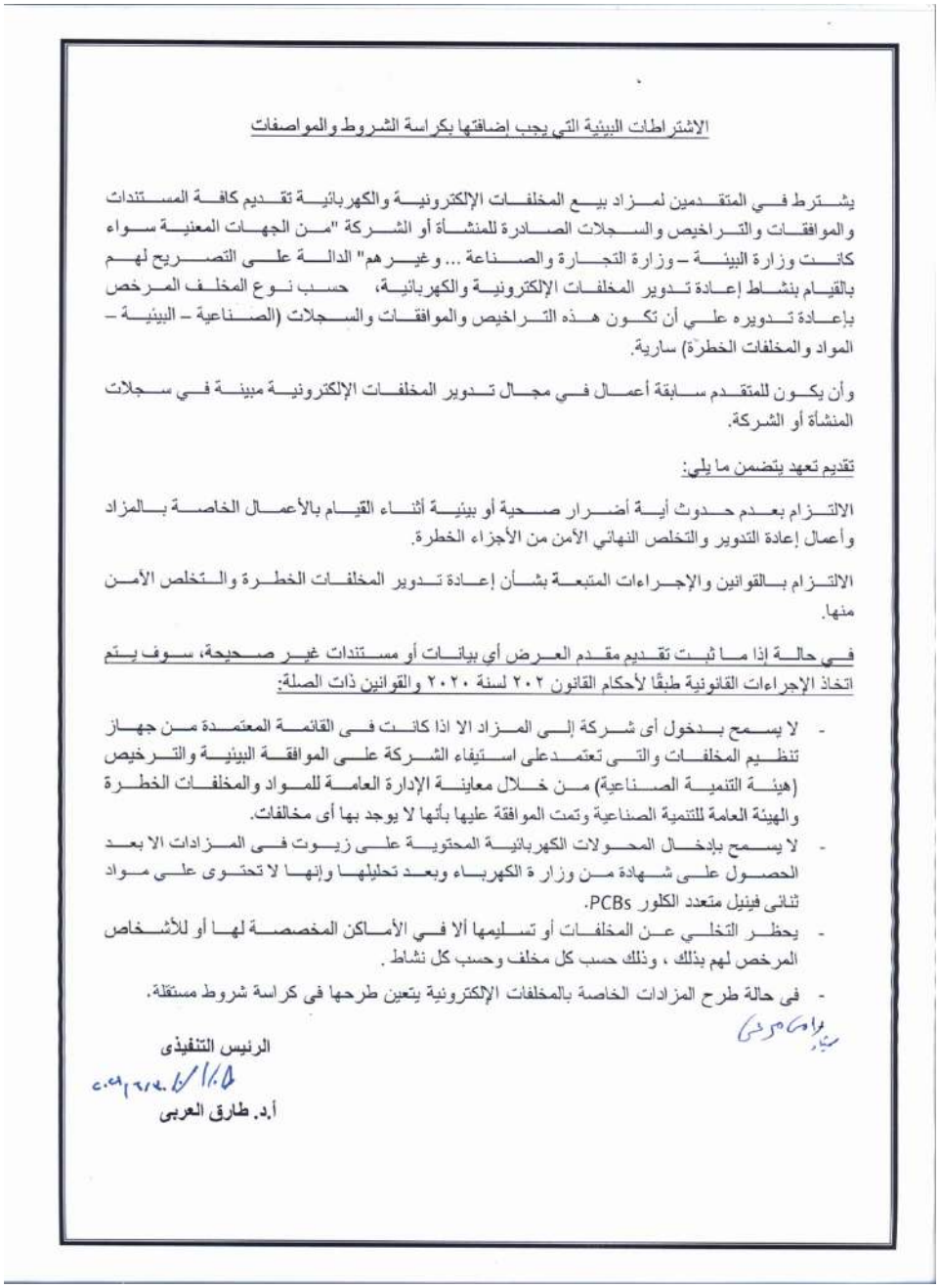
[10] WMRA Conditions

[11] "Baseline assessment on persistence organic pollutants (POPs), unintentionally produced persistent organic pollutants (UPOPs), and associated hazardous releases (mercury, lead, cadmium) from electronic waste(E-waste) processing", Medical and Electronic Waste Management Project.

[12] An EPR Scheme for WEEE in Egypt, Options for implementation, November 2021. Sustainable Recycling Industries (SRI) pro-gram phase II

8 Annexes

8.1 Annex 1: WMRA Rules for WEEE auctions



الاشتراطات البيئية التي يجب إضافتها بكراسة الشروط والمواصفات

يشترط في المتقدمين لمزاد بيع المخلفات الإلكترونية والكهربائية تقديم كافة المستندات والموافقات والتراخيص والسجلات الصادرة للمنشأة أو الشركة "من الجهات المعنية سواء كانت وزارة البيئة – وزارة التجارة والصناعة ... وغيرهم" الدالة على التصريح لهم بالقيام بنشاط إعادة تدوير المخلفات الإلكترونية والكهربائية، حسب نوع المخلف المرخص بإعادة تدويره على أن تكون هذه التراخيص والموافقات والسجلات (الصناعية – البيئية – المواد والمخلفات الخطرة) سارية.

وأن يكون للمتقدم سابقة أعمال في مجال تدوير المخلفات الإلكترونية مبينة في سجلات المنشأة أو الشركة.

تقديم تعهد يتضمن ما يلي:

الالتزام بعدم حدوث أية أضرار صحية أو بيئية أثناء القيام بالأعمال الخاصة بالمزاد وأعمال إعادة التدوير والتخلص النهائي الآمن من الأجزاء الخطرة.

الالتزام بالقوانين والإجراءات المتبعة بشأن إعادة تدوير المخلفات الخطرة والتخلص الآمن منها.

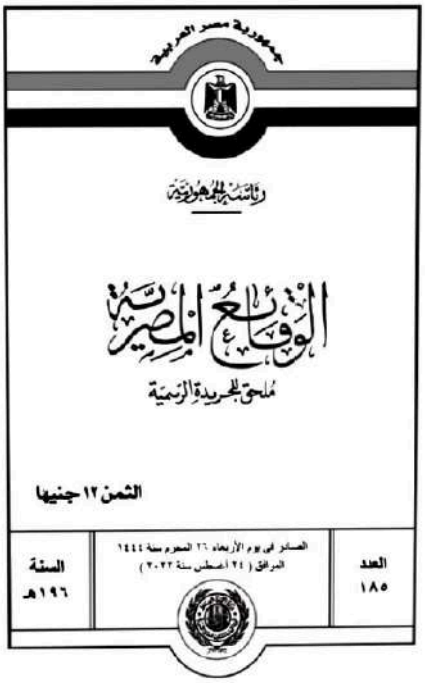
في حالة إذا ما ثبت تقديم مقدم العرض أي بيانات أو مستندات غير صحيحة، سوف يتم اتخاذ الإجراءات القانونية طبقًا لأحكام القانون ٢٠٢ لسنة ٢٠٢٠ والقوانين ذات الصلة:

- لا يسمح بدخول أى شركة إلى المزاد الا اذا كانت فى القائمة المعتمدة من جهاز تنظيم المخلفات والتى تعتمد على استيفاء الشركة على الموافقة البيئية والترخيص (هيئة التنمية الصناعية) من خلال معاينة الإدارة العامة للمواد والمخلفات الخطرة والهيئة العامة للتنمية الصناعية وتمت الموافقة عليها بأنها لا يوجد بها أى مخالفات.
- لا يسمح بإدخال المحولات الكهربائية المحتوية على زيوت فى المزادات الا بعد الحصول على شهادة من وزارة الكهرباء وبعد تحليلها وإنها لا تحتوى على مواد ثنائى فينيل متعدد الكلور PCBs.
- يحظر التخلي عن المخلفات أو تسليمها ألا في الأماكن المخصصة لها أو للأشخاص المرخص لهم بذلك ، وذلك حسب كل مخلف وحسب كل نشاط .
- فى حالة طرح المزادات الخاصة بالمخلفات الإلكترونية يتعين طرحها فى كراسة شروط مستقلة.

الرئيس التنفيذى

أ.د. طارق العربى

8.2 Annex 2: Ministerial decree 113/2022 (available as separate file)



جمهورية مصر العربية

رئاسة الجمهورية

الوقائع المصرية

ملحق الجريدة الرسمية

الثمن ١٢ جنيها

العدد	الصادر في يوم الأربعاء ٢٦ المحرم سنة ١٤٤٤ الموافق (٢٤ أغسطس سنة ٢٠٢٢)	السنة
١٨٥		١٩٦هـ

٢ الوقائع المصرية – العدد ١٨٥ في ٢٤ أغسطس سنة ٢٠٢٢

محتويات العدد

رقم الصفحة

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وزارة الإسكان والمرافق والمجتمعات العمرانية : قرار وزاري رقم ٤٤٥ لسنة ٢٠٢٢ ... ٨
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محافظة القاهرة مديرية التضامن الاجتماعي - إدارة المدن : ملخص عقد التأسيس والنظام الداخلي لجمعية ٢٦
وزارة قطاع الأعمال العام الشركة القابضة للصناعات الكيماوية (ش.م.ق.م) : قرارات الجمعية العامة غير العادية لشركة صناعة البابات ومهمات وسائل النقل ٢٨
إعلانات مختلفة : إعلانات الوزارات والهيئات والمصالح ٣٠
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: إعلانات بيع وتأجير ..... –
: حجوزات - بيوع إدارية ..... –

٣ الوقائع المصرية – العدد ١٨٥ في ٢٤ أغسطس سنة ٢٠٢٢

قـــرارات

وزارة البيئة

قرار رقم ١١٣ لسنة ٢٠٢٢

الصادر بتاريخ ٢٠٢٢/٦/١٩

وزير البيئة

بعد الاطلاع على قانون البيئة الصادر بالقانون رقم ٤ لسنة ١٩٩٤ ولائحته التنفيذية ؛

وعلى قانون الخدمة المدنية الصادر بالقانون رقم ٨١ لسنة ٢٠١٦ ولائحته التنفيذية ؛

وعلى قانون تنظم إدارة المخلفات الصادر بالقانون رقم ٢٠٢ لسنة ٢٠٢٠ ولائحته التنفيذية ؛

وعلى قرار الجمهوري رقم ٢٧٥ لسنة ١٩٩٧ بشأن اختصاصات وزير الدولة لشئون البيئة ؛

وعلى القرار الجمهوري رقم ٢٦٦ لسنة ٢٠١٨ الصادر بالتشكيل الوزاري وتعديلاته ؛

وعلى موافقة مجلس إدارة جهاز تنظيم إدارة المخلفات بجلساته رقمي (١) المنعقدة بتاريخ ٢٠٢١/١١/٤ ، (٣) المنعقدة بتاريخ ٢٠٢٢/٣/٢٤ ؛

وعلى ما قرره مجلس الوزراء بجلسته رقم (١٧٨) المنعقدة بتاريخ ٢٠٢٢/١/٢٦ ؛

وعلى كتاب السيد المستشار رئيس هيئة مستشاري مجلس الوزراء رقم (٣ - ١٥٧٨٠) بتاريخ ٢٠٢٢/٥/٣٠ بالموافقة بموافقة السيد الدكتور رئيس مجلس الوزراء على إصدار القرار ؛

٤ الوقائع المصرية – العدد ١٨٥ في ٢٤ أغسطس سنة ٢٠٢٢

قـــرر :

(مادة أولى)

بخلاف ضريبة القيمة المضافة المقررة ، تحدد رسوم وقائع مقابل إصدار تراخيص ممارسة أي نشاط من أنشطة الإدارة المتكاملة للمخلفات غير الخطرة ، طبقا للآتي :

مسلسل	بيان تصنيف الخدمة طبقا للسعة والقدرات للخطة التشغيلية (كيان أو فرد)	رسم الترخيص لمدة عام بالجنيه المصري
نشاط الجمع والنقل		
١	من صفر الى ٢٠ طن / يوم	٥,٥٠٠
٢	من ٢٠ الى ٢٠٠ طن / يوم	١٨,٠٠٠
٣	من ٢٠٠ الى ٢٠٠ طن / يوم	٣٦,٠٠٠
٤	من ٢٠٠ الى ٤٠٠ طن / يوم	٧٠,٠٠٠
٥	من ٤٠٠ الى ٨٠٠ طن / يوم	١٤٠,٠٠٠
٦	من ٨٠٠ الى ١٢٠٠ طن / يوم	١٧٥,٠٠٠
٧	فوق ١٢٠٠ طن / يوم	٢٠٠,٠٠٠
نشاط محطات المعالجة للمخلفات		
١	من صفر الى ١٠ طن / يوم	٤,٥٠٠
٢	من ١٠ الى ٤٠ طن / يوم	١٢,٠٠٠
٣	من ٤٠ الى ٢٠٠ طن / يوم	٤٢,٠٠٠
٤	من ٢٠٠ الى ٤٠٠ طن / يوم	٨٥,٠٠٠
٥	من ٤٠٠ إلى ٨٠٠ طن / يوم	١٤٥,٠٠٠
٦	من ٨٠٠ الى ١٢٠٠ طن / يوم	١٧٥,٠٠٠
٧	فوق ١٢٠٠ طن / يوم	٢٠٠,٠٠٠
نشاط المدافن الصحية الآمنة		
١	من صفر الى ٥٠ طن / يوم	١٨,٠٠٠
٢	من ٥٠ إلى ١٠٠ طن / يوم	٢٨,٠٠٠
٣	من ١٠٠ الى ٢٠٠ طن / يوم	٤٥,٠٠٠
٤	من ٢٠٠ إلى ٤٠٠ طن / يوم	٨٥,٠٠٠
٥	من ٤٠٠ إلى ٨٠٠ طن / يوم	١٤٥,٠٠٠
٦	من ٨٠٠ إلى ١٢٠٠ طن / يوم	١٧٥,٠٠٠
٧	فوق ١٢٠٠ طن / يوم	٢٠٠,٠٠٠

(مادة ثانية)

بخلاف ضريبة القيمة المضافة المقررة ، تحدد رسوم وفئات مقابل إصدار الموافقة على تداول المواد والمخلفات الخطرة ، طبقاً للآتى :

مسلسل	النشاط	رسم الموافقة لمدة عام بالجنيه المصرى
١	إصدار موافقة على نشاط النقل للمواد والمخلفات الخطرة داخل المحافظة	٢٠٠٠٠ جنيه عند إصدار الموافقة ١٠٠٠٠ جنيه عند سحب الموافقة وطلب إعادة إصدارها
٢	إصدار موافقة على نشاط النقل للمواد والمخلفات الخطرة داخل حدود خمس محافظات	٤٠٠٠٠ جنيه عند إصدار الموافقة ٢٠٠٠٠ جنيه عند سحب الموافقة وطلب إعادة إصدارها
٣	إصدار موافقة على نشاط النقل للمواد والمخلفات الخطرة فى عموم الجمهورية	٦٠٠٠٠ جنيه عند إصدار الموافقة ٣٠٠٠٠ جنيه عند سحب الموافقة وطلب إعادة إصدارها
٤	إصدار موافقة على تخزين المواد أو المخلفات الخطرة بصفة عامة	٣٥ جنيها لكل متر مربع ٢٠ جنيها لكل متر مربع عند سحب الموافقة وطلب إعادة إصدارها
٥	إصدار موافقة على معالجة المواد أو المخلفات الخطرة	٣٠٠٠٠ جنيه عن إصدار الموافقة ١٥٠٠٠ جنيه عند سحب الترخيص وطلب إعادة إصداره
٦	إصدار موافقة على التخلص الآمن من المواد أو المخلفات الخطرة (عدا دفائن الصحية الآمنة للمخلفات الخطرة)	٢٠٠٠٠٠ جنيه عن إصدار الموافقة ١٨٠٠٠٠ جنيه عند سحب الموافقة وطلب إعادة إصدارها

(مادة ثالثة)

بخلاف ضريبة القيمة المضافة المقررة ، تحدد رسوم وفئات مقابل التصاريح والخدمات التالية وفقاً للنسب والمبالغ المحددة قرين كل منها ، على النحو التالى :

م	نوع التصاريح أو الخدمة	رسم مقابل إصدارها
١	إصدار تصاريح استيراد المخلفات غير الخطرة لمدة عام كمستلزم إنتاج	مبلغ (١٪) من قيمة الكمية المسموح باستيرادها سنوياً ، بما لا يتجاوز الحد المسموح به فى القانون ٢٠٠ ألف جنيه
٢	إصدار تصاريح استيراد مواد خطرة	مبلغ (١٪) من قيمة الكمية المسموح باستيرادها سنوياً ، بما لا يتجاوز الحد المسموح به فى القانون ٢٠٠ ألف جنيه
٣	إصدار الحظر بالموافقة على (استيراد المخلفات غير الخطرة من طريق الدفاعية بزل - تصدير مخلفات خطرة من طريق الدفاعية وبازل - عبور المخلفات الخطرة بالأراضى المصرية لشحنات مخلفات خطرة العابرة للحدود المصرية وفقاً لاتفاقية بازل)	مبلغ ٢٠٠٠ جنيه بالنسبة للإخطار الواحد

(مادة رابعة)

يحصل جهاز تنظيم إدارة المخلفات من الجهة الإدارية المختصة على نسبة (٠,٥٪) نصف فى المائة من قيمة كل عقد تبرمه لتقديم خدمات الإدارة المتكاملة للمخلفات البلدية ، وذلك مقابل قيام الجهاز بإعداد التقارير الفنية اللازمة التى تساعد الجهة الإدارية المختصة على تقييم أداء مقدمى الخدمات وفقاً للعقود سالفة الذكر .

ويبدأ تحصيل النسبة المشار إليها بعد مضى عام من تاريخ العمل بهذا القرار .

(مادة خامسة)

يتم توريد حصيلة المبالغ المقررة بهذا القرار لحساب جهاز تنظيم إدارة المخلفات ، وتوريد حصيلة القيمة المضافة المحصلة إلى مصلحة الضرائب .

(مادة سادسة)

ينشر هذا القرار فى الوقائع المصرية ، ويعمل به من تاريخ صدوره ، وعلى الجهات المختصة تنفيذه كل فيما يخصه .

وزيرة البيئة

د/ ياسمين فؤاد

8.3 Annex 3: WMRA Certified Plastic Recyclers

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المصانع الرسمية العاملة فى مجال إعادة تدوير البلاستيك
والحاصلة على ترخيص من الهيئة العامه للتنمية الصناعية

م	اسم المنشأة	نوع النشاط	العنوان
١	وين يان جروب للصناعه Wen Yan Group For Industry	حبيبات مسترجعة من مخلفات من البلاستيك (ABS-P C-P.S-POM-PPO). حبيبات مسترجعة من البولى بروبلين حبيبات بلاستيك مسترجعة من بولى سنيارين	قطعتى ارقام ١٠٢ - بلوك ١١ - المنطقه الصناعيه الثالثه - مدينة برج العرب - الاسكندريه مؤجر من شركة رودكس للبلاستيك
٢	فتح الله للتصنيع والتجارة	خليط حبيبات بلاستيك مسترجعة من البولى البلين والبروبلين	وحدات ارقام ٢٢٢ - ٢٢٣ - منير (١٥) بمجمع الصناعات البلاستيكية - المنطقة الصناعية بمرغم الاسكندرية
٣	مخروس حنين اسعد وشريكه اسعد حنين اسعد	خليط حبيبات بلاستيك مسترجعة من البولى البلين والبروبلين	ك ٣٦ طريق اسكندريه القاهرة - خلف مرسيدس -قسم العامريه - الاسكندريه
٤	نوارة محمود على الشيخ	خليط حبيبات بلاستيك مسترجعة من البولى البلين والبروبلين	قيلى عبدالقادر بجوار مساكن مبارك - العامريه بحرى الترعه - امام مصنع الحمده - قسم العامريه - الاسكندريه مؤجر من جمعه عبدالونيس - ينتهى عقد الايجار فى ٢٠٢٩/١١/١٤
٥	سامى تامل ليس ارمانيوس	خليط حبيبات بلاستيك مسترجعة من البولى البلين والبروبلين	زاوية عبد القادر - بحرى السكه الحديد - بحرى مصرف النوبارية - خلف مصنع وليم للبلاستيك - العامرية - الاسكندرية
٦	الامل جيشرال جروب للصناعه	خليط حبيبات بلاستيك مسترجعة من البولى البلين والبروبلين	قطعه رقم ٧ - بلوك ٢ - المنطقه الصناعيه شرق القناييه - مدينة برج العرب الجديده - الاسكندريه بملك

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		امال محمود على طلبه - ينتهى الايجار فى ٢٠٢٧/٨/١٢	
٧	ام اية ام بلاست ، محمود محمد شحيب محمد) - مستأجر	حبيبات بلاستيك مسترجعة من بولى سنيارين مع ملاحظة الترخيص سينتهى فى ٢٠٢٢/١٠/٢٩	قطعة رقم (١٢٣) - المنطقة D منير الصناعية امتداد السادسة- مدينة ٦ أكتوبر-محافظة الجيزة
٨	عبد الناصر احمد عوض محمد فيلى - بوليمرز polymers	خليط حبيبات بلاستيك مسترجعة من البولى البلين والبروبلين - حبيبات بلاستيك مسترجعة من بولى سنيارين	القطعه ٣٣٣- المنطقة الصناعية إمتداد الثالثة - مدينه ٦أكتوبر - الجيزه
٩	البف العالمية لمنتجات التعبئة والتغليف ELIF GLOBAL PACKAGING S. A . E	خليط حبيبات بلاستيك مسترجعة من البولى البلين والبروبلين	قطع ارقام (O 18 , O 20) ضمن القطعة رقم (٢) - المحور الصناعي بالمنطقة الصناعية - منطقة التوسعات الشمالية - مدينة ٦ أكتوبر - محافظة الجيزة
١٠	هورايزن للبتروكيماويات	خليط حبيبات بلاستيك مسترجعة من البولى البلين والبروبلين	جزء من القطعة رقم (٢١) الصناعية الرابعة بمساحة ٥٠٠٠ م - مدينة ٦ أكتوبر - محافظة الجيزة
١١	شركة الوليد للبلاستيك - محمد شعبان رجب راشد و شريكته - مستأجر	خليط حبيبات بلاستيك مسترجعة من البولى البلين والبروبلين	مصنع مؤجر ، بملك وليد شعبان رجب راشد ، عقد الايجار ينتهى فى (٢٠٣٦/٨/١٤) بالقطعة رقم ٢١٥ - المنطقة الصناعية الثالثة - مدينة ٦ أكتوبر - محافظة الجيزة
١٢	حمدى محمود على ابو فازى	خليط حبيبات بلاستيك مسترجعة من البولى البلين والبروبلين	مؤجر بملك / احمد محمد رضا محمد ابراهيم السيد - دماط -مركز قطور - محافظة الغربية

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١٣	شريف عبد الله عبد الفتاح الجمل و شريكه	خليط حبيبات بلاستيك مسترجعة من البولى البلين والبروبلين	بملك "الشركة- شارع بورسعيد - المنطقة البلد - مركز المنطقة - محافظة الغربية
١٤	منال رمضان محمد عيد	خليط حبيبات بلاستيك مسترجعة من البولى البلين والبروبلين	بملك/ محمد محمد عبد القادر حماد - شبرابلوله - مركز قطور - الغربية
١٥	اشجان سعد السيد محمد عبدالعال	خليط حبيبات بلاستيك مسترجعة من البولى البلين والبروبلين	بملك / الطالب -نكر احمد شلبى - مركز قطور - محافظه الغربيه
١٦	ايهاب مرسى محمد المصيرى (المصيرى لتشكيل و تدوير البلاستيك)	خليط حبيبات بلاستيك مسترجعة من البولى البلين والبروبلين	مؤجر حتى تاريخ ٢٠٢٣/٤/٣٠ بملك /مرسى محمد شهاب المصيرى - الشين - مركز قطور - محافظه الغربيه
١٧	اوسيز تكنولوجيا صناعه البلاستيك	خليط حبيبات بلاستيك مسترجعة من البولى البلين والبروبلين خليط حبيبات بلاستيك مسترجعة من البولى البلين والبروبلين	مؤجر حتى تاريخ ٢٠٢٦/٩/٣٠ بملك /عبدالعزيز السعدى عبدالعزيز الشناوى - الكيلو ١٣ بعد مدخل القيائم - طريق لحله طنطا - مركز لحله الكبرى - محافظه الغربيه
١٨	ام . جي . تي لصناعة البلاستيك M.G.T	خليط حبيبات بلاستيك مسترجعة من البولى البلين والبروبلين	قطعة رقم (٢٢) - المنطقة الصناعية الرابعة - مدينة بدر - محافظة القاهرة (مستأجر حتى ٢٠٢٣/١٠/٢١)
١٩	جابر ادولف توفيق	خليط حبيبات بلاستيك مسترجعة من البولى البلين والبروبلين	القطعة رقم ٥٨ - المنطقة الصناعية ٢٥٠ فدان - مدينة بدر - القاهرة
٢٠	مجدى ميخائيل ملاك	خليط حبيبات بلاستيك مسترجعة من البولى البلين والبروبلين	قطعة رقم (٢١٥) المنطقة الصناعية الـ ٣٥٠ فدان - مدينة بدر -محافظة القاهرة .