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SUSTAINABLE RECYCLING INDUSTRIES

End of Life Management costs for Select ICT Products in Egypt

Towards an EPR System

Final version, May 2024

Tawfik Elkheshen

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Executive summary

Extended Producer Responsibility (EPR) is an environmental policy approach through which producers of products bear the responsibility for their products in the post-consumption phase. Egypt has taken steps to enshrine the principle of EPR in its Waste Legislation 202 for the year 2020, which stipulates that a Prime Minister (PM) decree shall be issued to specify product categories to be subject to EPR schemes and all the details associated with EPR implementation, including the fees to be paid by producers. Since ICT products have been identified by the Waste Management Regulatory Authority (WMRA) as priority products to be included in the PM Decree, it was imperative to try and develop an understanding of the costs associated with the End of Life (EoL) management of ICT products as a first step for proposing EPR fees to be included in the PM Decree.

A selection of 7 priority product categories (Mobile Phones, Liquid Cristal Display (LCD) Screens, Cathode Ray Tube (CRT) Screens, Notebooks, Routers, Desktop Personal Computers (PC), Hard Copy Peripherals (HCP)) was included in the financial analysis within this report. The products selected have positive value components that are tradable within local and international markets following extraction by recyclers. However, the products also include negative value fractions which need environmentally sound management and treatment either locally or by sending to facilities abroad with the capabilities to conduct sound treatment and disposal of such negative value fractions.

The costs associated with EoL management of the selected product categories include several cost items such as **access to waste costs, collection costs, treatment, and disposal costs**. Several factors influence the net cost for each unit of the selected products, **primarily the material composition of the device, its average weight, its share within the waste stream, the positive and negative prices of materials embedded within the device, and the extraction efficiency of recyclers**. Information obtained from recyclers as well as official Put on Market (PoM) quantities data and market surveys enabled the estimation of the net cost for each device.

The analysis in the study revealed that out of the 7 product categories 5 products have net negative costs associated with their EoL management (Mobile Phones, LCD Screens, CRT Screens, Notebooks, Routers). This essentially means that **the intrinsic economic value** within the devices does not offset the costs associated with sound management and treatment. This is mainly due to **high access to waste costs and a higher fraction of negative value fractions** which need treatment abroad or environmentally sound disposal. The fact that recycling businesses are still economically viable in Egypt can only indicate that the negative value fractions are not dealt with optimally and that the costs associated with sound management are not internalized.

Establishing an EPR system could enable WMRA and recyclers to address the negative value fractions more adequately and help towards establishing a sustainable E waste recycling ecosystem in the country. Using the values of the net costs as a reference for EPR fee calculation could present a fair way of allocating responsibilities to producers based on actual system costs. An EPR fee which would be channelled to recyclers would enable the creation of viable recycling industries and would have positive economic and social impacts in addition to the environmental ones. An EPR fee would also go a long way in addressing one of the main bottlenecks facing recyclers, which is the lack of sufficient feedstock to their facilities. By creating the financial incentives for the creation of a viable collection system for the selected product categories, collection rates could significantly increase.

1 Introduction and Background

This report is a follow-up report to the report “Options for EPR Implementation for ICT Equipment in Egypt” published in 2021 within the context of the Sustainable Recycling Industries (SRI) Programme phase II. The SRI programme addresses the demand for a comprehensive international approach to ensure that the recovery of secondary resources is enabled under sustainable conditions. SRI pursues and promotes life cycle thinking, harmonization of international standards towards “fair” recovery and trade of secondary resources, and applying novel financing mechanisms to safely detoxify waste streams and destroy illegal substances. Participating countries include Colombia, Peru, Egypt, Ghana and South Africa. The programme started in 2014 and is currently in its second phase which commenced in Egypt in 2019.

Under its policy component, the Programme aims to develop incentive mechanisms under the principle of Extended Producer Responsibility (EPR) to ensure the long-term functioning of recycling businesses. In this regard, the programme seeks to support the concerned authorities in developing a national e-waste policy and to adopt and put into effect respective legislation which supports the sound management of WEEE.

EPR has long been utilized as an environmental policy option for the sound management of WEEE. EPR is an environmental policy approach by which a producer’s responsibility for a product is extended to the post-consumption phase of the product life cycle. While the adoption of EPR started in developed countries, increasingly more and more developing countries are opting to start EPR schemes as a policy option to incentivize recycling and to shift the responsibility for the sound management of WEEE back to the producer rather than the taxpayer.

The Egyptian Waste Management Law 202/2020 was promulgated by parliament in December 2020. Article 17 of the law deals with EPR and stipulates that the Prime Minister shall issue a decree specifying which products shall be subject to EPR and what would be the mechanisms for implementation including fees to be paid by producers.

While this legal provision does not specifically address the sound management of WEEE, it paves the way and opens the door for the establishment of a regulated EPR scheme for WEEE. Furthermore, it is clear from the formulation of the article that the decree issued by the Prime Minister would be the document that identifies which products to target and sets the specifics and details of the system. This ensures a certain flexibility in adjusting, adapting, and refining the EPR system proposed since the Prime Minister has more flexibility in issuing and amending the decree rather than amending the law or the executive regulations of the law.

2 Scope and Objectives of the Report

This report endeavours to support stakeholders, specifically WMRA, to understand the end-of-life (EoL) costs associated with the sound management of select ICT products in their post-consumption phase (collection, treatment, and disposal). Understanding costs is a prerequisite for the determination of EPR fees for the various product categories selected. Hence, the report contributes to the formulation of the forthcoming Prime Minister Decree on EPR.

More specifically, this report addresses:

1. Financial analysis of costs of collection, treatment, and disposal of ICT Products
2. Proposals for determination of EPR fees for each product category
3. Scenarios for expected revenue collected from EPR fees.

This report focuses solely on the financial dimensions since other aspects of the EPR system have been covered in the preceding report on “Options for EPR Implementation for ICT Equipment in Egypt”.

It is important to note that one important requirement of Article 17 is consultation with concerned stakeholders. It is hence imperative that the options or proposals presented in this report be put through a consultation process with relevant stakeholders to reach a consensus on the final desired proposal. This report hence does not offer forgone conclusions but rather options to be explored and vetted with concerned parties including producers, recycles, collectors, and concerned government.

3 Approach and Methodology

3.1 Approach

The methodology used in the report is based on EoL life cost estimates for a set of product categories comprising priority products to be subject to an EPR scheme in Egypt. These products are listed in Table 1.

Table 1: Product Categories

No	Product
1	Mobile Phones
2	Liquid Cristal Display (LCD) Screens
3	Cathode Ray Tube (CRT) Screens
4	Notebooks
5	Routers
6	Desktop Personal Computers (PC)
7	Hard Copy Peripherals (HCP)[1]

These products were selected based on discussions with WMRA and recyclers and based on available data. It is not an exhaustive list of all ICT products which could be subject to EPR but only a first list of products that the study focused on for the basis of calculations and certainly more products could be added to the list at later stages.

EoL costs comprise of collection, treatment, and disposal costs.

Collection costs are based on the estimation of setting up **collection points as well as access to waste costs**, which recyclers incur to procure the aforementioned 7 categories of products. Accessing of waste occurs through various channels; either through **auctions** by governmental agencies and private companies or through **direct procurement** from third parties including the informal sector.

The **intrinsic positive value** within each product category is calculated per weight and per unit(device) based on 4 determining factors which are:

1: the current market prices of recycled material

2: the material composition of each product type

3: the average weight of the device and

4: the extraction efficiency of recyclers.

The **intrinsic negative costs** associated with each product category are based on the **costs of disposal of hazardous fractions** either locally or internationally. Fractions that can be disposed of locally in a sound manner are sent to the hazardous waste treatment facility in Nasiriya, Alexandria, while other fractions that cannot be treated or disposed of locally are shipped to treatment facilities abroad.

[1] This category includes a diverse set of products such printers, photocopiers, and fax machines. For the purpose of the calculations in this study the average weight of a printer was used.

The **costs of treatment** are based on current practices in Egypt which primarily revolve around dismantling of devices without added value operations. It however assumes fully controlled facilities and compliance with Environmental Health and Safety (EHS) considerations.

The **net costs** for each product type are subsequently calculated by subtracting the negative value from the positive value. The net costs could be used as a reference for setting EPR fees in the future.

Net cost= Total Costs-Intrinsic positive value within devices

3.2 Sources of Information

In compiling this report three main sources of information were relied upon which are:

1. Data on put on market (PoM) quantities for each product category was obtained from the Central Agency for Statistics and Mobilization (CAPMAS) for the years 2013-2022. This primary data was then used to estimate the amount of waste generated up to the year 2027 assuming a lifespan of 5 years for the aforementioned product categories. The data obtained from CAPMAS was however not complete for some years and/or for some product categories. In such cases, an average was used based on quantities for previous or subsequent years (Table 2).
2. Information on operational costs associated with treatment and disposal was primarily obtained from several meetings and group discussions with authorized recyclers of WEEE in Egypt. Averages were also used when information varied from one recycler to another.
3. Previous studies and reports were also used to corroborate information obtained from recyclers in particular regarding material composition of devices and market prices of materials.

Table 2: Put on Market Quantities 2013-2022[2]

Products	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Mobile Phones	6,580,599	5,010,650	3,979,172	2,396,737	6,777,828	5,713,333	43,099,120	18,760,000	17,826,667	5,338,335
Notebooks	467,128	590,421	540,421	387,280	1,654,870	420,143	1,216,714	1,335,952	1,701,571	3,741,590
Desktop PCs	202,405	241,769	332,937	225,351	35,853	488,434	359,293	394,504	101,869	47,804
CRT Monitors	12,327	12,853	13,120	9,906	14,775	40,426	27,872	31,560	38,936	13,800
LCD Monitors	644,306	367,128	224,645	329,936	504[3]	241,489	252,447	284,894	167,660	184,090
HCPs	999,720	524,402	701,671	1,012,818	733,580	1,291,167	690,833	741,750	814,442	632,333
Routers[4]					1,708,965	1,291,000	2,025,026	2,223,478	1,708,965	1,876,444

[2] The data in table 2 was obtained from CAPMAS. For the year 2022, the data for some of the products was not complete and in such cases an average of the last 3 years was used to estimate the PoM in 2022.

[3] There was no clear indication as to why the figure for LCD screens in 2017 was so low it was also assumed that this could be an error in the data provided.

[4] Data for the 2013-2016 was not available through CAPMAS. Also, Routers were included in a large category of wireless communication and data processing so for the sake of simplifications it was assumed that routers constitute around 50% of this category based on discussions with CAPMAS and MCIT.

4 EoL Cost Estimates for Product Categories

4.1 Intrinsic Economic Value within each Product Category

4.1.1 Material Prices

As indicated before, a key determining factor of **intrinsic value within devices are the prices of material expected to be extracted from each device.** The prices of material were primarily obtained through discussions with recyclers and reflect local market prices as of December 2023. As often recyclers provided ranges for prices, the prices reflected in the calculations were an average of local prices and an international benchmark. Table 3 Summarizes the prices of materials.

Table 3: Average Prices of Material within Devices

Fraction	Average Price in Egyptian Market (EGP/Ton)	International Benchmark (Euro/Ton)
Steel	19,000	450
Copper	275,000	9.500
Aluminium	45,000	2,500
Plastics	3,500	180
Mixed Plastics with Brominated Flame Retardants (BFR)	-2,750	-150
Printed circuit board (PCB) Low Grade	11,250	330
PCB Medium grade	190,000	4000
PCB High grade	350,000	6,250
PCB from Mobile Phones	400,000	8,095
Cables	90,000	2500
Yokes	35,000	1,730
CRT Glass	-2,750	-60
LCD Glass	-2750	-63
Lithium-Ion Batteries	-2,750	-90
Ni-MH Batteries	-2,750	-90
Li-Phosphate Batteries	-2,750	-,3500
Hazardous waste	-,2750	-650
Other	-500	-40

BFR: brominated flame retardant

PCB: printed circuit board

For negative value fractions, particularly hazardous waste fractions, current practices seem to indicate that they are either stored or sent to Nasiriya hazardous waste disposal facility in Alexandria. However, the model utilised an average of the disposal cost in Nasiriya and an international benchmark cost reflecting the cost of shipping and treatment in specialised facilities. It should be noted that Nasiriya facility does not have the capacity or

resources to handle hazardous waste emanating from ICT devices and indefinite storage is not a sustainable solution.

4.1.2 Device Material Composition

The second key determining factor of intrinsic economic value is the material composition of each device. This information was obtained from recyclers and corroborated with the background studies conducted in other countries, since the composition of devices is unlikely to vary significantly from one country to another. Table 4 summarizes the material composition of each device reflected as a percentage of the average device weight.

Table 4: Material composition of devices reflected as a percentage of the average device weight.

Product	Note-book	Mobile Phone	Desktop PC	Router	CRT Screen	LCD Screen	HCPs[5]
Steel	12	0	70		7	37	40
Copper	6		6			0	6
Aluminium	6	0	4			6	0
Plastics	41	51	10	65	13	9	20
Mixed plastics				17		21	13
Li-on battery	15	15					
PCB Low					7	11	
PCB Medium			8	10		3	
PCB High	7					1	4
PCB Mobile Phone		22					
CRT Glass					65		
LCD Glass	9					1	
Yokes					3		
Cables					2	1	1
Hazardous waste	4			8			16
Other	9	12	6	10	2	3	
Total	100	100	100	100	100	100	100

4.2 Costs of Collection and Treatment

4.2.1 Access to waste costs

The most common method used by recyclers to procure WEEE in Egypt is through auctions by private companies and governmental entities. Through these auctions lots of mixed items are bid for by WMRA authorized recyclers and collectors. Based on the **average share of each product within lots,** a **cost per product** can be estimated. Table 5 summarizes the average access to waste cost based on information provided by recyclers. It is assumed that the access to waste cost would remain the same for other collection methods. This is primarily because the expectation among consumers in Egypt is always to receive a monetary value for the devices they discard and

[5] Since HCP comprises a wide range of products the average weight for a standard printer was used for the calculations. This was based on information from recyclers that this is the most common device they receive.

not to dispose of it for free. For example, collection of waste through collection points would still entail an access to waste cost and hence access to waste costs are always added on top of collection costs.

Table 5: Access to Waste Costs

Product	Access Cost (EGP/Unit)	Average Share of Product in Lot (%)
Mobile Phones	50	5
Notebooks	180	5
Desktop PC	100	40
CRT Screens	20	20
LCD Screen	40	15
HCPs	40	10
Routers	10	5

4.2.2 Costs of Collection and Transport

Under an EPR system, it is assumed that the **main collection method would be through collection points** that are set either at retailers or separate collection points established for the purpose of taking back EoL devices from consumers. Under such a system it is assumed that the access to waste costs would remain the same as consumers would expect to receive an incentive to return their EoL devices. **Collection costs** were calculated based on a number of factors including the following (Table 6):

- Rental Costs for collection centres/space
- Collection workers' salaries
- Share of each product in the waste stream
- Disposal rate of each product

Table 6: Collection Cost

Product	Collection Cost (EGP/Unit)	Collection Cost (EGP/Ton)
Mobile Phones	0.0375	250
Notebooks	0.875	250
Desktop PC	19.8	2,000
CRT Screens	14.1	1000
LCD Screen	3.52	750
HCPs	3.00	500
Routers	0.175	250

Transport costs on the other hand were calculated based on an average distance (200KM) to be travelled from collection points to treatment facilities and the current costs of fuel per km travelled. The results of the are presented in Table 7[6].

Table 7: Transport Cost

Product	Transport Cost (EGP/Unit)	Transport Cost (EGP/Ton)
Mobile Phones	0.030	200
Notebooks	0.700	200
Desktop PC	15.8	1600
CRT Screens	11.3	800
LCD Screen	2.82	600
HCPs	2.40	400
Routers	0.140	200

4.2.3 Treatment Costs

For the purposes of the calculation of treatment costs the current practices of recyclers are considered. Invariably recyclers in Egypt are mainly engaged in dismantling of devices and extraction of specific fractions for further processing at other facilities. The costs of treatment are hence assumed to be the average operational costs of a dismantling facility adhering to the key EHS requirements.

Several factors are considered in calculating treatment costs (Table 8) including the following:

- Dismantlers salaries
- Working days per month
- Average time to dismantle each device
- Overheads
- Investment costs

Table 8: Treatment Costs

Product	Treatment Cost (EGP/Unit)	Treatment Cost (EGP/Ton)
Mobile Phones	2.81	18,750
Notebooks	28.13	8,035
Desktop PC	42.19	4,261
CRT Screens	42.19	2,992
LCD Screen	42.19	8.976
HCPs	14.06	2,343
Routers	5.63	8,035

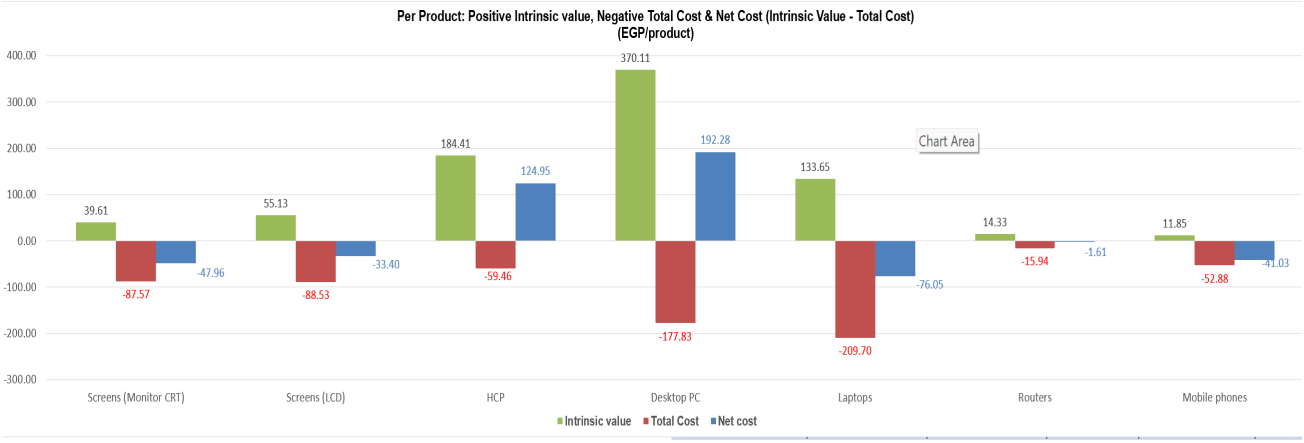
[6] Transport costs from recyclers to market and to disposal site are already factored in prices/costs so there was no need for additional calculations. Transport costs here indicate transport costs to treatment plant from the point of access to waste.

4.2.4 Net Costs

Net costs for each device are calculated after subtracting the intrinsic economic value within each device from the total costs including access to waste, collection, and treatment. Figure 1 provides an overview of the net costs associated with each product type.

Net Costs= Total Costs- Intrinsic economic Value within Devices

Figure 1: Net Costs per Product



The result of the financial analysis (Table 9) reveals that 5 of the product categories have net negative costs (CRT Screens, LCD Screens, Notebooks, Mobile Phones, and Routers) while 2 categories have a net positive value (Desktop PCs and HCPs). Several factors contribute to such results: access to waste cost and the presence of hazardous materials such as contaminated glass and batteries are major contributing factors to negative net costs. The average weight of devices and their share within the waste stream also plays an important role. Devices with larger weight and which include a large fraction of positive value material as a percentage of their weight had net positive value.

Table 9: Net Unit Costs per Device

Product	Net Unit Cost (EGP/Device)
Mobile Phones	-41.12
Notebooks	-57.52
Desktop PC	254.48
CRT Screens	-49.27
LCD Screen	-23.65
HCPs	124.9
Routers	-3.30

5 Total EoL System Costs

Based on the net costs for each product category it was feasible to calculate total system costs considering the PoM quantities and the estimated waste generated **every year considering a lifespan of 5 years for each product category.** Table 10 provides an estimate of the total costs for EoL management of the selected product categories in 2024. The estimated figures for waste generated in 2024 is based on the PoM of 2019 since a 5 year lifespan is assumed. The total system costs don't include costs to run the EPR system such as administration, communication etc.

Table 10: Total System Costs

Product	Waste Generated (tons/year)	Net Cost (EGP/Ton)	Total System Costs (EGP)
Mobile Phones	6,482	-274,120	-1,776,850,377
Notebooks	4,259	-16,434	-69,985,641
Desktop PC	3,557	25,705	91,433,015
CRT Screens	393	-3,494	-1,373,148
LCD Screen	1,187	-5,032	-5,970,866
HCPs	4,145	25,436	105,434,637
Routers	1,418	-4,719	-6,690,159
Total System Costs			-1,664,002,539

The total system costs are significantly influenced by the estimated waste generated of mobile phones in 2024 which according to the data from CAPMAS represents an anomaly for this year. If an average of the estimated waste generated for the years 2023-2027 is used the total system costs would be significantly different as presented in Table 11.

Table 11: Total System Costs using an average of mobile phone quantities estimated for the years 2023-2027

Product	Waste Generated(tons/year)	Net Cost (EGP/Ton)	Total System Costs
Mobile Phones	3,724	-274,120	-1,020,825,500
Notebooks	4,259	-16,434	-69,985,641
Desktop PC	3,557	25,705	91,433,015
CRT Screens	393	-3,494	-1,373,148
LCD Screen	1,187	-5,032	-5,970,866
HCPs	4,145	25,436	105,434,637
Routers	1,418	-4,719	--6,690,159
Total System Costs			-907,977,662

6 Options for Setting EPR Fees

6.1 EPR fees set as the net costs per unit or per weight for each category

When setting EPR fees for different product categories, the cost per unit or per weight of each category is the main determining factor. We could hence assume that the first option for setting the EPR fee for each product category would be to set it equivalent to the net cost per device as reflected in Table 8 or the net cost per weight as reflected in Table 9. However, one aspect that should be considered is that the proposed system in the Egyptian context foresees charging advanced recycling fees at the point of entry and for some categories, such as mobile phones, CRT screens, and LCD screens, new products entering the country are declining in quantity compared to previous years. In such cases the fee on new products would not be able to cover the costs for collection and recycling of historical waste. However, it should be also considered that it is not realistic to expect that collection rates would be 100%, especially for the first few years of the EPR system implementation. Table 12 compares the expected revenue from EPR fees in 2024 using 2022 PoM quantities as a reference and the net cost per unit or per weight for dealing with generated waste in 2024, assuming 50% collection rate.

Table 12: Comparison of System Costs at 50% collection with expected EPR Revenue

Product	Waste Collected 2024 (tons/year)	Net Cost (EGP/Ton)[7]	Total System Costs	Estimated PoM Quantities 2024 (Tons)	EPR Revenue (EGP)
Mobile Phones	1,862	-274,121	-510,412,743	800	219,296,800
Notebooks	2,129	-16,434	-34,988,712	13,095	215,216,325
Desktop PC	1778	25,705	45,703,655	473	-
CRT Screens	196	-3,494	-684,827	194	678,030
LCD Screen	593	-5,032	-2,984,175	865	4,353,545
HCPs	2072	25,437	52,704,601	3,794	-
Routers	708	-4,720	-3,341,497	1313	6,197,360
Total System Costs			-454,003,699	**20,534**	**445,742,060**

This assessment reveals that assuming a 50% collection rate, the total estimated revenue in 2024 from EPR fees would almost cover the total system costs. However, for mobile phone devices that are decreasing in quantity, the EPR fees collected would not cover the cost of EoL management given the expected WEEE generation in 2024.

[7] Figures rounded up from net costs table

6.2 EPR Fees set as net cost per unit or weight for each category, considering 50% collection rate and disparity between PoM and collected waste.

A second option for setting EPR fees could hence take into account disparity between PoM and expected waste to be collected to ensure the fees for each device covers the costs of the expected waste to be collected for each year. Table 13 demonstrates how EPR fees could be set in 2024 using this approach.

Table 13: Proposed EPR Fees considering disparity between generated waste and PoM quantities in 2024

Product	EPR Fee (EGP/Device)	EPR Fee (EGP/Ton)
Mobile Phones	96	638,016
Notebooks	9	2,672
Desktop PC	0	0
CRT Screens	50	3,530
LCD Screen	16	3,450
HCPs	0	0
Routers	2	2,545

6.3 Flat EPR Fee set per weight, equivalent to total system costs distributed equally among all products categories

A third approach to setting EPR fees is to set a flat fee per weight equally for all devices. This is an approach adopted in Croatia for example where the fee for all WEEE is set at 0.30 Euro/Kg. Adopting a similar approach to EPR fees in the context of Egypt by distributing the system costs equally among all devices, regardless of whether they have a positive value or not, would yield a result of **23 EGP/KG if a 50%** collection rate is assumed as reflected in Table 14. This approach is less complex and easier to administer, especially if more products are added to the scope of EPR, the flat fee could be easily applied without further calculations.

Table 14: Flat EPR fee per weight for all devices

Product	Waste Collected 2024 (tons/year)	Net Cost (EGP/Ton)	Total System Costs	PoM Quantities 2024 (Tons)	EPR Fee EGP/KG
Mobile Phones	1,862	-274,120	-510,412,743	800	**23**[8]
Notebooks	2,129	-16,434	-34,988,712	13,095	
Desktop PC	1778	25,705	45,703,655	473	
CRT Screens	196	-3,494	-684,827	194	
LCD Screen	593	-5,032	-2,984,175	865	
HCPs	2072	25,436	52,704,601	3,794	
Routers	708	-4,719	-3,341,497	1313	
Total Weight	**9339**		-454,003,699	**20,534**	

[8] Figure rounded up to remove fractions

6.4 Summary of Options for EPR fees

Option 1: EPR fees set as the net costs per unit or per weight for each category.

Option 2: EPR Fees set as net cost per unit or weight for each category, taking into account 50% collection rate and disparity between PoM and collected waste.

Option 3: Flat EPR Fee set per weight, equivalent to total system costs distributed equally among all products categories.

Table 15: Comparison of 3 options for setting EPR fees

	Option 1		Option 2		Option 3
Product	EPR Fee (EGP/Device)[9]	EPR Fee (EGP/Ton)	EPR Fee (EGP/Device)	EPR Fee EGP/Ton)	EPR Fee (EGP/KG)
Mobile Phones	42	274,121	96	638,016	23
Notebooks	58	16,435	9	2,672	
Desktop PC	0	0	0	0	
CRT Screens	50	3,495	50	3,530	
LCD Screen	24	5,033	16	3.450	
HCPs	0	0	0	0	
Routers	4	4,720	2	2,545	

[9] Fees are rounded up to remove fractions

7 Conclusions

The results of the aforementioned financial analysis reveal that the sound management of the five product categories of notebooks, mobile phones, routers, CRT Screens, and LCD Screens cannot be sustained solely through market dynamics and the sale of valuable fractions within each product category. The creation of an EPR fund to be managed by WMRA as envisaged by the law and the preferred option for EPR implementation could address this gap by shifting responsibility for the sound management of these product categories to producers. WMRA can use the results of the study to establish EPR fees to reflect net costs per unit or net costs per weight for each device as per the aforementioned calculations. Alternatively, a flat fee for all product categories could also be set to simplify calculations and the administrative burden on WMRA. In such a case, if the total system costs were to be divided equally among all product categories a fee of 23 EGP/KG could be set to cover the system costs.