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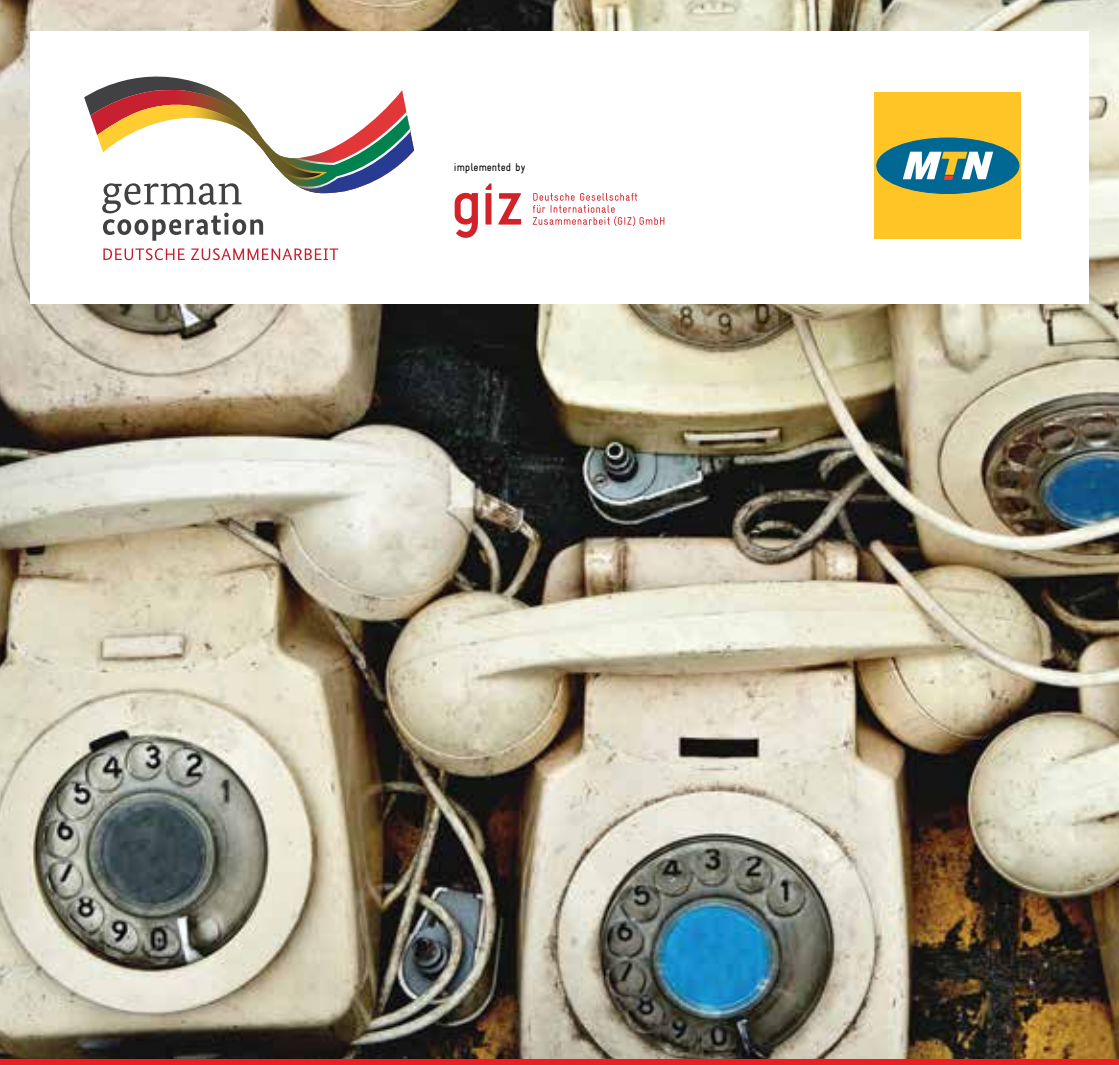

Best Practice Guidebook for SMALL South African E-Waste Businesses

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Environmental Management System Development:
Guidelines for SME's in the e-waste Sector Towards a "Light"
Implementation Framework, Based on ISO 14001:2004

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Project Team

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Disclaimer

No member of the writing and support team of this guide booklet assumes any personal liability or responsibility for the mismanagement of any portion of e-waste with regards to possible environmental or human health damages as a result of the information provided in this guidebook.

1. Welcome

We welcome you as a SMALL BUSINESS OWNER/MANAGER to learn more about any legal obligations you might incur as a result of your business activities linked to the handling of any e-waste. As a manager of "waste electrical or electronic equipment" (WEEE as e-waste is also referred to) it is important that you are going about your daily work as efficiently and as safely (for yourself & the environment) as possible and this guidebook seeks to assist you in this endeavour. We hope it will be a useful source of information for you as well as a compass that can lead you with new knowledge through a rapidly changing legal landscape.

2. A-Z of Words Used in this Guidebook

Collection:
The gathering of e-waste, including the preliminary sorting and preliminary storage of e-waste for the purposes of transport to a e-waste treatment facility.

Collection facility:
Also called a "(temporary) storage area": This is the location where a collector is gathering any e-waste received and the location that can be used if a party wants to drop off e-waste directly.

Collector:
A person or business entity who collects electronic or other recyclable waste from the public or from private businesses for the purpose of selling it on to a legally compliant and licenced processing facility.

End-Use Recycler:
A person who changes the physical or chemical composition of a covered electronic device by crushing, compacting, shredding, or refining e-waste for purposes of transporting those components to an end-user (such as a refinery, smelter or plastic extrusion company).

E-Waste Businesses:
Ideally an officially licenced and registered business but also includes all the non-licensed, registered and/or not licensed and unregistered e-waste recyclers, collectors or refurbishers (repair shops) that ply their trade in towns, townships or informal settlements.

E-Waste Processor/Handler/Recycler:
Any (properly licenced and registered) person/ business who works responsibly with e-waste by recovering (through opening and dismantling equipment- either manually or mechanically) both the fractions and components that can be sold on to an end-recycler/user as well as the toxic and/or non-valuable e-waste components for the safe disposal to a landfill.

Hazardous waste:
Any waste that contains organic or inorganic elements or compounds that may have a detrimental impact on health and the environment.

Informal Sector:
Has been defined as incorporating individuals, including persons who may be unregistered (for example, do not own any identification documents), who do not pay taxes nor have any insurance or health cover. This refers e.g. to waste pickers on landfills or street/trolley collectors.

Waste:
Means any substance, whether or not that substance can be reduced, reused, recycled and recovered

a. that is surplus, unwanted, rejected, discarded, abandoned or disposed of
b. which the generator has no further use of for the purposes of production
c. that must be treated or disposed of
d. that is identified as a waste by the Minister by notice in the Gazette, and includes waste generated by the mining, medical or other sector, but
    i. a by-product is not considered waste
    ii. any portion of waste, once reused, recycled and recovered, ceases to be waste.

3. Purpose of this Guidebook

The main objective of this guidebook is to give both advice and information to any SMALL e-waste business that wishes to ensure that all its e-waste is correctly handled at all times (when collected, transported, stored, dismantled or prepared for reuse through repair and/or refurbishment) in order to ensure that no harm is done to the receiving environment or its people.

This guidebook is for small to medium enterprises/small businesses[1] that specifically participate in the business of e-waste recycling. So, if you are a leading social entrepreneur in e-waste recycling who seeks to run a small business that incorporates environmental, social and economic factors alike as part of your on-going commitment, then this guidebook can assist you to continually improve your business.

3.1 Is this Guidebook Relevant to MY BUSINESS?

The small e-waste business recyclers addressed by this guidebook seek to comply with all legal requirements such as both national and provincial and possibly even municipal registration and licencing requirements (see also Chapter 4), and fulfill minimum required occupational health and safety norms of the workers (see also Chapter 5) so that they are not exposed to toxic and hazardous elements present in e-waste.

Unfortunately, informally run and illegally operating micro- and small type e-waste businesses currently still abound in South Africa. Such businesses are known to typically extract any valuables in an entirely unregulated manner. This is often crudely done, with manual disassembly or in open fires, or in small or backyard workshops, without personal protective equipment (PPE).

1 The definition of small business according to industry sector is based on the National Small Business Act No. 102. 27 November 1996. In terms of the definition, you are considered a small to medium business if you have between 5 – 120 employees and have an annual turnover of R150,000 – R40,000,000 depending on the sector in which you operate.

There are great environmental and health risks resulting from these bad practices, such as the release of dioxins and other VERY harmful chemicals into the atmosphere through the burning of PVC plastics (e.g. from cables) and the exposure of e-waste to the elements (which can result in leaking and leaching of materials into the ground).

The smashing of e-waste or its dismantling in unsound manners also releases substances. These chemicals produce superficial and chronic health effects such as eye irritation, respiratory problems and cuts and infections owing to the absence of the use of PPE.

Hence, in order to comply with these objectives NO burning, mechanical shredding, chemical treatment and wet extraction processes are permitted on ANY e-waste component (see also Chapter 5.2 listing those activities and associated dangers in more detail) at a small e-waste business set-up (the typical SMALL e-waste business owner/manager we wish to address with this guidebook).

4. The African Perspective

Due to its potentially hazardous nature, e-waste is likely to be considered a hazardous waste in your country. Therefore, the disposal of e-waste as well as its treatment is likely to be legislated (e.g. through broader environmental protection legislation or even a specific waste legislation) and that means you have to adhere to such laws in your country.

Especially West African countries such as Ghana and Nigeria, that receive and trade in a lot of used (second-hand) electronics (coming from Europe and the US), generate high volumes of e-waste.

This is why national e-waste strategies have been developed, seeking to prevent e-waste from polluting the environment and people working with it whilst also creating opportunities for individuals to financially benefit from managing e-waste responsibly.

4.1 South African Legislation: Legal Requirements, Permits, Licences and Mandatory Data Disclosure

The South African Constitution is the most important legislative document we have, as it gives every South African citizen basic human rights including the right to live in an environment that is not harmful and will be protected for present and future generations through the prevention of any pollution and ecological degradation.

Therefore, all businesses, including e-waste businesses, must ensure that their activities do not impact negatively on the health of people or the environment. In order to enforce this right, National Government has put in place certain legal requirements including permits, licences and reporting of data. Businesses thus have to ensure that they obtain the relevant authorisation(s) and comply with the work conditions linked to such permissions in order to operate legally.

The National Waste Information Baseline Report (DEA, 2012) states that South Africa generates at least about 64,000 tons of e-waste of which only about 6,900 tons are known to be currently recycled.

The National Environmental Management: Waste Act (Waste Act; Act 59 of 2008) was promulgated and is in effect since July 2009. The Waste Act is the overarching legislation for waste management and sets parameters in terms of regulating the waste industry with regards to listing activities that require a waste management license.

4.2 What Do I Need to Know About the Waste Act ?

The National Environmental Management: Waste Act (59 of 2008) (the Waste Act) combines all the regulations and control of waste management practices in one place. Among other things, its aim is to:

- protect human health and the environment
- provide for the licensing and control of waste management activities
- provide for national norms and standards for regulating the management of waste
- provide for a national waste information system.

The Waste Act makes any business or industry that creates waste responsible for the waste they generate. It also holds businesses involved in waste management and recycling accountable for the waste they manage.

This helps minimise illegal dumping, pollution and with it, harmful effects on human health and the environment.

But I just want to start a small e-waste recycling initiative, what does this mean for me?

To make sure that waste is managed correctly and safely, the Waste Act regulates the licensing and control of waste management activities, some of which are 'listed'.

4.2.1 What are "Listed Activities"?

The Waste Act provides a list of waste (management) related activities that are required to have a waste management licence to be able to operate legally.

Listed activities include:

1. storage of waste, (e.g. required when e-waste gets temporarily stored before it is repaired, refurbished or dismantled)
2. reuse, recycling and recovery of waste – all activities typical for dismantling
3. treatment of waste – this could be thermal or chemical or physical
4. disposal of waste- both for general and hazardous waste types typical for integrated e-waste management and handling
5. storage, treatment and processing of animal hazardous waste – very limited storage is permitted without a licence
6. the construction of facilities to undertake the above.

If I start a small recycling initiative must I apply for a licence?

Not necessarily. The government understands that there are small scale initiatives that if managed correctly will not have a negative

impact on human health or the environment. Initiatives that handle waste under certain limits or thresholds do not require a waste management licence.

If your operation manages waste in quantities or volumes above these limits you will need to apply for a licence in order to continue and be legally compliant.

Threshold limits for the listed activities include:
- storage of waste
- the reuse, recycling and recovery of waste.

4.3 Licence Triggering Threshold Limits

4.3.1 Threshold Limit for the Storage of Waste by Volume:

*Temporary or permanent storage of **general waste** whose total volume is over 100m³ in a facility at any one time.*

*Temporary storage of **hazardous waste** at a facility that has the capacity to store in excess of 35m³.*

Figure A: A 30m³ shipping container. If you store recyclable waste that can fill more than three of these containers, you will need to apply for a waste management licence.

For example, if you are storing ***general waste*** for recycling at a facility that can hold more waste than 3 shipping containers (a shipping container is approximately 30m^3) you will need a waste management licence.

While not all types and not all parts of e-waste are hazardous, as a measure of precaution, ALL e-waste is classified as hazardous waste in terms of the Waste Act. Therefore, the threshold limits are different to that of general waste and, if you have the capacity to store in excess of 35m^3 (i.e. more than one shipping container) of e-waste, then you will need to apply for a waste management license.

4.3.2 Threshold Limit for the Reuse, Recycling and Recovery of Waste by Weight

If you are sorting, shredding, grinding or baling waste at a facility that is capable of processing more than 1 ton per day you will need a waste management licence. 1 ton equals 1 000 kg – this would be the same weight as 71 black refuse bags full of glass bottles, or 20 bags of cement. (See the table below Figure B for a weight and volume reference).

Figure B: If your facility sorts, shreds, grinds or bales more than the weight of 20 cement bags per day, you will need to apply for a waste management licence.

TAKE NOTE: The listed activities work together. This means that even if you store less than 100m^3 of general waste by volume, you are still limited to the weight that you are allowed to sort, shred or bale, which is 1 ton per day.

Table 1: Materials, Types and Weights			
Material	**Type**	**1 Kg**	**1 Ton**
Metal	340 ml beverage can (steel)	1 kg = 30 cans	1 ton = 30 000 cans and 4.4m^3
	380 g food can (steel)	1 kg = 16 cans	1 ton = 16 000 cans and 4.4m^3
	410 g food can (steel)	1 kg = 21 cans	1 ton = 21 000 cans and 4.4m^3
Glass	330 ml dumpie beer bottle	1 kg = 5 bottles	1 ton = 5 000 bottles and 2.5m^3
	750 ml wine bottle	1 kg = 2 bottles	1 ton = 2 000 bottles and 2.5m^3
Plastic	500 ml PET (e.g. Coke) bottle	1 kg = 31 bottles	1 ton = 31 000 bottles
	2 litre PET bottle	1 kg = 22 bottles	1 ton = 22 000 bottles and 71.4m^3
	1 litre milk jug	1 kg = 28 jugs	1 ton = 28 000 jugs and 52.6m^3
	2 litre milk jug	1 kg = 22 jugs	1 ton = 22 000 jugs and 52.6m^3
Paper and paperboard	Newspaper	1 standard plastic shopping bag = 4 kg	1 ton = 250 plastic shopping bag or approximately 4.7m^3
	500 g cereal (paperboard) box	1 kg = 16 boxes	1 ton = 16 000 boxes or approximately 7.7m^3
	30s cigarette box (paperboard)	1kg = 108 boxes	11 ton = 108 000 boxes or approximately 5.5m^3

Table 2: E-Waste Types and their Weight	
E-Waste Type	**Average weight (kg) for one unit only**
Desktop computer	9.9
Laptop computer	3.5
CRT monitor	14.1
Printer	6.5
TV set	31.6
Video/DVD machines	5
Washing machine	65
Fridge/freezer	35
Microwave	15
Iron/kettle/toaster/hair dryer	1

What if my recycling initiative will be or is above these thresholds?

This will mean you need to apply for a waste management licence. To apply for a waste management licence, you first need to have an assessment done of your proposed facility to ensure that it does not negatively impact the environment. This environmental assessment can cost in excess of R80,000. You should approach a professional that can assist you with this.

How long will the waste management licence process take?

This depends on the nature of the application in terms of the listed activities triggered and whether a Basic Assessment (BA) process or a full scoping and Environmental Impact Assessment (EIA) process is required. A BA process will take approximately 8 months and the full scoping and EIA process about 16 months to complete.

If you are not familiar with the nature of EIAs, you might want to find out more under this website link **www.eiatoolkit.ewt.org.za/faq/index.html#scoping**

What will happen if I start operating before I have a waste management licence?

If you operate over and above the threshold limits and do not have a waste management licence, you are acting unlawfully and can be fined or imprisoned. The maximum fine for contravention of the Act is R10,000,000 and/or 10 years imprisonment.

4.4 Additional Permits and Authorisations You Might Require

Municipalities may have different licence and registration requirements, therefore you should approach the designated waste management officer of your municipality for guidance. It is important to find out if the municipality has developed a dedicated waste by-law and to check the particulars of their Integrated Waste Management

Plan in order to ensure that your operations are aligned with the strategic thinking and planning of the municipality and future operational planning.

Some municipalities, including the City of Cape Town and Overstrand Municipality, have already developed their own integrated waste management by-laws that are applicable over and above national legislation.

The City of Cape Town requires that companies operating recycling facilities submit an application for accreditation and an integrated Waste Management Plan (IWMP) of their operation. If a company only transports waste, then an application for accreditation must still be submitted (for more information **www.capetown.gov.za/en/Solidwaste2/Documents/Accreditation_App_Form_Feb2011_Eng.pdf**).

Overstrand municipality is in the process of registering all e-waste collectors, taking down their details and requesting collection volumes from them that are then entered into their municipal waste information system (see also more about waste information systems in the next Chapter). For more information on the future requirements for e-waste recyclers operating in this vicinity, please call Municipal Solid Waste Manager Johan van Taak at (028) 313 8241. Often metros and smaller municipalities request the registration of local waste contractors irrespective of which waste they collect, transport and dispose of. Check with them directly on any such requirements and future operational planning.

4.5 National and Provincial Waste Information Systems

The National Department of Environmental Affairs (DEA) currently does not require any collectors or transporters to register with the South African Waste Information Centre (SAWIC) but you will have to register your business with a Provincial Waste Information System (the latter currently only exists for the Gauteng and Western Cape Province) as soon as it is a formal business structure with a sizable (note: latter is not defined further) fleet of vehicles, and permanent storage and handling areas (see also section below for registration documents required in that case).

For more information on the Western Cape Province's (DEA & DP) Waste Information Systems (IPWIS) please go to **www.westerncape.gov.za/eng/pubs/public_info/I/120566**

Core waste management activities that must be registered are:
- Recycling and recovery of waste
- Treatment of waste
- Disposal of waste

Documents required for registration:
- Company profile
- Certified copy of company registration
- Certified copy of tax clearance certificate
- Certified copy of roadworthiness certificate of vehicles used
- Certified copy of proof of up to date payment of municipal rates and taxes
- Certified copy of land use rights from where you operate

Refer to **www.sawic.org.za** for more information!

4.6 The Second-Hand Goods Act (Act No. 6 of 2009)

The Second-Hand Goods Act, Act No 6 of 2009, in effect since April 2012, has been developed to fight the theft and resultant sales of stolen items. Among other things, the Act requires all dealers in second-hand goods to report all suspicious transactions where the seller attempts to provide false particulars, or where the goods are suspected to be stolen or tampered with, to the police.

The Act holds people who buy stolen goods as liable as those who stole the goods. Therefore a licenced e-waste processor that buys your e-waste will by law want to know where and from whom the e-waste comes from.

Anyone from whom you receive e-waste (no matter if by individual households or businesses or by informal collectors or "middlemen" giving you access to certain e-waste sources) they must ALL issue you with their full address details (e.g. through a copy of an ID) as a confirmation of original ownership and you have to pass this

information on to the person/business you sell the e-waste and any related fractions (typically for end- processing) to.

As a legally compliant e-waste processor you will always have to ask for and record the following information (also see the description under 4.4):

- The identity and particulars of all previous owners of the e-waste delivered/collected (issue a weight note or a piece count)
- The weight of the e-waste and (in most cases) the type of e-waste accepted
- Your signature on delivery
- Name and identity number and residential address of the person providing the e-waste
- A copy of their identity document or passport

NOTE: By law the buying, possession and disposal of burnt cable is a criminal offence that is punishable with severe sentences including prison.

It is also important to note that every person who carries on a business as a dealer must be registered with the National Commissioner and will be issued with a certificate.

4.7 Transboundary Shipment of E-Waste

The Basel Convention seeks to control the transboundary movements of all hazardous wastes and therefore their disposal. This convention governs imports and exports of hazardous wastes, which includes e-waste. Importantly, the Convention underlines that shipment of such waste to developing countries does not constitute environmentally sound management as required by the Convention and specifically prohibits the export of hazardous wastes from OECD countries to non-OECD countries.

The Convention was first signed in May 1992 and South Africa became a signatory to the Convention in May 1994.

WHY?
In developing countries (including most West African states, China, Korea and India), inadequate or non-existing legislation and lack of enforcement make the processing of e-waste dangerous to the people and the receiving environment involved, due to exposure to hazardous chemicals and toxins typical in informal and uncontrolled working environments.

5. Good Set Up and Operational Practices for a SMALL E-Waste Business

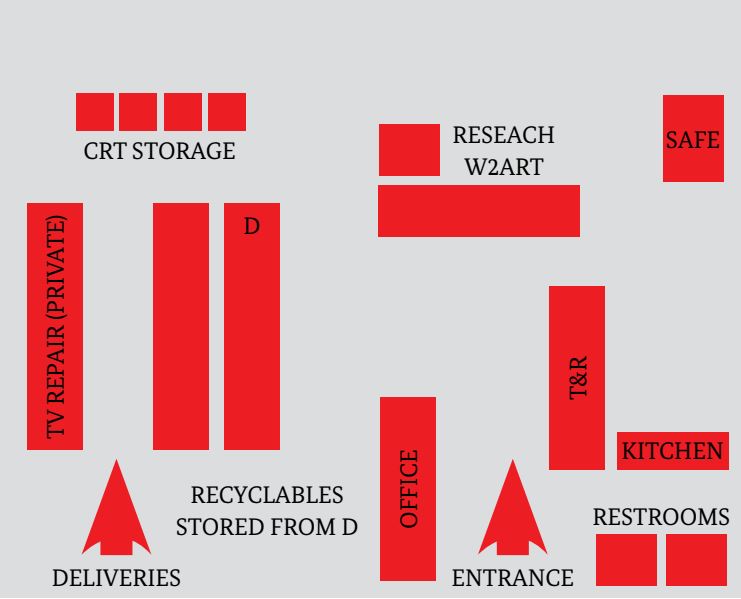
5.1 General Facility Design and Basic Tools Required for Operation

Whilst there are no hard and fast rules about how to optimally set up an e-waste facility, there are guidelines that should be followed to assist.

- Your facility should be in an existing industrial zoned area in an existing building with all the necessary infrastructure already in place, including water, sanitation and electricity.
- Your key working areas should offer good natural lighting and ventilation.
- The facility should be fully roofed (including the storage area of any incoming or outgoing e-waste and any components) and must have an impermeable floor.
- The facility needs ample storage space both for e-waste materials received and for refurbished equipment and/or dismantled components prior to dispatch. Note that items such as CRT monitors and plastic shells require a large amount of space for temporary storage prior to being taken to a downstream recycler or a (hazardous) landfill site.
- You will also need to ensure that you have the necessary fire and emergency equipment and related procedures (e.g. fire

extinguisher, fire blankets, evacuation drill) in place, in order to comply with relevant local safety regulations (check with your municipality). Computer plastics are treated with poisonous flame retardant chemicals and as a result produce highly hazardous fumes when burnt, so this is a SERIOUS health risk for yourself and your workers that needs to be responsibly addressed through pro-active planning as part of your routine operational management set-up.

- A secure store for the valuables that you dismantle is essential, i.e. a safe or a lockable area.
- Ensure that your workers have access to and USE standard personal protection equipment (PPE) items whenever required, including: closed shoes, overalls, gloves, security glasses and masks (the latter two are required for any dismantling activities).
- You also need to invest in an industrial type scale to be able to weigh e-waste delivered to you and removed from site.
- Hessian bags or other storage type containers will be required to store sorted e-waste.
- If you come across different types of e-waste, you will need to put up leak proof containers where fluorescent tubes etc. can be safely stored so that glass is not broken before you sell on or dispose of such materials.
- A set of magnetic screw drivers will suffice to do most of the basic dismantling and pre-processing activities you might want to consider doing in your business. Further equip yourself with a trimming knife, a pair of scissors, a hammer, chisel, cable cutters and pliers and a basic tool-set, all of which you should ideally neatly store in a toolbox.



Legend:
D = Dismantling/stripping area for components, T&R= Testing and Refurbishing

Figure 3 provides an example of a Cape Town pilot project which operated from 2008-2009 where sorting, dismantling, refurbishment and waste2art activities took place to ascertain the financial viability of such a project. For more information please also read the official publication and full list findings under **www.ewasteguide.info/files/2008_Schluep_REWAS.pdf**

If you are not yet running an e-waste processing facility (but merely consider it at this stage) please be aware that apart from all the impending licence and registration requirements, you will have to fulfill the set-up costs for such a layout as above (and prior to ANY operational activities and excluding any rental costs) which will amount to at least R 70 000.

You can find a scientific paper with a comprehensive evaluation of the Cape Town HP funded pilot project in Maitland under: **www.ewasteguide.info/files/2008_Schluep_REWAS.pdf**

5.2 Good Housekeeping

General:

The responsible handling of e-waste in any stage of management (from receiving it at the gate, to list storage, sorting, dismantling, repair, refurbishment, baling and dispatch for transport to a downstream recycler or to the landfill site) is absolutely crucial. It is essential that your entire recycling operation has a good housekeeping schedule.

A roster must be kept that clearly describes good housekeeping requirements to check that the facility is run without creating any negative environmental and health and safety impacts.

With regards to environmental protection, the roster must include housekeeping strategies that can fully ensure the prevention of any ODOURS, LITTER, STORMWATER CONTAMINATION or any other NUISANCE FACTORS. Any e-waste storage AND processing such as dismantling must be performed under a roof and on a floor with an impermeable surface so that e-waste is not exposed to the elements and cannot contaminate water, air or soil. Manual dismantling will ensure that no air pollution (e.g. in the form of dust loaded with heavy metals) is generated, as is the case with mechanical crushing or other mechanical, thermal or chemical processes. Also, the manual dismantling process does not involve the use of any water.

Recording Incoming E-Waste

To comply with the Second-Hand Goods Act, any incoming material needs to be recorded by writing down the serial number or bar-code of any received equipment and where it was received from.

There are basically 3 points in the operation of an e-waste business where data is captured. First, when it is received at the gate e.g. from a collector, then when it is put into storage and then a data record is kept of parts and components that have been dismantled as value adding steps and sold on to the relevant buyers.

Keeping track of your processed equipment flow is important as it underpins the further evaluation of financial statements that will be required from a registered and licensed e-waste business.

Storage:

Whether you are under or over the threshold limits requiring a waste management licence, you need to ensure that your methodology of storing and sorting waste is sound.

- All your e-waste should be stored in a suitable area that is weatherproof and is situated away from any living areas.
- It must be stored away from any stormwater drains or natural water systems.
- Sorting areas must be regularly cleaned and at the end of the day the facility must be swept.
- Make sure the processed or baled recyclables are collected regularly or taken to a reputable recycler on time. It is recommended that when you are nearing ¾ of your allowable limit, you should contact your recycler to collect, or prepare to transport your materials.

Testing of Equipment for Functionality Prior to Dismantling

When it comes to the potential financial benefits through re-selling, the "recovery of function" is always preferable to the "recovery of materials" by subsequent dismantling.

This is also in line with the preferred waste management hierarchy where the reuse of materials is by far more preferential with regards to the environmental impact created.

Unfortunately experience in South Africa has shown that most e-waste derived from public collection sources and households is rarely suitable for reuse and mostly very outdated due to the fact that e-waste is traditionally stored in-house for very long times (as there is still a perceived value to it). e-waste sources coming from businesses and government sources are typically better in quality, however it is often the case that components such a hard-drives are missing due to selected

cherry picking by the owners themselves or the staff concerned with overseeing “temporary storage” facilities.

A small e-waste business is very unlikely to get access to corporate e-waste streams, unless it is fully licensed, registered and equipped with high-tech testing, does refurbishment and most importantly, data destruction.

A small business is mostly concerned with the testing of components as complete units, e.g.: a complete PC unit, is unlikely to be obtained often. However, components such as monitors, towers, keyboards, mice etc can be tested easily by connecting such items to an otherwise fully equipped electrical or electronic unit with known functionality.

Other main components to be tested (as they are sellable for reuse on their own) include memory cards, disk drives, hard drives, power supplies and network cards.

Note that typically most component reuse takes place (either formally or informally) before it is passed on as e-waste to a dismantler, which is why you will be mostly concerned with the recovery of “materials” and not “function”.

Any residual waste (originating from materials or components that can’t be repaired or refurbished or dismantled for material recovery or are valueless to your business due to the lack of down-stream recycling demand) must be placed within a designated and clearly labelled bin. Residual waste must be disposed of weekly at a licensed waste disposal facility and hazardous waste components (such as non-functioning monitors) must be taken to a hazardous landfill site. All safe disposal certificates must be retained on site.

Pre-processing and Dismantling

With rapidly tightening legislation and increasing controls, the e-waste handling landscape in South Africa is changing dramatically and as a small e-waste business you must be fully aware that your operational range is likely to be limited from the outset to selected activities that are mostly revolving around value-adding steps before components (or fractions thereof) are handed over to an end-use recycler who has the facilities and controls in place (e.g. high-tech mechanical printed wire board shredders, cable granulators, plastic injection moulding machines, CRT glass cutters, etc.) to further refine and enrich the material streams that will eventually end up predominantly in local and even international refineries and smelters.

Typical E-Waste Trading Commodities

A small business by nature is likely to be mostly concerned with value adding steps and hardly provides the final treatment solution – hence pre-processing and in particular component dismantling is the key activity a small e-waste business should be concerned with. All e-waste (components) dismantled and segregated must be placed separately in clearly identifiable suitable sorting bins. The table below lists the typical fractions that medium enterprises and large scale end-recyclers are keen to buy from you. If you deliver an e-waste mix entirely unsorted you will still be paid for it but receive very little compared to separating the printed wire boards up-front. Also, make sure that you try to find buyers for other materials such as the plastics, as this will increase your profit margin and decrease the landfill cost you will have to bear for the not so valuable and hazardous parts in the e-waste that need proper disposal.

Table 3: Copy of a List of Sought After Items from a Buyer (e.g. a Large Mechanical Dismantler or End-use Recycler)
Description
High grade printed circuit boards (computers, servers, cell phone)
Medium grade printed circuit boards (copiers, printers, phones)
Low grade printed circuit boards (rest)
Mixed printed circuit boards
Processors ceramics
Processors Plastics:
IT plugs (plugs from printer cables/computer cables)
Hard drives (HDD)
PC power supply (PC-PSU)
Old copper cables (thin without plugs)
Old copper cables (thick without plugs)
Cables (mixed with plugs)
Computer boxes (full) servers, switchboards (full)
Unsorted e-waste (computers, printers, copiers, monitors, etc.)

Especially in countries like South Africa where labour costs are comparably low (while first world dismantling and shredding technology is often unaffordable), manual dismantling can be a very effective and efficient way to recover the economic and environmental value in e-waste. Also, manual disassembly can greatly improve the value yield of the material as precious metals can be lost in a basic shredding process. Furthermore, manual dismantling can be generally done by unskilled labour (which need however to receive adequate on-the-job-training) and with very simple tools.

Dangerous/Hazardous Components Found in E-Waste

Unfortunately, e-waste contains many components that are made of hazardous materials and can therefore severely harm a dismantler and/or the environment if malpractice takes place. Worldwide attempts of substance restriction and a move towards the replacement with less problematic materials is underway as part of the design of

new electrical and electronic equipment. This is regulated in powerful legislation such as the RoHS Act (in Europe). However the realities are that you are likely to handle and dismantle very old equipment which is still filled with problematic substances.

The table below gives you a list of the most common hazardous materials you can be exposed to (especially if you apply highly illegal operations such as burning, melting (plastics) and other heat treatment to them) and where to find them.

Table 4: Common Hazardous Materials in E-Waste

Hazardous (hence now restricted) substances	Where to be found?	How are they released?	Why dangerous?
Lead	• Solders	• Heating up solder	• Heavy metal accumulates in body tissue through unprotected contact • Kidney damage
Cadmium	• Contacts • Colouring of plastic casing	• Burning/heat treatment	• Brain damage- even death
Mercury	• Switches • Sensors • Contacts	• Heat treatment • Shredding	• Nerve toxin, deadly in small doses • Severe polluter of water, soil, air
Hexavalent Chromium	• Plating • Anti corrosion agent • Pigment in plastics	• Melting • Burning plastic	• Causes cancer
Flameretardends: • Polychlorinated Biphenyls • Polychlorinated Diphenyl-Ether	• Plastic casing and housing • Plastic wiring and cables • Printed wire boards	• Melting • Burning plastics • Shredding	• Causes cancer

The table below gives you an indication of the Do's and Don'ts linked to the pre-processing and dismantling of e-waste:

Table 5: Do's & Don'ts of E-Waste Dismantling

Activity	DO	DON'T
Dismantled parts	• Remove hazardous parts and components such as: - Ink cartridges (where present) - PCB containing capacitors - Mercury containing switchers - Especially heavy metal containing batteries (NiCd,NiMH Li-ion and Li-Polymer) • Dispose of such items as "hazardous waste"	• Touch any e-waste without wearing personal protection equipment including gloves, goggles and if dust is formed a respiration mask
Maximise value	• Recover "valuable" components to sell on to "end-use" recycler: - PWBs - HD - Reusable components - Ferrous metals - Non-ferrous metals (Al, Cu) • Dispose of responsibly and according to hazardousness any other component that has a low demand or is not "valuable" at all including: - CRT monitors - LED Screens - Plastic casing - Any other remaining dismantling fractions	• Simply dump or dispose of hazardous or otherwise valueless/ non recyclable waste components with your normal rubbish- it is highly illegal – you WILL have to pay for the proper disposal of such items.

Further Reading Sources:

In early 2012 the KZN Department of Agriculture and Environmental Affairs released a "hands-on" e-waste recycling manual that shows the key tools you need, how/where to use them and best processing and dismantling practices. This manual is downloadable at: **http://enviro.kzntl.gov.za/Environment/EWaste%20Recycling%20 Manual.pdf**

In 2007 a Swiss study was conducted on the viability of dismantling certain e-waste components and the findings can be read at **http://www.unil.ch/webdav/site/ipteh/shared/Recherche/Master_07Laffely.pdf**

6. Potential South African Buyers of Pre-Processed E-Waste

Below is a link to the e-waste Association South Africa (eWASA) – a non-profit organisation that has been working with manufacturers, vendors and distributors of electronic and electrical goods and e-waste handlers (including refurbishers, dismantlers and recyclers) to manage e-waste effectively since 2008. eWASA is regularly updating its list of e-waste operators. The contacts contained therein are for Southern Africa and (where applicable) are split up into three categories namely:

- Collection sites
- Recyclers
- Refurbishers

As prices as well as the demand for certain materials can vary on a day to day basis it is not possible to specify the exact types and prices of e-waste that they might want to offer you.

Also note that such high-end users and recyclers such as DESCO and eCycle will likely take a very careful look at your business practice and general code of conduct and ethics as part of their own quality insurance/environmental management systems which requires that stringent controls are in place for key suppliers.

If you operate illegally and unlicensed and they find out about it, they will in all likelihood NOT uphold any business relationship with you. It might take you longer but it will definitely pay off to do the right thing as a small e-waste business if you set high standards that can form the start of basic environmental health and safety management structure for your business. The next Chapter summarises the basic elements your business plan should retain in that regard.

For potential buyers, please check out the very comprehensive list of eWASA accredited AND (not yet) accredited collection sites, recyclers and refurbishers: **www.ewasa.org** (scroll down on the "Recycling" tab)

7. Vital Elements of YOUR Business Plan[2]

Being a small e-waste recycling business you are generally very vulnerable with regards to having a financially feasible, ethical as well as environmentally acceptable operational set-up and practice. To this end it is absolutely essential that you build your operation on the foundations of a sound business plan that contains elements as described below:

2 The following information has been kindly provided and shared courtesy of the Recovery Action Group (RAG) South Africa.

General Information[3]

- Name of the business
- Legal entity (i.e. closed corporation, partnership)
- Proof of registration
- Physical and postal address
- Contact persons
- Contact numbers
- Organisational structure[4]

The Business[5]

- Describe your business in terms of what you do, what you collect and what your vision is
- Who owns the business?
- What is the goal of the business?
- In what area do you operate?
- What markets do you service?
- What makes your business unique?
- Who supports your business (ie. the local municipality)?

Finance

- How much start-up capital do you have?
- How much will it cost to acquire a site, containers, tables, tools and other infrastructure items?
- How much will signage, fencing and other security items cost?
- How much cash float will you need to pay informal collectors?
- How much will you pay for recyclables?
- What income do you expect to get?

The People

- How many people will work for you?
- How much will you pay them?

3 Basic information that needs to be in your business plan
4 Best done with a human resource flow diagram
5 This is information specific to YOUR operations

Targets

- What are your recycling targets for the first three months, six months, year?
- How many clients do you want to acquire in the first three months, six months, year?

Record Keeping

- Keep daily records of all recyclables collected and sold.
- Keep a monthly record of all income and expenses.

The Legal Stuff

- Do you need provincial or EIA approval?
- What licenses do you require?
- What licenses have you applied for?
- Can you operate the business while you wait for license approval?[6]

Marketing

- How will you market your business to your target market?
- What type of communication will you use to market your business?
- Who are your competitors?

Further Reading:
The RAG guidebook entitled: "How to start "step by step" a recycling collection business" can be downloaded at:
http://www.petco.co.za/ag3nt/media/set_999700/I-want-to-start-a-collection-business.pdf

6 Remember: if you are discovered to be operating unlicensed you could be heavily fined.

8. Legal Reference Links

This is only a handy guide to assist you with managing your recycling initiative and understanding the legal requirements. The list below provides references for the Waste Act, other legislation that may be applicable and further reading. It is important that you keep yourself updated with the legislation, as it changes from time to time.

- National Environmental Management: Waste Act, 2008, (Act 59 of 2008), 10 March 2009 – URL: http://www.info.gov.za/view/DownloadFileAction?id=97351
- National Environmental Management Act, 1998, (Act 107 of 1998), as amended in 2008 (Act 14 of 2008), 18 September 2009 – Url: http://www.westerncape.gov.za/other/2009/12/nema_02.12.2009.pdf
- National Health Act, 2003, (Act 61 of 2003), 23 July 2004 – URL: http://www.info.gov. za/view/DownloadFileAction?id=68039
- City of Cape Town: Integrated Waste Management By-Law, 2009, 30 March 2009 – URL: https://www.capetown.gov.za/en/Solidwaste2/Documents/Waste_ByLaw_Integrated_Waste_Man_By_Law_Final_2009.pdf
- City of Cape Town: Environmental Health By-Law, 30 June 2003 – URL: http://www. capetown.gov.za/en/CityHealth/Documents/Legislation/By-Law%20-%20City%20 of%20Cape%20Town%20-%20Environmental%20Health%20-%20GN%206041%20 of%2030%20June%202003.pdf

Notes

www.giz.de